2026 PMP STREET & UTILITY IMPROVEMENTS

Issued: 02/09/2026

PROJECT MANUAL

CITY OF ARDEN HILLS
1245 WEST HIGHWAY 96
ARDEN HILLS, MN 55112

CITY PROJECT PW-26-0100
BMI PROJECT NO. 25X.137753

TITLE PAGE

City of Arden Hills

2026 PMP Street & Utility Improvements

City Project Number: PW-26-0100

OWNER:

City of Arden Hills
1245 West Highway 96
Arden Hills, MN 55112
Telephone: (651) 792-7800

CIVIL ENGINEER:

Bolton & Menk, Inc.
12224 Nicollet Avenue
Burnsville, MN 55337
Telephone: (952) 890-0509
Contact: Brad Fisher
Email: bradley.fisher@bolton-menk.com

CERTIFICATION

2026 PMP Street & Utility Improvements

City Project No.: PW-26-0100

I hereby certify that this specification was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature: Bradley Fisher

Printed Name: Bradley J. Fisher License No. 56595

Date: 02/09/2026

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ADVERTISEMENT FOR BIDS

(OFFICIAL PUBLICATION)

2026 PMP STREET & UTILITY IMPROVEMENTS
CITY PROJECT NUMBER PW-26-0100

FOR THE CITY OF ARDEN HILLS
RAMSEY COUNTY, MINNESOTA

NOTICE IS HEREBY GIVEN that proposals for the work described below will be received online through QuestCDN.com until 10:00 a.m. local time, on March 4, 2026, at which time the bids will be opened and publicly read online via Microsoft Teams by representatives of the City of Arden Hills. Please use the link or call-in number/conference ID below to see and/or hear the bid opening results:

1. Microsoft Teams Meeting Link: https://tinyurl.com/ardh2026pmp
2. Call: 612-428-8778, Conference ID 363 422 695#

Said proposals are for the furnishing of all equipment, labor and materials for the construction, complete in-place, of the following approximate quantities and other quantities specified in the Proposal Form:

Quantity	Unit	Item
31,000	SY	FULL DEPTH RECLAMATION
5,000	SY	MILL BITUMINOUS SURFACE
7,600	TON	BITUMINOUS WEARING COURSE MIXTURE
800	LF	WATERMAIN DUCTILE IRON
60	EA	CASTING ASSEMBLY
30	LF	CONSTRUCT DRAINAGE STRUCTURE
3,300	LF	CONCRETE CURB & GUTTER (SPOT)
25,000	SF	BITUMINOUS WALK
1	LS	STORM LIFT STATION LUMP SUM (ALTERNATE)

The plan holders list, addendums and bid tabulations will be available for download on-line at www.questcdn.com or www.bolton-menk.com.

Complete digital project bidding documents are available at www.questcdn.com or www.bolton-menk.com. You may view the digital plan documents for free by entering Quest project # 10055027 on the website's Project Search page. Documents may be downloaded for a nonrefundable fee of $50.00. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, viewing, downloading, and working with this digital project information.

An optional paper set of the Proposal Forms, Contract Documents, Plans, and Specifications are on file and may be seen at the Office of the City Engineer of Arden Hills, 1245 West Highway 96, Arden Hills, MN 55112.

A bid shall be submitted online no later than the date and time prescribed. For this project, the Owner will only be accepting online electronic bids through QuestCDN. To access the electronic bid form, download the project document and click the online bidding button at the top of the advertisement. Prospective bidders must be on the plan holders list through QuestCDN for bids to be accepted.

All prospective contractors must comply with the minimum criteria for a "responsible contractor" as defined in Minn. Stat. § 16C.285, subd. 3. A false statement under oath verifying compliance with any of the minimum criteria will make the contractor ineligible for the project and may result in contract termination.

A Proposal Bond made payable without recourse in the amount of not less than 5 percent of the total amount bid, drawn in favor of City of Arden Hills shall accompany each bid, to be forfeited as liquidated damages in the event that the bid is accepted and the bidder fails to enter promptly into a written contract and furnish the required bonds. A Performance Bond and a Labor and Material Payment Bond, each in the full amount of the Contract Sum, will be required of the successful bidder.

No bid may be withdrawn for a period of ninety (90) calendar days after bids are opened. The Owner reserves the right to reject any or all bids and to waive irregularities and formalities in order to award the contract in the best interests of the City of Arden Hills.

DATED: February 9, 2026
By Order of the Arden Hills City Council
Julie Hanson
City Clerk
City of Arden Hills, Minnesota

PUBLISHED IN THE:	Pioneer Press:	February 10, 2026; February 17, 2026; February 24, 2026
	QuestCDN:	February 10, 2026 to March 4, 2026

INSTRUCTION TO BIDDERS

1. CONTRACT DOCUMENTS

   Contract Documents consist of those documents as listed in Agreement. The form of these documents is on file in the office of the City Clerk.

2. EXAMINATION OF SITE AND CONTRACT DOCUMENTS

   A. Bidders are expected to make a thorough examination of the site of the work prior to submitting a proposal. It is the Bidder's responsibility to become familiar with obstacles which may be encountered and other local conditions affecting the execution of the work.

   B. Bidders must satisfy themselves by personal examination of the Contract Documents and by such other means as they prefer as to the accuracy of the quantities of work to be performed, the intent of the Contract Documents, the contract completion dates, and the requirements of the Owner and Engineer. The successful Bidder must employ, as far as possible, the methods and means of carrying out the work in a manner as will not cause interference or interruption with the work of others or the operations of the Owner.

   C. Submission of a Proposal shall be considered evidence that the Bidder is thoroughly familiarized with the conditions to be encountered, the character, quality and quantity of the work to be performed, materials to be furnished, and the requirements of the Contract Documents.

3. INADEQUACIES, OMISSIONS, CONFLICTS

   A. Any verbal information obtained from or statement made by representatives of the Owner upon examination of the Contract Documents or the site, for the purpose of bidding, which apparently corrects or in any way amends the Contract Documents, shall be invalid. The Owner will not be responsible for such verbal information or statements.

   B. Bidders shall bring any inadequacies, omissions, or conflicts to the Engineer's attention at least seven (7) days before the due date for bids. Clarification will be supplied to Bidders by Addenda, and each Addendum shall be acknowledged on the Proposal Form. Failure to so request clarification of any inadequacy, omissions, or conflicts will not relieve the Bidder of responsibility. The signing of the Proposal will be considered as implicitly denoting that the Bidder has a thorough comprehension of the full intent and scope of the Contract Documents.

4. MODIFICATIONS TO CONTRACT DOCUMENTS

   A. The Owner reserves the right to modify the Contract Documents at any time prior to the opening of bids.

   B. Such modification will be made by Addendum, duly numbered and dated.

   C. If Addenda are issued, Bidders shall acknowledge receipt thereof on the Proposal Form. Failure to do so may be cause for rejection of any such Proposal.

5. SUBSTITUTION OF MATERIALS

   A. Should a Bidder propose to substitute materials other than those specified herein, said materials must be found acceptable and approved by the Engineer, in writing, seven (7) calendar days prior to the opening of bids. Otherwise, it is understood that the Bidder shall furnish materials as specified.

6. WITHDRAWAL OF BIDS

   A. A bidder may withdraw a proposal without prejudice, provided the bidder files a written request to the Owner before the hour of opening of bids.

   B. Such withdrawn proposal may be modified and resubmitted by the bidder at any time prior to the hour set for the opening of bids.

7. PREPARATION OF PROPOSALS

   A. The bidder shall submit his proposal on the form provided by the Engineer.

   B. The blank spaces in the proposal shall be filled in correctly where indicated for each and every item for which a quantity is given, and the bidder shall state the prices for which he proposes to do each item of the work contemplated. Alterations, corrections or deletions may nullify the bid.

   C. The bidder's proposal shall be signed correctly with ink. If the proposal is made by an individual, his name and post office address shall be shown. If made by a firm or partnership, the name and post office address of each member of the firm or partnership shall be shown. If made by a corporation, the person signing the proposal shall show the name of the state under the law of which the corporation was chartered. All bids for corporations shall bear the official seal of the corporation.

   D. The bidder shall not stipulate in the proposal any conditions not provided for on the Proposal Form.

   E. Proposals may be rejected if they show any omission, alteration of form, additions not called for, conditional bids or alternate bids not specified, or irregularities of any kind. Proposals in which the prices are obviously unbalanced may be rejected.

8. DELIVERY OF PROPOSALS

   A. All bids shall be submitted online through QuestCDN.

9. PUBLIC OPENING OF PROPOSALS

   A. Proposals will be opened publicly and read aloud in such place as designated at the time and the date set in the Advertisement for Bids.

   B. Bidders or their authorized agents are invited to be present.

10. AWARD OF CONTRACT

A. The award of the Contract will be made to the lowest responsive, responsible Bidder based on the Proposal Form with the lowest base bid, or with the lowest sum of the base bid and any combination of selected bid alternates, at the discretion of the Owner. The decision to include alternate bid items as part of the basis for awarding the contract shall be at the sole discretion of the City

B. Discrepancies between words and figures will be resolved in favor of words. If discrepancies exist between an extension or indicated sum of any column of figures, the corrected extensions or sum thereof will govern.

C. In case of error in the extension of prices, the unit bid prices shall govern.

D. Owner reserves the right to reject any and all bids, the right to waive any and all informalities, the right to disregard all nonconforming or conditional bids or counter proposals, and to accept any bid which will best serve the interests of the Owner.

E. A “responsible” bid is one from a Bidder that has:

   a. Financial resources, technical qualifications, experience, organization and facilities adequate to carry out the project, or a demonstrated ability to obtain these;

   b. Resources to meet the completion schedule contained in the Agreement;

   c. A satisfactory performance record for completion of other similar projects from both the Contractor and the superintendent/foreperson who will be overseeing this work.

   d. A satisfactory performance record of conformance with local, state and federal regulations.

F. A “responsive” bid must include the following:

   a. Complete Proposal Form.

   b. Bid Security.

   c. Initial Contractor Verification of Compliance form.

11. RESPONSIBLE CONTRACTOR

A. The provisions of Minn. Stat. 16C.285 are imposed as a requirement of this contract. All bidders and persons or companies providing a submission to the Advertisement for Bids of the City shall comply with the provisions of the statute.

B. Any prime contractor or subcontractor that does not meet the minimum criteria established for a “responsible contractor” as defined in Minn. Stat. § 16C.285, subd. 3, or fails to verify that it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the Project or to perform work on the Project.

C. A responding contractor shall submit to the Owner a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in clauses (1)-(6) of Minn. Stat. § 16C.285, subd. 3, at the time that it responds to this solicitation document.

A responding contractor must also submit a list of first-tier subcontractors it intends to retain on the project, at the time that it responds to this solicitation document.

D. Prior to being awarded a contract, the apparent successful prime contractor must submit a supplemental verification under oath confirming that all subcontractors and motor carriers meet the minimum criteria of Minn. Stat. § 16C.285, subd. 3. The apparent successful prime contractor has an ongoing duty to submit supplemental verification forms for each additional subcontractor retained for the project.

E. A false statement under oath verifying compliance with any of the minimum criteria shall make the prime contractor or subcontractor that makes the false statement ineligible to be awarded a construction project and may result in termination of a contract awarded to a prime contractor or subcontractor that submits a false statement.

12. EVIDENCE OF RESPONSIBILITY

A. When requested by the Owner, the bidder shall furnish a balance sheet, certified by a certified public accountant as to a date not more than sixty (60) days prior to the date of the opening of the proposals which shall set forth outstanding assets and liabilities in reasonable detail.

B. The bidder shall also furnish, when requested, a list of work of a similar nature performed with dates of completion.

C. The bidder shall also furnish any other additional information relative to financial responsibility and competence to do the work as may be requested by the Owner prior to the acceptance of any proposal.

13. DISQUALIFICATION OF BIDDERS

A. More than one proposal for the same project from an individual firm, partnership or corporation under the same or different names will not be considered.

B. Evidence that any bidder is interested in more than one proposal for the same work will cause rejection of all such proposals. Collusion between the bidders will be considered sufficient cause for the rejection of all bids so affected.

C. Failure on the part of any bidder to carry out previous contracts satisfactorily or lack of the experience, equipment or financial resources necessary for the satisfactory completion of the work may be deemed sufficient cause for disqualification.

14. CONTRACT EXECUTION

A. The Bidder to whom a Contract is awarded will be required to furnish, and at all times maintain, a satisfactory Performance and Payment Bond to the Owner in an amount equal to one hundred percent (100%) of the Contract Price. The bonds shall be executed by a Surety Company authorized to do business in the State of Minnesota and acceptable as Surety to the Owner. The form of bond is that required by statute. Personal sureties will not be approved.

B. Failure to furnish the Contract Bond in a sum equal to the amount of the award, furnish adequate insurance certificates, or to execute the Contract within ten (10) days, as

specified, shall be just cause for the annulment of the award, and it shall be understood by the bidder that in the event of the annulment of the award, the amount of the guaranty deposited with the proposal shall be retained by the Owner, not as a penalty, but as liquidated damages.

C. The Owner reserves the right to delete any line item from the bid prior to final contract execution.

D. All out-of-state contractors on construction work over $100,000 will be required to file an exemption from Surety Deposit (Form SDE) prior to their first progress payment.

E. If awarded the project, the Bidder agrees not to discriminate on account of race, creed or color as per Minnesota Statutes, Section 181.59 and Minnesota Statutes 363.

PROPOSAL FORM

Bidder _____

City of Arden Hills
1245 Highway 96
Arden Hills, MN 55112

Time: 10:00 AM
Date: March 4, 2026

Attention: Arden Hills City Council

RE: 2026 PMP Street & Utility Improvements, Arden Hills, MN

The following proposal is made for furnishing and installing all labor and materials necessary for the 2026 PMP Street & Utility Improvements Project (City Project No. PW-26-0100), for the City of Arden Hills, Minnesota.

The undersigned certifies that the Contract Documents listed in the Instructions to Bidders have been carefully examined, and that the site of the work has been personally inspected. The undersigned declares that the amount and nature of the work to be done is understood, and that at no time will misunderstanding of the Contract Documents be pleaded.

On the basis of the Contract Documents, the undersigned proposes to furnish all necessary apparatus and other means of construction, to do all the work and furnish all the materials in the manner specified, and to accept as full compensation therefore the sum of the various products obtained by multiplying each unit price herein bid for the work or materials, by quantities thereof actually incorporated in the completed project, as determined by the Engineer.

The undersigned understands that the quantities mentioned herein are approximate only, and are subject to increase or decrease, and hereby proposes to perform all work as either increased or decreased, in accordance with the provisions of the specification, at the unit prices bid in the following proposal schedule, unless such schedule designates lump sum bids.

BASIS OF BID: Unit Price for the Base Bid and Lump Sum for Alternates 1 to 6.

Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form, for the Base Bid.

Bidders will complete the Work in accordance with the Contract Documents at the lump sum price(s) shown on the Bid Form, for Alternates 1 to 6.

The City may select any combination of the Alternates based on the bids provided, including selecting none of the Alternates. Note that the City will only select one of Alternates 1, 2, or 3.

The Work included with each of the Alternates is identified with the appropriate Alternate number on the sheet title if the entire plan sheet applies to said Alternate, or with an appropriate annotation/note on the plan sheet to discern what is included with each Alternate (if no annotation/note is provided, the work shall apply to the Base Bid scope of work). The scope of work included with Alternates is further distinguished in the technical specifications.

PROPOSED SCHEDULE: The Bidder agrees to perform all work described in the Contract Documents and shown on the plans for the following Base Bid unit prices, and Alternate lump sum prices (if selected):

SCHEDULE OF BID PRICES

2026 PMP STREET & UTILITY IMPROVEMENTS
CITY OF ARDEN HILLS, MINNESOTA
CITY PROJECT NO. PW-26-0100
BMI PROJECT NO. 25X.137753

BIDDER agrees to perform all of the work described in the CONTRACT DOCUMENTS for the following unit prices:
NOTE: BIDS shall include sales tax and all applicable taxes and fees.
BIDDER must fill in unit prices in numerals, make extension for each item, and total.

(1) CASTING & VALVE BOX REPLACEMENTS WILL BE AS DIRECTED BY THE ENGINEER IN THE FIELD. TOKEN QUANTITY FOR POTENTIALLY BROKEN/DAMAGED EXISTING CASTINGS & VALVE BOXES.
(2) MAILBOXES SHALL BE PROTECTED DURING STORAGE, TEMPORARY MAILBOXES SHALL BE INSTALLED DURING CONSTRUCTION (INCIDENTAL), AND FINAL REINSTALLATION LOCATION SHALL BE IDENTIFIED BY THE ENGINEER.
(3) CONCRETE CURB AND GUTTER SPOT REPLACEMENT WILL BE REQUIRED AROUND ALL CATCH BASIN CASTING REPLACEMENTS, PEDESTRIAN RAMP IMPROVEMENTS, AND FOR DEFICIENT CURB AS MARKED IN THE FIELD BY THE ENGINEER.
(4) INCLUDES SAND FILLING OF THE ABANDONED INFRASTRUCTURE AND BULKHEADING EACH END WITH CONCRETE & BLOCKS, AS SPECIFIED.
(5) TOKEN QUANTITY, TO BE USED AS DIRECTED BY THE ENGINEER.

(6) SUBGRADE PREPARATION IS FOR TRAIL REHABILITATION AREAS ONLY AND INCLUDES THE RE-GRADING, HAULING, PLACEMENT, SUPPLEMENTING, AND PREPARATION OF THE EXISTING AGGREGATE BASE, OR CONSTRUCTION OF A NEW AGGREGATE BASE WITH EXCESS RECLAIM MATERIAL, FOR BITUMINOUS TRAIL CONSTRUCTION.
(7) PATCH BITUMINOUS PAVEMENT SHALL BE USED FOR BASE PAVEMENT REPLACEMENT IN THE MILL & OVERLAY AREA, AS DIRECTED BY THE ENGINEER AFTER COMPLETION OF THE MILLING OPERATION.
(8) BID ITEM INCLUDES REQUIRED EXCAVATION FOR AND THE FURNISHING & INSTALLATION OF AGGREGATE BASE MATERIAL, AS SPECIFIED.
(9) INCLUDES FURNISHING & INSTALLATION OF TRASH GUARD ON INLET APRONS (NOT OUTLETS), AS INDICATED IN THE DETAILS.

(10) FINAL CASTING/VALVE BOX ADJUSTMENT SHALL BE INCLUDED IN THE PRICE BID FOR NEW CASTING ASSEMBLIES/VALVE BOXES OR CASTING/VALVE BOX ADJUSTMENTS. ADJUSTMENTS SHALL INCLUDE THE REMOVAL/REPLACEMENT OF ALL ADJUSTING RINGS AND SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED WORK.

(11) CONNECTION TO EXISTING SERVICE PIPES SHALL BE INCIDENTAL, REGARDLESS OF THE EXISTING PIPE SIZE OR MATERIAL, INCLUDING THE NECESSARY FITTINGS AND LABOR AS REQUIRED.
(12) EXTERNAL CHIMNEY SEALS & INTERNAL CHIMNEY SEALS (AS INDICATED IN THE SPECIFICATIONS) SHALL BE INSTALLED WITH ALL NEW SANITARY MH CASTINGS OR SANITARY CASTING ADJUSTMENTS AND SHALL BE INCLUDED IN THE PRICE BID FOR THE ASSSOCIATED BID ITEM.
(13) INTERNAL CHIMNEY SEALS (AS INDICATED IN THE SPECIFICATIONS) SHALL BE INSTALLED WITH ALL NEW STORM MH/CB CASTINGS OR STORM CASTING ADJUSTMENTS AND SHALL BE INCLUDED IN THE PRICE BID FOR THE ASSSOCIATED BID ITEM.
(14) CONSTRUCT STORM SEWER 2'X3' CATCHBASINS AS SHOWN IN THE DETAILS.
(15) CONSTRUCT STORM SEWER CATCHBASIN MANHOLES WITH A 2'X3' TOP SLAB OPENING AS SHOWN IN THE DETAILS.
(16) INCLUDES THE FURNISHING AND INSTALLATION OF GEOTEXTILE FABRIC, AS SPECIFIED.
(17) SIGN PANELS SHALL INCLUDE NEW SIGN POSTS, HARDWARE, AND INSTALLATION AS REQUIRED AND SHALL BE INCLUDED IN THE PRICE BID.
(18) INCLUDES THE FURNISHING AND INSTALLATION OF FERTILIZER AND SEED MIXTURE, AS SPECIFIED.
(CV) COMPACTED VOLUME
(EV) EXCAVATED VOLUME
(LV) LOOSE VOLUME
(P) PLAN QUANTITY

ITEM NO.	MNDOT SPEC NO.	ITEM	NOTES	UNIT	EST. QTY	UNIT PRICE	AMOUNT
SCHEDULE "A" - BASE BID							
1	2021.501	MOBILIZATION		LUMP SUM	1.00		
2	2101.502	CLEARING		EACH	6.00		
3	2101.502	GRUBBING		EACH	6.00		
4	2101.505	GRUBBING		ACRE	0.62		
5	2104.502	REMOVE METAL APRON		EACH	1.00		
6	2104.502	REMOVE CASTING	(1)	EACH	51.00		
7	2104.502	REMOVE GATE VALVE & BOX		EACH	12.00		
8	2104.502	REMOVE VALVE BOX	(1)	EACH	1.00		
9	2104.502	REMOVE HYDRANT		EACH	6.00		
10	2104.502	REMOVE DRAINAGE STRUCTURE		EACH	7.00		
11	2104.502	REMOVE SIGN		EACH	8.00		
12	2104.502	SALVAGE SIGN PANEL		EACH	1.00		
13	2104.502	SALVAGE MAILBOX SUPPORT	(2)	EACH	5.00		
14	2104.503	REMOVE WATERMAIN		LIN FT	142.00		
15	2104.503	REMOVE SEWER PIPE (STORM)		LIN FT	56.00		
16	2104.503	REMOVE CURB & GUTTER	(3)	LIN FT	3,414.00		
17	2104.503	REMOVE RETAINING WALL		LIN FT	79.00		
18	2104.503	SALVAGE FENCE		LIN FT	43.00		
19	2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT		SQ YD	60.00		
20	2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT		SQ YD	240.00		
21	2104.518	REMOVE BITUMINOUS WALK	(P)	SQ FT	23,674.00		

Use Online Bidding Schedule

ITEM NO.	MNDOT SPEC NO.	ITEM	NOTES	UNIT	EST. QTY	UNIT PRICE	AMOUNT
22	2104.518	REMOVE CONCRETE WALK		SQ FT	420.00		
23	2104.602	REMOVE CURB STOP BOX		EACH	1.00		
24	2104.603	ABANDON WATERMAIN	(4)	LIN FT	650.00		
25	2104.618	SALVAGE BRICK PAVERS	(5)	SQ FT	55.00		
26	2106.507	EXCAVATION - CHANNEL AND POND	(EV)(P)	CU YD	1,900.00		
27	2106.507	COMMON EMBANKMENT (POND)	(CV)(P)	CU YD	200.00		
28	2106.604	CEMENT STABILIZED SUBGRADE	(5)	SQ YD	6,130.00		
29	2112.604	SUBGRADE PREPARATION (TRAIL)	(P)(6)	SQ YD	2,850.00		
30	2123.610	EXPLORATORY EXCAVATION	(5)	HOUR	45.00		
31	2215.504	FULL DEPTH RECLAMATION	(P)	SQ YD	30,939.00		
32	2231.604	REMOVE AND PATCH BITUMINOUS PAVEMENT	(7)	SQ YD	437.00		
33	2232.504	MILL BITUMINOUS SURFACE (2.5")	(P)	SQ YD	4,373.00		
34	2357.506	BITUMINOUS MATERIAL FOR TACK COAT		GAL	2,100.00		
35	2360.504	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B) 3.0" THICK	(8)	SQ YD	293.00		
36	2360.509	TYPE SP 9.5 WEARING COURSE MIXTURE (3,C)		TON	7,623.00		
37	2501.502	12" HDPE PIPE APRON	(9)	EACH	2.00		
38	2501.502	36" RC PIPE APRON	(9)	EACH	2.00		
39	2501.602	ADJUST APRON		EACH	4.00		
40	2503.503	12" RC PIPE SEWER		LIN FT	24.00		
41	2503.503	15" RC PIPE SEWER		LIN FT	24.00		
42	2503.503	24" RC PIPE SEWER		LIN FT	16.00		
43	2503.503	27" RC PIPE SEWER		LIN FT	8.00		
44	2503.503	36" RC PIPE SEWER		LIN FT	34.00		
45	2503.602	CONNECT TO EXISTING STORM SEWER		EACH	14.00		
46	2503.602	SANITARY SEWER SPOT REPAIR		EACH	1.00		
47	2503.602	JOINT SEALING SANITARY MANHOLE		EACH	1.00		
48	2503.602	REINSTATE LATERALS		EACH	1.00		
49	2503.602	CIPP SHORT LINER (12" SEWER PIPE - STORM)		EACH	3.00		
50	2503.602	CIPP SHORT LINER (15" SEWER PIPE - STORM)		EACH	1.00		
51	2503.602	CIPP SHORT LINER (24" SEWER PIPE - STORM)		EACH	3.00		
52	2503.602	CIPP SHORT LINER (27" SEWER PIPE - STORM)		EACH	1.00		
53	2503.602	CIPP SHORT LINER (8" SEWER PIPE - SAN)		EACH	1.00		
54	2503.603	LINING SEWER PIPE 8" (SAN)		LIN FT	285.00		
55	2504.601	TEMPORARY WATER SERVICE		LUMP SUM	1.00		
56	2504.602	CONNECT TO EXISTING WATERMAIN		EACH	20.00		
57	2504.602	HYDRANT		EACH	8.00		
58	2504.602	VALVE BOX	(1)(10)	EACH	1.00		
59	2504.602	1" CORPORATION STOP	(11)	EACH	5.00		
60	2504.602	6" GATE VALVE & BOX		EACH	11.00		
61	2504.602	8" GATE VALVE & BOX		EACH	5.00		
62	2504.602	ADJUST CURB BOX		EACH	54.00		
63	2504.602	CURB STOP BOX		EACH	1.00		
64	2504.603	6" WATERMAIN DUCTILE IRON CL 52		LIN FT	749.00		
65	2504.603	8" WATERMAIN DUCTILE IRON CL 52		LIN FT	36.00		
66	2504.604	4" POLYSTYRENE INSULATION	(5)	SQ YD	21.00		
67	2504.608	DUCTILE IRON FITTINGS		LB	757.00		
68	2505.602	ADJUST VALVE BOX	(10)	EACH	22.00		
69	2506.502	CASTING ASSEMBLY (SANITARY)	(10)(12)	EACH	31.00		
70	2506.502	CASTING ASSEMBLY (STORM)	(10)(13)	EACH	27.00		
71	2506.502	ADJUST FRAME & RING CASTING (STORM)	(10)(13)	EACH	7.00		

Use Online Bidding Schedule

ITEM NO.	MNDOT SPEC NO.	ITEM	NOTES	UNIT	EST. QTY	UNIT PRICE	AMOUNT
72	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL (2'X3' CB)	(14)	LIN FT	7.10		
73	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020		LIN FT	7.90		
74	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4022	(15)	LIN FT	7.60		
75	2506.503	RECONSTRUCT DRAINAGE STRUCTURE (SANITARY)		LIN FT	9.00		
76	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 1 (SUMP & SAFL BAFFLE)		EACH	1.00		
77	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 2 (SUMP & SAFL BAFFLE)		EACH	1.00		
78	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 4 (OCS)		EACH	1.00		
79	2506.602	GROUT CATCH BASIN OR MANHOLE		EACH	6.00		
80	2506.602	CASTING ASSEMBLY SPECIAL (FORD TYPE A-1)	(5)	EACH	7.00		
81	2511.507	RANDOM RIPRAP CLASS III	(16)	CU YD	72.00		
82	2521.518	6" CONCRETE WALK	(8)	SQ FT	913.00		
83	2521.518	3" BITUMINOUS WALK		SQ FT	25,678.00		
84	2521.602	DRILL & GROUT REINF BAR (EPOXY COATED)		EACH	96.00		
85	2531.503	CONCRETE CURB & GUTTER DESIGN SPECIAL SURMOUNTABLE (SPOT)	(3)	LIN FT	1,615.00		
86	2531.503	CONCRETE CURB & GUTTER DESIGN B618 (SPOT)	(3)	LIN FT	1,799.00		
87	2531.503	CONCRETE CURB DESIGN V	(5)	LIN FT	20.00		
88	2531.504	6" CONCRETE DRIVEWAY PAVEMENT	(8)	SQ YD	60.00		
89	2531.618	TRUNCATED DOMES		SQ FT	131.00		
90	2540.602	INSTALL MAILBOX SUPPORT	(2)	EACH	5.00		
91	2540.618	INSTALL BRICK PAVERS	(5)	SQ FT	55.00		
92	2557.603	INSTALL FENCE		LIN FT	43.00		
93	2563.601	TRAFFIC CONTROL		LUMP SUM	1.00		
94	2564.502	INSTALL SIGN PANEL	(17)	EACH	1.00		
95	2564.518	SIGN PANEL	(17)	SQ FT	16.50		
96	2564.602	SIGN PANELS TYPE SPECIAL (STREET NAME BLADES)	(17)	EACH	18.00		
97	2565.602	RIGID PVC LOOP DETECTOR 6' X 6'		EACH	9.00		
98	2571.502	DECIDUCUS TREE 2.5" CAL B&B	(5)	EACH	14.00		
99	2572.602	TREE PRUNING	(5)	HOUR	20.00		
100	2573.501	STABILIZED CONSTRUCTION EXIT		LUMP SUM	1.00		
101	2573.502	STORM DRAIN INLET PROTECTION		EACH	43.00		
102	2573.503	SILT FENCE, TYPE MS		LIN FT	502.00		
103	2573.503	FLOTATION SILT CURTAIN TYPE STILL WATER		LIN FT	133.00		
104	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER		LIN FT	4,018.00		
105	2574.507	COMMON TOPSOIL BORROW	(LV)	CU YD	480.00		
106	2574.607	CLAY LINER	(CV)(P)	CU YD	186.00		
107	2575.504	ROLLED EROSION PREVENTION CATEGORY 20 W/ SEED MIXTURE (XX-XXX)	(18)	SQ YD	3,699.00		
108	2575.504	ROLLED EROSION PREVENTION CATEGORY 30 W/ SEED MIXTURE (XX-XXX)	(18)	SQ YD	4,016.00		
109	2575.504	SHORELINE STABILIZATION (GEOWEB BY PRESTO)		SQ YD	110.00		
110	2582.503	4" SOLID LINE MULTI-COMPONENT		LIN FT	490.00		
111	2582.503	4" BROKEN LINE MULTI-COMPONENT		LIN FT	701.00		
112	2582.503	4" DOUBLE SOLID LINE MULTI-COMPONENT		LIN FT	973.00		
113	2582.518	PAVEMENT MESSAGE MULTI-COMPONENT		SQ FT	140.00		
114	2582.518	CROSSWALK MULTI-COMPONENT		SQ FT	900.00		

SCHEDULE "A" - BASE BID = _____

Use Online Bidding Schedule

ITEM NO.	MNDOT SPEC NO.	ITEM	NOTES	UNIT	EST. QTY	UNIT PRICE	AMOUNT
SCHEDULE "B" - ALTERNATE 1 (BASE PUMP SYSTEM IMPROVEMENTS)							
115	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 1		LUMP SUM	1.00		
				SCHEDULE "B" - ALTERNATE 1 BID =			
SCHEDULE "C" - ALTERNATE 2 (PUMP SYSTEM IMPROVEMENTS W/ REMOTE MONITORING)							
116	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 2		LUMP SUM	1.00		
				SCHEDULE "C" - ALTERNATE 2 BID =			
SCHEDULE "D" - ALTERNATE 3 (PUMP SYSTEM IMPROVEMENTS W/ REMOTE MONITORING & CONTROLS)							
117	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 3		LUMP SUM	1.00		
				SCHEDULE "D" - ALTERNATE 3 BID =			
SCHEDULE "E" - ALTERNATE 4 (REPLACE CONDUIT & WIRE TO NEW PUMP SYSTEM)							
118	2545.601	REPLACE CONDUIT AND WIRE TO STORM LIFT STATION LUMP SUM ALTERNATE 4		LUMP SUM	1.00		
				SCHEDULE "E" - ALTERNATE 4 BID =			
SCHEDULE "F" - ALTERNATE 5 (ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS)							
119	2540.601	ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS LUMP SUM ALTERNATE 5		LUMP SUM	1.00		
				SCHEDULE "F" - ALTERNATE 5 BID =			
SCHEDULE "G" - ALTERNATE 6 (ARDEN MANOR PARK BASKETBALL COURT IMPROVEMENTS)							
120	2540.601	ARDEN MANOR PARK BASKETBALL COURT IMPROVEMENTS LUMP SUM ALTERNAT		LUMP SUM	1.00		
				SCHEDULE "G" - ALTERNATE 6 BID =			

Use Online Bidding Schedule

_____DOLLARS AND _____CENTS

(PRINT TOTAL BASE BID, IN WORDS, ABOVE)

All Bidders shall submit the following information with their Bid:

1. Required Bid Security;
2. Non-Collusion Affidavit;
3. Responsible Contractor Verification and Certification Compliance Form

Bid security in the amount of at least five percent (5%) of the Total Base Bid accompanies this Bid, the same being subject to forfeiture in the event of default.

The undersigned acknowledges receipt of the following Addenda:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

The Contractor agrees to complete the project as set forth in the Agreement Between Owner and Contractor for Construction Contract Form.

It is understood by the undersigned that the Owner reserves the right to reject any or all bids and to waive irregularities and formalities in order to serve the best interests of the Owner and that this bid may not be withdrawn until Ninety (90) days after the date of opening.

It is understood that if accepted by the Owner, this Bid becomes a part of the Contract documents, and failing to comply with any part of this Bid will be taken as failure of the bidder to comply with the Contract Documents and will be just cause for rejection of the work.

Respectfully Submitted:

Bidder is (Corporation) (Partnership) (Individual)

Firm: _____

By: _____

Title: _____

Address: _____

_____Zip Code_____

Telephone: _____

E-Mail: _____

END OF DOCUMENT

BID BOND

Bidder Name: Address *(principal place of business)*:	**Surety** Name: Address *(principal place of business)*:
Owner Name: City of Arden Hills, MN Address *(principal place of business)*: 1245 W. Hwy 96 Arden Hills, MN 55112	**Bid** Project *(name and location)*: 2026 PMP Street & Utility Improvements Arden Hills, MN 55112 Bid Due Date: March 4, 2026
Bond Penal Sum: Date of Bond:	

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

Bidder	Surety
(Full formal name of Bidder)	*(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title:	Title:

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

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1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder will occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

   3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

   3.2 All Bids are rejected by Owner, or

   3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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NON-COLLUSION AFFIDAVIT

The following Non-Collusion Affidavit shall be executed by the bidder:

State Project No. _____

Federal Project No. _____

State of Minnesota _____)

) ss

County of _____)

I, _____, do state under penalty of
(name of person signing this affidavit)

perjury under 28 U.S.C. 1746 of the laws of the United States:

(1) that I am the authorized representative of _____

_____
(name of person, partnership or corporation submitting this proposal)

and that I have the authority to make this affidavit for and on behalf of said bidder;

(2) that, in connection with this proposal, the said bidder has not either directly or indirectly entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding;

(3) that, to the best of my knowledge and belief, the contents of this proposal have not been communicated by the bidder or by any of his/her employees or agents to any person who is not an employee or agent of the bidder or of the surety on any bond furnished with the proposal and will not be communicated to any person who is not an employee or agent of the bidder or of said surety prior to the official opening of the proposal, and

(4) that I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Signed: _____
(bidder or his authorized representative)

RESPONSIBLE CONTRACTOR VERIFICATION AND CERTIFICATION OF COMPLIANCE

Responsible Contractor:

The Owner cannot award a construction contract in excess of $50,000 unless the Bidder is a "responsible contractor" as defined in Minnesota Statutes §16C.285, subdivision 3. A Bidder submitting a Proposal for this Project must verify that it meets the minimum criteria specified in that statute by submitting the Responsible Contractor Verification and Certification of Compliance form (Attachment A). A company owner or officer must sign the Responsible Contractor Verification and Certification of Compliance form under oath verifying compliance with each of the minimum criteria. Bidders must obtain verifications of compliance from all subcontractors. A Bidder must submit signed copies of verifications and certifications of compliance from subcontractors upon the Owner's request.

A Bidder or subcontractor who does not meet the minimum criteria established in Minnesota Statutes §16C.285, subdivision 3, or who fails to verify compliance with the criteria, will not be a "responsible contractor" and will be ineligible to be awarded the Contract for this Project or to work on this Project. Making a false statement verifying compliance with any of the minimum criteria will render the Bidder or subcontractor ineligible to be awarded a construction contract for this Project and may result in the termination of a contract awarded to a Bidder or subcontractor that makes a false statement.

A Bidder must also identify each subcontractor it intends to use on the Project. A Bidder must complete Attachment A-1 and submit it with the Responsible Contractor Verification and Certification of Compliance form (Attachment A), identifying each subcontractor it intends to use as of the time of bid submission. **THE COMPLETED FORMS MUST BE SUBMITTED WITH THE BID PROPOSAL.**

If the Bidder retains additional subcontractors after submitting its Responsible Contractor Verification and Certification of Compliance form, then the Bidder must submit Attachment A-2 within 14 days of retaining the additional subcontractor. Documents must be submitted to the Project Engineer. Include the State Project number specific to the bid on the form**.**

For Projects in excess of $50,000, the Contractor may sublet work only to subcontractors that meet the definition of "responsible contractor" in Minnesota Statutes §16C.285, subdivision 3. The Contractor is responsible for obtaining verifications of compliance with §16C.285 from subcontractors using a form provided by the Department. The Contractor must provide such verifications to the Department upon the Department's request.

ATTACHMENT A
PRIME CONTRACTOR RESPONSE

RESPONSIBLE CONTRACTOR VERIFICATION AND CERTIFICATION OF COMPLIANCE

CITY PROJECT NUMBER PW-26-0100

This form includes changes by statutory references from the Laws of Minnesota 2015, chapter 64, sections 1-9. This form must be submitted with the response to this solicitation. A response received without this form, will be rejected.

Minn. Stat. § 16C.285, Subd. 7. **IMPLEMENTATION.** … any prime contractor or subcontractor or motor carrier that does not meet the minimum criteria in subdivision 3 or fails to verify that it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the project or to perform work on the project…	
Minn. Stat. § 16C.285, Subd. 3. **RESPONSIBLE CONTRACTOR, MINIMUM CRITERIA**. "Responsible contractor" means a contractor that conforms to the responsibility requirements in the solicitation document for its portion of the work on the project and verifies that it meets the following minimum criteria:	
(1)	The Contractor: (i) is in compliance with workers' compensation and unemployment insurance requirements; (ii) is in compliance with Department of Revenue and Department of Employment and Economic Development registration requirements if it has employees; (iii) has a valid federal tax identification number or a valid Social Security number if an individual; and (iv) has filed a certificate of authority to transact business in Minnesota with the Secretary of State if a foreign corporation or cooperative.
(2)	The contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 177.24, 177.25, 177.41 to 177.44, 181.03, 181.101, 181.13, 181.14, or 181.722, and has not violated United States Code, title 29, sections 201 to 219, or United States Code, title 40, sections 3141 to 3148. For purposes of this clause, a violation occurs when a contractor or related entity: (i) repeatedly fails to pay statutorily required wages or penalties on one or more separate projects for a total underpayment of $25,000 or more within the three-year period, provided that a failure to pay is “repeated” only if it involves two or more separate and distinct occurrences of underpayment during the three-year period; (ii) has been issued an order to comply by the commissioner of Labor and Industry that has become final; (iii) has been issued at least two determination letters within the three-year period by the Department of Transportation finding an underpayment by the contractor or related entity to its own employees; (iv) has been found by the commissioner of Labor and Industry to have repeatedly or willfully violated any of the sections referenced in this clause pursuant to section 177.27; (v) has been issued a ruling or findings of underpayment by the administrator of the Wage and Hour Division of the United States Department of Labor that have become final or have been upheld by an administrative law judge or the Administrative Review Board; or (vi) has been found liable for underpayment of wages or penalties or misrepresenting a construction worker as an independent contractor in an action brought in a court having jurisdiction. Provided that, if the contractor or related entity contests a determination of underpayment by the Department of Transportation in a contested case proceeding, a violation does not occur until the contested case proceeding has concluded with a determination that the contractor or related entity underpaid wages or penalties;*

(3)	The contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 181.723 or chapter 326B. For purposes of this clause, a violation occurs when a contractor or related entity has been issued a final administrative or licensing order;*
(4)	The contractor or related entity has not, more than twice during the three-year period before submitting the verification, had a certificate of compliance under section 363A.36 revoked or suspended based on the provisions of section 363A.36, with the revocation or suspension becoming final because it was upheld by the Office of Administrative Hearings or was not appealed to the office;*
(5)	The contractor or related entity has not received a final determination assessing a monetary sanction from the Department of Administration or Transportation for failure to meet targeted group business, disadvantaged business enterprise, or veteran-owned business goals, due to a lack of good faith effort, more than once during the three-year period before submitting the verification;*
	* Any violations, suspensions, revocations, or sanctions, as defined in clauses (2) to (5), occurring prior to July 1, 2014, shall not be considered in determining whether a contractor or related entity meets the minimum criteria.
(6)	The contractor or related entity is not currently suspended or debarred by the federal government or the state of Minnesota or any of its departments, commissions, agencies, or political subdivisions that have authority to debar a contractor; and
(7)	All subcontractors and motor carriers that the contractor intends to use to perform project work have verified to the contractor through a signed statement under oath by an owner or officer that they meet the minimum criteria listed in clauses (1) to (6).

Minn. Stat. § 16C.285, Subd. 5. **SUBCONTRACTOR VERIFICATION**.

A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project. Prior to execution of a construction contract, and as a condition precedent to the execution of a construction contract, the apparent successful prime contractor shall submit to the contracting authority a supplemental verification under oath confirming compliance with subdivision 3, clause (7). Each contractor or subcontractor shall obtain from all subcontractors with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each subcontractor.

If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors.

A prime contractor shall submit to the contracting authority upon request copies of the signed verifications of compliance from all subcontractors of any tier pursuant to subdivision 3, clause (7). A prime contractor and subcontractors shall not be responsible for the false statements of any subcontractor with which they do not have a direct contractual relationship. A prime contractor and subcontractors shall be responsible for false statements by their first-tier subcontractors with which they have a direct contractual relationship only if they accept the verification of compliance with actual knowledge that it contains a false statement.

Subd. 5a. **Motor carrier verification.** A prime contractor or subcontractor shall obtain annually from all motor carriers with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each motor carrier. A prime contractor or subcontractor shall require each such motor carrier to provide it with immediate written notification in the event that the motor carrier no longer meets one or more of the minimum criteria in subdivision 3 after submitting its annual verification. A motor carrier shall be ineligible to perform work on a project covered by this section if it does not meet all the minimum criteria in subdivision 3. Upon request, a prime contractor or subcontractor shall submit to the contracting authority the signed verifications of compliance from all motor carriers providing for-hire transportation of materials, equipment, or supplies for a project.

Minn. Stat. § 16C.285, Subd. 4. **VERIFICATION OF COMPLIANCE.**
A contractor responding to a solicitation document of a contracting authority shall submit to the contracting authority a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in subdivision 3, with the exception of clause (7), at the time that it responds to the solicitation document. A contracting authority may accept a signed statement under oath as sufficient to demonstrate that a contractor is a responsible contractor and shall not be held liable for awarding a contract in reasonable reliance on that statement. A prime contractor, subcontractor, or motor carrier that fails to verify compliance with any one of the required minimum criteria or makes a false statement under oath in a verification of compliance shall be ineligible to be awarded a construction contract on the project for which the verification was submitted. A false statement under oath verifying compliance with any of the minimum criteria may result in termination of a construction contract that has already been awarded to a prime contractor or subcontractor or motor carrier that submits a false statement. A contracting authority shall not be liable for declining to award a contract or terminating a contract based on a reasonable determination that the contractor failed to verify compliance with the minimum criteria or falsely stated that it meets the minimum criteria. A verification of compliance need not be notarized. An electronic verification of compliance made and submitted as part of an electronic bid shall be an acceptable verification of compliance under this section provided that it contains an electronic signature as defined in section 325L.02, paragraph (h).

CERTIFICATION	
By signing this document I certify that I am an owner or officer of the company, and I certify under oath that: **1) My company meets each of the Minimum Criteria to be a responsible contractor as defined herein and is in compliance with Minn. Stat. § 16C.285, and** **2) if my company is awarded a contract, I will submit Attachment A-1 prior to contract execution, and** **3) if my company is awarded a contract, I will also submit Attachment A-2 as required.**	
Authorized Signature of Owner or Officer:	**Printed Name:**
Title:	**Date:**
Company Name:	

NOTE: Minn. Stat. § 16C.285, Subd. 2, (c) If only one prime contractor responds to a solicitation document, a contracting authority may award a construction contract to the responding prime contractor even if the minimum criteria in subdivision 3 are not met.

ATTACHMENT A-1

FIRST-TIER SUBCONTRACTORS LIST

SUBMIT PRIOR TO EXECUTION OF A CONSTRUCTION CONTRACT

STATE PROJECT NUMBER: _____

Minn. Stat. § 16C.285, Subd. 5. A prime contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project. Prior to execution of a construction contract, and as a condition precedent to the execution of a construction contract, the apparent successful prime contractor shall submit to the contracting authority a supplemental verification under oath confirming compliance with subdivision 3, clause (7). Each contractor or subcontractor shall obtain from all subcontractors with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each subcontractor.

FIRST TIER SUBCONTRACTOR NAMES* (Legal name of company as registered with the Secretary of State)	**Name of city where company home office is located**

*Attach additional sheets as needed for submission of all first-tier subcontractors.

SUPPLEMENTAL CERTIFICATION FOR ATTACHMENT A-1	
By signing this document I certify that I am an owner or officer of the company, and I certify under oath that: **All first-tier subcontractors listed on attachment A-1 have verified through a signed statement under oath by an owner or officer that they meet the minimum criteria to be a responsible contractor as defined in Minn. Stat. § 16C.285.**	
Authorized Signature of Owner or Officer:	**Printed Name:**
Title:	**Date:**
Company Name:	

ATTACHMENT A-2

ADDITIONAL SUBCONTRACTORS LIST

PRIME CONTRACTOR TO SUBMIT AS SUBCONTRACTORS ARE ADDED TO THE PROJECT

STATE PROJECT NUMBER: _____

This form must be submitted to the Project Manager or individual as identified in the solicitation document.

Minn. Stat. § 16C.285, Subd. 5. … If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors. …

ADDITIONAL SUBCONTRACTOR NAMES* (Legal name of company as registered with the Secretary of State)	**Name of city where company home office is located**

*Attach additional sheets as needed for submission of all additional subcontractors.

SUPPLEMENTAL CERTIFICATION FOR ATTACHMENT A-2	
By signing this document I certify that I am an owner or officer of the company, and I certify under oath that: **All additional subcontractors listed on Attachment A-2 have verified through a signed statement under oath by an owner or officer that they meet the minimum criteria to be a responsible contractor as defined in Minn. Stat. § 16C.285.**	
Authorized Signature of Owner or Officer:	**Printed Name:**
Title:	**Date:**
Company Name:	

NOTICE TO ALL BIDDERS

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

MINNESOTA DEPARTMENT OF TRANSPORTATION
NOTICE TO BIDDERS
SUSPENSIONS/DEBARMENTS

Do not use suspended or debarred parties as subcontractors or material suppliers on this project.

Both the federal government and the State of Minnesota suspend and debar vendors. Review the lists of suspended and debarred vendors when submitting a bid and when submitting a request to sublet.

State Suspensions and Debarments.

To review the list of parties suspended and debarred by the State of Minnesota, go to this website: http://www.mmd.admin.state.mn.us/debarredreport.asp . This list includes parties suspended and debarred by the Minnesota Department of Transportation and the Minnesota Department of Administration.

Federal Suspensions and Debarments.

The federal government maintains a website listing suspended and debarred parties. You do not need a username or password to use the search functions on the website. You can either search for specific entity names, or see a list of parties suspended and debarred by the Federal Highway Administration.

To search the status of a particular vendor, follow this process:

First, go to the System for Awards Management (SAM) website: https://www.sam.gov (requires Internet Explorer version 11 or higher, or another supported browser such as Chrome).

Next, click on the "Search Records" icon.

Next, enter the potential subcontractor or supplier's name in the "Quick Search" box and click the "search" button.

To view a list of all entities suspended or debarred by the Federal Highway Administration, follow this process:

First, go to the System for Awards Management (SAM) website: https://www.sam.gov (requires Internet Explorer version 11 or higher, or another supported browser such as Chrome).

Next, click on the "Search Records" icon.

Next, click on the "Advance Search – Exclusion" tab.

Next, click on the "single search" icon and a search form will pop up.

Next, go to the "Agency" field on the search page and select "Federal Highway Administration" from the drop-down list.

Next, click the "search" button, and the list of suspended and debarred parties will appear.

July 26, 2018

NOTICE TO BIDDERS

Minnesota Statutes require prompt payment to subcontractors:

Minn. Stat. § 471.425 PROMPT PAYMENT OF LOCAL GOVERNMENT BILLS.

Subdivision 1. **Definitions.** For the purposes of this section, the following terms have the meanings here given them.

. . . (d) "Municipality" means any home rule charter or statutory city, county, town, school district, political subdivision or agency of local government. "Municipality" means the Metropolitan Council or any board or agency created under chapter 473.

. . . Subd. 4a. **Prompt payment to subcontractors**. Each contract of a municipality must require the prime contractor to pay any subcontractor within ten days of the prime contractor's receipt of payment from the municipality for undisputed services provided by the subcontractor. The contract must require the prime contractor to pay interest of 1-1/2 percent per month or any part of a month to the subcontractor on any undisputed amount not paid on time to the subcontractor. The minimum monthly interest penalty payment for an unpaid balance of $100 or more is $10. For an unpaid balance of less than $100, the prime contractor shall pay the actual penalty due to the subcontractor. A subcontractor who prevails in a civil action to collect interest penalties from a prime contractor must be awarded its costs and disbursements, including attorney's fees, incurred in bringing the action.

Minn. Stat. § 15.72 PROGRESS PAYMENTS ON PUBLIC CONTRACTS; RETAINAGE.

. . . Subd. 2. **Retainage.** . . . (c) A contractor on a public contract for a public improvement must pay all remaining retainage to its subcontractors no later than ten days after receiving payment of retainage from the public contracting agency, unless there is a dispute about the work under a subcontract. If there is a dispute about the work under a subcontract, the contractor must pay out retainage to any subcontractor whose work is not involved in the dispute, and must provide a written statement detailing the amount and reason for the withholding to the affected subcontractor.

NOTICE OF AWARD

Date of Issuance:			
Owner:	City of Arden Hills, MN	Owner's Project No.:	PW-26-0100
Engineer:	Bradley J. Fisher	Engineer's Project No.:	25X.137753
Project:	2026 PMP Street & Utility Improvements		
Contract Name:	2026 PMP Street & Utility Improvements		
Bidder:			
Bidder's Address:			

You are notified that Owner has accepted your Bid dated [_____] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

The Contract Price of the awarded Contract is: $ _____ Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

_____unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award or has been transmitted or made available to Bidder electronically.

☐ Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [____] counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security [such as required performance and payment bonds] and insurance documentation, as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Deliver to Owner executed SECTION – RESPONSIBLE CONTRACTOR VERIFICATION AND CERTIFICATION COMPLIANCE in accordance with Minn. Stat. 16C.285 subd.3 Subclauses (1) to (7). Delivery is a condition precedent to execution of this contract and failure to submit this form shall be cause for the Owner to cancel Award of Contract and declare your Bid security forfeited.

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner**:** City of Arden Hills, MN

By *(signature)* _____

Name *(printed)* _____

Title: _____

Copy: Engineer

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AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT

THIS AGREEMENT is made this ___ day of ___, 20__ (hereinafter "Effective Date of the Contract") by and between the City of Arden Hills, Ramsey County, Minnesota (hereinafter "Owner") and_____ _____ (hereinafter "Contractor"). The Owner and Contractor hereby agree as follows:

ARTICLE 1 – THE WORK AND THE PROJECT

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Street and trail rehabilitation and construction, concrete curb and gutter replacement and construction, storm sewer construction and rehabilitation, watermain replacement and rehabilitation, sanitary sewer rehabilitation, and restoration as outlined in the project plan set drawings.

1.02 The Project, of which the Work under the Contract Documents is a part is generally described as follows: 2026 PMP Street & Utility Improvements, City Project No. PW-26-0100.

ARTICLE 2 – CONTRACT DOCUMENTS

2.01 The Contract Documents consist of the following:

A. This Agreement
B. Performance and Payment Bonds
C. Insurance Certificates
D. Instructions to Bidders
E. General Conditions
F. Supplementary Conditions
G. Division 1 – General Requirements
H. Division 2 – Technical Specifications & Special Provisions
I. Division E – Electrical Technical Specifications
J. Division LS – Parks Technical Specifications
K. Drawings (not attached by incorporated by reference) consisting of ___ sheets with each sheet bearing the following general title: _____, dated _____.
L. Addenda (Numbers _ and _ inclusive)
M. Exhibits to the Agreement
    1. Contractor's Bid (pages _ to _ inclusive)
    2. Non-Collusion Affidavit
    3. Responsible Contractor Verification and Certification of Compliance Form
N. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    1. Notice to Proceed
    2. Work Change Directives
    3. Change Orders
    4. Field Orders

2.02 This instrument, together with the documents hereinabove mentioned, form the Agreement, and they are as fully a part of the Agreement as if hereto attached or herein repeated.

2.03 The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions and Supplemental Conditions.

ARTICLE 3 – CONTRACT TIMES

3.01 Contract Times: The Work will be substantially completed on or before **October 2, 2026**, and completed and ready for final payment in accordance with Paragraph 15.06 of the General

Conditions on or before **October 16, 2026**. Substantial Completion Date shall be defined as the completion of all items, including final wear course paving and turf restoration, with the exception of minor punchlist items, removal of traffic control, and removal of erosion/sediment control.

3.02 All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.02.1 Milestone completion requirements apply to this project. Upon completion of a project milestone, Contractor must notify the Engineer of its completion. Upon receipt of such notification, Engineer shall inspect the applicable work and issue to the contractor notice of the Engineer's findings with respect to achievement of the Milestone. Parts of the Work must be completed on or before the following Milestone(s):

3.02.1.1 Milestone 1: The watermain and associated work along Highway 96 (all work within the Highway 96 right-of-way, including trail/driveway/turf restoration, in accordance with the associated Ramsey County Excavation Permit) shall reach Substantial Completion by **June 1st, 2026**.

3.02.1.1.1 Trails and driveways must be paved and turf restored within 1 week of watermain completion/testing/acceptance.

3.02.1.2 Milestone 2: Upon initiation of earth disturbing activities (with the exception of the watermain and associated work along Highway 96), the entire project shall reach Substantial Completion within **12 weeks**.

3.02.1.3 Milestone 3: Each individual spot utility improvement area shall be completed within 7 calendar days and brought back up to a passable gravel roadway condition. The gravel patch shall be maintained until milling/reclamation operations are completed on that street.

3.02.1.4 Milestone 4: Upon initiation of trail pavement removal, subgrade preparation of the trail aggregate base (including hauling/installation of supplemental aggregate base/reclaim material as required) and trail paving shall be completed within 14 calendar days.

3.02.1.4.1 The Highway 96 trail does not apply as it has its own completion requirements, as noted above.

3.02.1.4.2 Trail paving must be completed prior to street paving on any adjacent street that will be utilized for hauling in the trail paving operations.

3.02.1.4.3 Utility work (including the new storm pump station), shoreline stabilization, and construction of the new stormwater pond BMP must be completed prior to trail paving on any adjacent trail that will be utilized for equipment access to these sites. Minor work only requiring pickup truck access to these sites will still be allowed after trail paving.

3.02.1.4.4 Contractor shall schedule their work as necessary to allow for proper installation, and protection, of ADA pedestrian ramps/concrete work as required to tie-into bituminous trails without requiring a bituminous patch behind the concrete walk. Damage or non-conforming work shall be corrected by the contractor to the satisfaction of the Engineer at no cost to the Owner.

3.02.1.5 Milestone 5: Permanent Stabilization, including but not limited to turf restoration, shall be initiated as soon as practicable and be completed within 14 calendar days of completion of the applicable adjacent improvements that cause the soil disturbance (including but not limited to spot curb replacements, spot walk replacements, trail replacements, and/or identified spot utility) for that street section.

3.02.1.5.1 If the contractor's construction operations necessitate, the contractor shall provide additional temporary erosion control measures for areas

of soil disturbance to meet the requirements of the Stormwater Pollution Prevention Plan and the Construction Stormwater Permit. Additional costs associated with temporary erosion control measures to meet these requirements due to the contractor's progression of work/schedule shall be the responsibility of the contractor and at no cost to the owner.

3.02.1.6 Milestone 6: Upon initiation of street pavement removal/reclaiming, remaining utility construction, aggregate base installation, removal of excess reclaim material, and preparation of the in-place reclaim aggregate base material must be completed within 7 calendar days for that reclamation street section.

3.02.1.6.1 Additional time will be provided if Cement Stabilized Subgrade is determined necessary by the Engineer

3.02.1.6.2 Spot concrete curb replacements, spot concrete walk replacements, trail replacements, and/or identified spot utility work must be completed prior to pavement removal/reclamation operations, as necessary to meet the project requirements.

3.02.1.7 Milestone 7: Base pavement corrections for the mill & overlay street sections shall be completed within 7 calendar days from the date the pavement surface milling work began for that street section.

3.02.1.7.1 Spot concrete curb replacements, spot concrete walk replacements, trail replacements, and/or identified spot utility work must be completed prior to pavement removal/reclamation operations, as necessary to meet the project requirements.

3.02.1.8 Milestone 8: Upon completion of aggregate base installation and/or final reclaim street preparation, the first layer of bituminous roadway pavement must be constructed within 7 calendar days for that reclamation street section.

3.02.1.8.1 Note: Both the first layer of bituminous roadway pavement and the final bituminous wear paving must be completed within 7 calendar days of reclaim street preparation on Cummings Park Drive (14 calendar days from initiation of reclamation operations to final wear course paving).

3.02.1.9 Milestone 9: Upon completion of base pavement corrections on mill & overlay streets and/or completion of the first layer of bituminous roadway pavement on reclamation streets, the final bituminous wear paving must be completed within 7 calendar days.

3.02.1.9.1 Note: Both the first layer of bituminous roadway pavement and the final bituminous wear paving must be completed within 7 calendar days of reclaim street preparation on Cummings Park Drive (14 calendar days from initiation of reclamation operations to final wear course paving).

3.02.1.10 Milestone 10: Pavement Markings shall be installed on Cummings Park Drive as soon as possible following the final wear course pavement installation, based on the Manufacturer's Recommendations.

3.03 Phasing Requirements: Additional phasing requirements are listed on the plans and below:

3.03.1 Access must be provided to all properties throughout construction. Parking must be provided for all properties within a reasonable distance of the property at all times, but specifically during the concrete curing process.

3.03.2 The contractor must maintain a minimum of one lane of access in each direction on Cummings Park Drive at all times during construction to maintain access to each business. A hard closure will not be allowed. The contractor shall assume

that traffic management, such as flaggers, will be necessary during major operations to direct traffic to the appropriate lane, around construction operations.

3.03.3 The City of Arden Hills is hosting a 75th Anniversary event at Cummings Park on **Friday July 17th, 2026**. No work will be allowed on Cummings Park Drive or within Cummings Park on July 17th, 2026. Cummings Park Drive must be cleaned up to the extent practical and must maintain a minimum of one lane in each direction. The access road to Cummings Park (directly east of the water tower), the Cummings Park parking lot (directly south of Cummings Park), and the service road between the parking lot and Cummings Park itself must be completely accessible with no equipment parking, materials stockpiles, etc. in the vicinity (including within Cummings Park itself). The ped ramp/trails from the parking lot to Cummings Park shall be left in their existing condition, construction completed per the plans, or a Temporary Pedestrian Access Route (TPAR) must be installed, in accordance with ADA standards, for the event.

3.03.4 Contractor may elect to split the project into multiple phases. If so, contractor shall submit their phasing plan to the Engineer for approval. If approved, the final wear course paving layer must still be installed in one operation for the entire project.

3.03.5 Storm pump station improvements shall be scheduled to not interfere with the City's required pumping operations. Karth Lake does not have a natural emergency overflow so the City's pumping operations are the only means to manage the lake level. The contractor will be required to coordinate the timing of removals that will impact the operability of the existing deployable pump system with the City's pumping schedule, relative to the anticipated new pump station installation and materials availability to complete the improvements necessary to reinstate the City's ability to operate the lake pump. For reference, the existing pumping operation takes approximately 3-weeks to draw down the lake 2-feet in elevation and the pump is typically operated approximately 3 to 4 times over a given year (typical procedure), but the City can initiate pumping operations earlier to prepare for the Contractor's anticipated schedule.

3.04 Liquidated Damages: Contractor and Owner recognize that time is of the essence as stated above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraphs 3.01 and 3.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize that delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay, but not as a penalty;

A. Substantial Completion: Contractor shall pay Owner $2,000.00 for each day that expires after the time specified in Paragraph 3.01 above for Substantial Completion until the Work is substantially complete, as duly adjusted pursuant to the Contract.

B. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time for completion and readiness for final payment, as duly adjusted pursuant to the Contract, Contractor shall pay Owner $600.00 for each day that expires after such time until the Work is completed and ready for final payment.

C. Milestones: Contractor shall pay Owner $500.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of each milestone until the milestone is achieved. Liquidated damages for failure to timely achieve multiple milestones are additive and will be imposed concurrently.

D. Liquidated damages for failing to timely attain Milestones and Substantial Completion are not additive and will not be imposed concurrently. Liquidated damages for Substantial Completion will apply in this scenario.

ARTICLE 4 – CONTRACT PRICES

4.01 The Owner shall pay the Contractor for the performance of this Agreement according to the schedule of approximate quantities and unit prices as set out in the Contract Documents submitted by the Contractor on _____, the aggregate of which is estimated to be $_____.

4.02 The Contract shall include the Base Bid and Alternate(s) _____ items as provided on the Proposal Form.

4.03 Payment is based an amount equal to the sum of the extended prices, established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item completed and accepted by the Engineer.

4.04 The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determination of actual quantities and classifications are to be made by the Engineer.

ARTICLE 5 – PAYMENT PROCEDURES

5.01 Progress Payments: Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 10th day of each month during performance of the Work as provided in Paragraph 5.02 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

5.02 Retainage: Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

A. Ninety five (95) percent of Work completed (with the balance being retainage).
B. No payment shall be made for materials and equipment not incorporated into the Work.

5.03 Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set-off by Owner pursuant to Paragraph 15.01E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

5.04 Final Payment: Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Prices as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 6 – CONTRACTOR'S REPRESENTATIONS

6.01 In order to induce the Owner to enter into this Contract, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or

subsurface structures at the Site that have been identified in the Contract Documents, and reports relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Contract Documents.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the site-related reports identified in the Contract Documents, with respect to the effect of such information, observation, and documents on (1) the cost, progress and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by the Contractor; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 7 – MISCELLANEOUS

7.01 Terms: Terms used in the Agreement will have the meanings stated in the General Conditions and Supplementary Conditions.

7.02 Assignment of Contract: Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

7.03 Successors and Assigns: Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations in the Contact Documents.

7.04 Severability: Any provision or part of the Contract Documents held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

7.05 Contractor's Certifications

A. The provisions of Minn. Stat. 16C.285 Responsible Contractor are imposed as a requirement of this Contract. This Contract may be terminated by the Owner at any time upon discovery by the Owner that the prime contractor or subcontractor has submitted a false statement under oath verifying compliance with any of the minimum criteria set forth in the Statute.

B. The provisions of Minn. Stat. 471.425, subdivision 4a regarding payments to subcontractors are imposed as a requirement of this Contract.

REMAINDER OF THIS PAGE IS BLANK

IN WITNESS WHEREOF, Owner and Contractor have caused this instrument to be executed in duplicate as of the Effective Date of the Contract.

OWNER:	**CONTRACTOR:**
City of Arden Hills	
By:	By:
Title: Mayor	Title:
Attest:	Attest:
Title: City Clerk	Title:
Address for Giving Notices:	Address for Giving Notices:
City of Arden Hills	
Attention: Public Works Director	
1245 West Highway 96	
Arden Hills, MN 55112	

NOTICE TO PROCEED

Owner:	City of Arden Hills	Owner's Project No.:	PW-26-0100
Engineer:	Bolton & Menk, Inc.	Engineer's Project No.:	25X.137753
Contractor:		Contractor's Project No.:	
Project:	2026 PMP Street & Utility Improvements		
Contract Name:	2026 PMP Street & Utility Improvements		
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

The Substantial Completion and Final Completion must be achieved in accordance with the requirements of the Agreement.

Owner:	City of Arden Hills, MN
By *(signature)*:	
Name *(printed)*:	
Title:	
Date Issued:	

Copy: Engineer

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PERFORMANCE BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **[Full formal name of Owner]** Mailing address *(principal place of business)*: **[Address of Owner's principal place of business]**	**Contract** Description *(name and location)*: **[Owner's project/contract name, and location of the project]** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

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1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

    3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

    3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

    5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

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5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

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statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

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PAYMENT BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner	**Contract**
Name: **[Full formal name of Owner]** Mailing address *(principal place of business)*: **[Address of Owner's principal place of business]**	Description *(name and location)*: **[Owner's project/contract name, and location of the project]** Contract Price: **[Amount, from Contract]** Effective Date of Contract: **[Date, from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

EJCDC® C-615, Payment Bond.
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1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond will arise after the following:

    5.1. Claimants who do not have a direct contract with the Contractor

        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2. Pay or arrange for payment of any undisputed amounts.

    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

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8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. *Claim*—A written statement by the Claimant including at a minimum:

        16.1.1. The name of the Claimant;

        16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

        16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

        16.1.4. A brief description of the labor, materials, or equipment furnished;

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16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

18. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

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DEPARTMENT OF REVENUE

IC134

Contractor Affidavit

This Contractor Affidavit must be certified by the Minnesota Department of Revenue before the state of Minnesota or any of its subdivisions can make final payment to contractors. For more detailed information, see the instructions on the back of this form.

Please type or print clearly. This information will be used for returning the completed form.

Company name	Daytime phone	Minnesota tax ID number
Address	Total contract amount $	Month/year work began
City State ZIP code	Amount still due $	Month/year work ended

Project number	Project location

Project owner Address City State ZIP code

Did you have employees work on this project? ☐ Yes ☐ No. If no, who did the work?

Check the box that describes your involvement in the project and fill in all information requested.

☐ **Sole contractor**

☐ **Subcontractor**

Name of contractor who hired you

Address

☐ **Prime contractor—**If you subcontracted out any work on this project, all of your subcontractors must submit their own Contractor Affidavits and have them certified by the Department of Revenue *before* you can submit your Contractor Affidavit. For each subcontractor you had, fill in the information below and attach a copy of each subcontractor's certified Contractor Affidavit. If you need more space, attach a separate sheet.

Business name Address Owner/Officer

I declare that all information I have filled in on this form is true and complete to the best of my knowledge and belief. I authorize the Department of Revenue to disclose pertinent information relating to this project, including sending copies of this form, to the prime contractor if I am a subcontractor, and to any subcontractors if I am a prime contractor, and to the contracting agency.

Contractor's signature Title Date

Mail to: Minnesota Revenue, Mail Station 6610, St. Paul, MN 55146-6610
Phone: 651-282-9999 or 1-800-657-3594

Certificate of Compliance

Based on records of the Minnesota Department of Revenue, I certify that the contractor who has signed this Contractor Affidavit has fulfilled all the requirements of Minnesota Statutes 290.92 and 270C.66 concerning the withholding of Minnesota income tax from wages paid to employees relating to contract services with the state of Minnesota and/or its subdivisions.

Department of Revenue approval *Date*

(Rev. 12/17)

DEPARTMENT OF REVENUE

Form IC134 Instructions

Contractor Affidavit

No state agency or local unit of government can make final payment to a contractor until the Department of Revenue has certified that the contractor and any subcontractor have fulfilled the requirements of Minnesota withholding tax laws.

If you are a prime contractor, a contractor or a subcontractor who did work on a project for the state of Minnesota or any of its local government subdivisions — such as a county, city or school district — you must submit a Contractor Affidavit to the Department of Revenue to receive a certificate of compliance.

Use of Information

The Department of Revenue needs **all** the requested information to determine if you have met the state income tax withholding requirements. If all required information is not provided, Form IC134 will be returned to you for completion.

All information on this Contractor Affidavit is private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee the same privacy and certain government agencies as provided by law.

Minnesota Tax ID Number

You must have a Minnesota tax ID number if you have employees who work in Minnesota. You must enter your Minnesota tax ID number on Form IC134.

If you don't have a Minnesota tax ID number, apply online at www.revenue.state.mn.us or by calling our Business Registration Office at 651-282-5225 or 1-800-657-3605.

If you have no employees and did all the work yourself, you do not need a Minnesota tax ID number. Instead, enter your Social Security number in the space for Minnesota tax ID number and explain who did the work.

Submit Contractor Affidavit

Form IC134 cannot be processed by the Department of Revenue until you finish the work. If you submit the form before the project is completed, it will be returned to you unprocessed.

If any withholding payments are due to the state, Minnesota law requires certified payments before we approve your Form IC134.

If you are a subcontractor or sole contractor, submit the form when you have completed your part of the project.

If you are a prime contractor, submit the form when the entire project is completed and you have received certified Contractor Affidavits from all of your subcontractors.

If you're a prime contractor and a subcontractor on the same project

If you were hired as a subcontractor to do work on a project, and you subcontracted all or a part of your portion of the project to another contractor, you are a prime contractor as well. Complete both the subcontractor and prime contractor areas on a single Form IC134.

You may submit your Contractor Affidavit either electronically **or** by mail. This affidavit must be certified and returned before the state or any of its subdivisions can make final payment for your work.

For an immediate response: Complete and submit your Contractor Affidavit electronically. Go to www.revenue.state.mn.us and choose **Withholding Tax**. Under the File and Pay tab, click on Contractor Affidavit Information for Government Projects.

You may complete and mail Form IC134 to: Minnesota Revenue, Mail Station 6610, St. Paul, MN, 55146-6610. If you have fulfilled the requirements of Minnesota withholding tax laws, the department will sign your Form IC134 and return it to you.

To receive your final payment, submit the certified Contractor Affidavit to the government unit for which the work was done. If you are a subcontractor, submit the certified Contractor Affidavit to your prime contractor to receive your final payment.

Information and Assistance

Additional forms and information, including fact sheets and frequently asked questions, are available on our website.

Website: www.revenue.state.mn.us

Email: withholding.tax@state.mn.us

Phone: 651-282-9999 or 1-800-657-3594

This information is available in alternate formats.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

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requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

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recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.

23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

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33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.

34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.

36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion of such Work.

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43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

46. *Technical Data*

    a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

    b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.

    c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.

47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

48. *Unit Price Work*—Work to be paid for on the basis of unit prices.

49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

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1.02 *Terminology*

A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*: The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*: The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

1. does not conform to the Contract Documents;

2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

3. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

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F. *Contract Price or Contract Times*: References to a change in "Contract Price or Contract Times" or "Contract Times or Contract Price" or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term "or both" is not expressed.

G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).

B. *Evidence of Contractor's Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.

C. *Evidence of Owner's Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

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into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

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ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

A. *Standards Specifications, Codes, Laws and Regulations*

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

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inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

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B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

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established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. Abnormal weather conditions;

3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and

4. Acts of war or terrorism.

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D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.

G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

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B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

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and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;

2. is of such a nature as to require a change in the Drawings or Specifications;

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

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Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;

b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:

1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

2. complying with applicable state and local utility damage prevention Laws and Regulations;

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3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.

C. *Engineer's Review*: Engineer will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and

4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Early Resumption of Work*: If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.

F. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and

c. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

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of construction to be employed by Contractor, and safety precautions and programs incident thereto;

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

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conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.

B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.

C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

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Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.

E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.

F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.

H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.

D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

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Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.

F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

H. Contractor shall require:

1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and

2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.

I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.

K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

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L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

A. *Required Insurance*: Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions*: The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. *Additional Insureds*: The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;

2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;

3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

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4. not seek contribution from insurance maintained by the additional insured; and

5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

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Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

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6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

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B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

A. *Contractor's Request; Governing Criteria*: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that the proposed item:

1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

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2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) has a proven record of performance and availability of responsive service; and

4) is not objectionable to Owner.

b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

    a. will certify that the proposed substitute item will:

        1) perform adequately the functions and achieve the results called for by the general design;

        2) be similar in substance to the item specified; and

        3) be suited to the same use as the item specified.

    b. will state:

        1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

        2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

        3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

    c. will identify:

        1) all variations of the proposed substitute item from the item specified; and

        2) available engineering, sales, maintenance, repair, and replacement services.

    d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

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H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.

L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

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7.09 *Permits*

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

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7.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.

F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

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I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:

a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determine and verify:

1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;

2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;

c. confirm that the Submittal is complete with respect to all related data included in the Submittal.

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

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3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.

1. *Shop Drawings*

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.

2. *Samples*

a. Contractor shall submit the number of Samples required in the Specifications.

b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Engineer's Review of Shop Drawings and Samples*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

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document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. *Resubmittal Procedures for Shop Drawings and Samples*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. *Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs*

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

   a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

   b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

   c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

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d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.

2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03. 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.

C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:

1. Observations by Engineer;

2. Recommendation by Engineer or payment by Owner of any progress or final payment;

3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Shop Drawing or Sample submittal;

6. The issuance of a notice of acceptability by Engineer;

7. The end of the correction period established in Paragraph 15.08;

8. Any inspection, test, or approval by others; or

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9. Any correction of defective Work by Owner.

E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.

B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.

C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

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D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:

1. Checking for conformance with the requirements of this Paragraph 7.19;

2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and

3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.

F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.

G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

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E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

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B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.

2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

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9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

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ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.

B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

A. Engineer has the authority to reject Work in accordance with Article 14.

B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.

C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.

D. Engineer's authority as to changes in the Work is set forth in Article 11.

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E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

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ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

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B. If Owner has issued a Work Change Directive and:

1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.

B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

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1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
   1. A mutually acceptable fixed fee; or
   2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
      a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
      b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
      c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
      d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
      e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
      f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

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11.08 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.

B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.

2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.

    a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.

    b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

    The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review*: Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.

4. *Engineer's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

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Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and

4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

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and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

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2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

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consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

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g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

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Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

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thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

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D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

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losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

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or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

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establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

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4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

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b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

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submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

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significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

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d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

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appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

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F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

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attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

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provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

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18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SUPPLEMENTARY GENERAL CONDITIONS

SGC 0 INTRODUCTION

These Supplementary General Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2018 Edition) and other provisions of the Contract Documents as indicated below. All provisions, which are not so amended or supplemented, remain in full force and effect.

SGC 1.01 DEFINED TERMS

The terms used in these Supplementary Conditions, which are defined in the Standard General Conditions of the Construction Contract (C-700, 2018 Edition), have the meanings assigned to them in the General Conditions and as amended below.

Owner shall mean the City of Arden Hills, 1245 West Highway 96, Arden Hills, MN 55112.

Engineer shall mean the City Engineer of the City of Arden Hills.

Department shall mean the City of Arden Hills Public Works Department.

Contractor shall mean the individual or entity with whom the Owner has entered into the Agreement.

Observer shall mean the individual or entity with whom the Owner and Engineer is represented in the observation and inspection of the project.

SGC 2.01 DELIVERY OF BONDS AND EVIDENCE OF INSURANCE

Delete paragraph 2.01B and insert the following:

Evidence of Contractor's Insurance: When Contractor delivers the signed counterparts of the Agreement to Owner and before any work at the site is started, Contractor shall deliver to Owner, with a copy to Engineer, insurance certificates and endorsements (and other evidence of insurance requested by Owner) which Contractor is required to purchase and maintain in accordance with paragraphs 5.03B and 5.04.

SGC 2.03 BEFORE STARTING CONSTRUCTION

Paragraph 2.03.A of the General Conditions shall be deleted in its entirety and replaced by the following paragraphs.

B. Preliminary Schedules: Within ten (10) days after the Effective Date of the Agreement (unless otherwise specified in the Contract Documents) and before the preconstruction conference, Contractor shall submit to Engineer the following for timely review.

1. The Contractor shall submit in writing to the Engineer for review a progress schedule indicating the order in which the Contractor proposes to perform the various stages of the Work, the dates on which the Contractor will start the various features thereof, and the contemplated dates for completing the same. This schedule shall be in the form of a bar chart of a suitable scale to indicate appropriately the percentage of work scheduled and completed by weekly schedules. The lack of a schedule shall be cause for withholding of progress payments and could result in a work stoppage. If the work is stopped, no credit of working days or payment of down time will be provided.

The progress schedule will be acceptable to the Engineer if it provides an orderly progression of the Work to completion within any specified Milestones and the

Contract Times. Such acceptance will not impose on the Engineer responsibility for the progress schedule of the Work nor interfere with or relieve the Contractor from the Contractor's full responsibility therefore.

2. The Contractor shall present to the Engineer three (3) copies of detailed, dimensioned manufacturer's drawings of all materials, apparatus and machinery, and for such fittings and devices as the Engineer may direct. The Engineer will keep two copies of each set and return the rest to the Contractor with the Engineer's approval or notations. In case of lack of approval, the Contractor shall submit new drawings, corrected as required by the Engineer. All such drawings shall be submitted to the Engineer with ample time allowance for consideration. Submittals shall be required for, but not limited to: manhole structures, castings, sewer pipe, water main, lift stations, waterworks brass, concrete mix design, bituminous pavement design, seed, prefabricated structures, traffic control, and other materials as required by the Engineer.

3. The Engineer's approval of such drawings and progress schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications unless the Contractor has, in writing, called the Engineer's attention to such deviations at the time of submission, nor shall it relieve the Contractor from the responsibility for errors of any sort in shop drawings or progress schedules. No Work shall be started progress schedules have been approved by the Engineer.

SGC 2.04 PRECONSTRUCTION CONFERENCE

Add a new paragraph immediately after 2.04.A of the General Conditions, which is to read as follows:

B. The preconstruction meeting will be arranged by the Engineer. The Contractor's project superintendent and foreman will be present at this meeting. The Contractor's project superintendent shall be familiar with all phases of the work to be executed and shall oversee the work during its progress. The project superintendent shall represent the Contractor in the Contractor's absence, and communications and directions given to the project superintendent shall be as binding as if given to the Contractor. The Contractor's work schedule and a list of subcontractors and suppliers shall be submitted and reviewed along with any other information necessary for the orderly execution of the work at the preconstruction conference.

SGC 2.05 INITIAL ACCEPTANCE OF SCHEDULES

Paragraph 2.05 of the General Conditions shall be deleted in its entirety.

SGC 3.02 REFERENCE STANDARDS

Add new paragraphs immediately after 3.02.A.2 of the General Conditions, which are to read as follows:

3. The work shall be performed in accordance with:

   A. The 2018 edition of the Minnesota Department of Transportation Standard Specifications for Construction, (MnDOT Specifications) and any supplements or amendments thereto issued prior to the date of these Contract Documents.

   B. The 2018 Edition of the City Engineers Association of Minnesota Standard Utilities Specifications for Water Main and Service Line Installation and Sanitary Sewer and Storm Sewer Installation.

   C. The Project Manual, which contain individual project Bidding Requirements, Proposal Form, Conditions of the Contract, Contract Forms, Specifications, and any other project-specific information in the form of appendices.

Traffic control shall be in accordance with the current edition of the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD), including the current edition of the Field Manual for Temporary Traffic Control Zone Layouts.

The provisions for construction shall comply with the following precedence ("1" being the highest precedence, "3" being the lowest):

1) Individual Project Plan
2) Individual Project Manual
3) MnDOT Standard Specifications for Construction

Any conflicting requirements or language shall follow that stated in the highest precedence document of those listed above, unless directed in writing by the Engineer.

4. Coordination of Plans and Specifications shall be in accordance with the provisions of MnDOT Specification 1504, as modified by the following definitions:

   a. Standard Specification: Refer in precedent order to the current Standard Utilities Specifications of the City Engineers Association, the current MnDOT Standard Specifications and the other specifications of ASTM, ANSI, AWWA, etc., as referenced and as published on the date of the bid advertisement.

   b. Supplemental Specifications: Refer in precedent order to the Supplementary Conditions and the General Conditions as contained in these Contract Documents.

   c. Work under these Contract Documents shall be governed by all applicable federal, state, and local laws, regulations, codes and ordinances, and the Contract Documents defined in the Agreement

Should the Contract Documents conflict with any of the regulations and standards mentioned in preceding paragraphs of these Supplementary Conditions, the regulations and standards shall take precedence. This shall not, however, be construed to relieve the Contractor from complying with the requirements of the Contract Documents, which are in excess of, but not contrary to, the regulations and standards.

SGC 4.04 PROGRESS SCHEDULE

Paragraph 4.04.A of the General Conditions shall be deleted in its entirety.

SGC 5.03 SUBSURFACE AND PHYSICAL CONDITIONS

Add new paragraph immediately after 5.03.C of the General Conditions, which are to read as follows:

Notwithstanding Paragraphs 5.03.A and 5.03.C, under no circumstances may the Contractor rely upon the accuracy of the "technical data" contained in reports of explorations or tests of the amounts, elevations, or locations of subsurface groundwater.

SGC 5.04 DIFFERING SUBSURFACE OR PHYSICAL CONDITIONS

Amend paragraph 5.04.E.2.a. by inserting in the second line of this paragraph immediately after the word "conditions" the following:

"or reasonably should have known thereof."

SGC 5.06I HAZARDOUS ENVIRONMENTAL CONDITION AT SITE

Paragraph 5.06I of the General Conditions shall be deleted in its entirety.

SGC 6.01C PERFORMANCE, PAYMENT, AND OTHER BONDS

The first sentence of this section is changed to read as follows:

All bonds shall be in a form acceptable to Owner and shall fulfill statutory requirements

SGC 6.03 CONTRACTOR'S LIABILITY INSURANCE

The following supplementary conditions are for City contracts. Add the following new paragraph immediately after paragraph 6.03.B:

The limits of liability for the insurance required by paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations. The intent is to require all Contractors to carry at least $2,000,000 of coverage. These limits may be derived from the use of underlying coverage or Umbrella/Excess Insurance.

1. Worker's Compensation and related coverage under paragraphs 6.03 of the General Conditions.

   Coverage A: Statutory

   Coverage B: Employers Liability

Bodily Injury by Accident: Each Accident	$500,000
Bodily Injury by Disease: Each Employee	$500,000
Bodily Injury by Disease: Policy Limit	$2,000,000

   Coverage may be written at the State minimum limits but the difference must be supplemented through the use of an Umbrella/Excess policy.

2. The policy shall name the City of Arden Hills and the firm serving in the official capacity of Observer as additional insureds on a primary and non-contributory basis. As additional insureds, the City of Arden Hills and Observer shall be entitled to the limit required by this agreement or Contractor's actual policy limits, whichever is greater.

   Contractor is required to provide the following endorsements: CG 20 10 07 04 or CG 20 10 04 13 and CG 20 37 07 04 or CG 20 37 04 13 or their equivalent.

   General Liability:

Commercial General Liability	
General Aggregate	$2,000,000
Product – Completed Operations Aggregate	$2,000,000
Personal and Advertising Injury	$1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$1,000,000
(Explosion, Collapse, and Underground shall not be deleted)	

Certificate of Insurance should indicate:

Contractual Liability is covered	Yes
Governmental Immunity is waived to the extent of insurance	Yes
Operations of subcontractor is covered	Yes

Optional:

Certificate of Insurance should indicate:

Contractual Liability is covered	Yes
Operations of subcontractor is covered	Yes

The intent is to ensure that the “per occurrence” limits and "product-completed operation" aggregates are at least $2,000,000, but may be attained through the use of an Umbrella/Excess policy.

3. Automobile Liability:

Bodily Injury:	
Each Person	$2,000,000
Each Accident	$2,000,000
Property Damage:	
Each Accident	$2,000,000
or	
Bodily Injury & Property Damage (Combined Single Limit)	$2,000,000

The intent is to ensure that the limits are at least $2,000,000, but may be attained through the use of an Umbrella/Excess policy.

4. Umbrella/Excess Liability:

General Aggregate	$5,000,000*
Each Occurrence	$5,000,000

**The required minimum shall be $5,000,000, or policy limits, whichever is greater.*

The Contractor is also responsible for meeting all insurance requirements set by Ramsey County or the Minnesota Department of Transportation (MnDOT) for any work on or under the County or MnDOT right- of-way if applicable.

SGC 6.04 OWNER’S LIABILITY INSURANCE

Paragraph 6.04A of the General Conditions shall be deleted in its entirety.

SGC 6.04 BUILDER’S RISK AND OTHER PROPERTY INSURANCE

Delete paragraph 6.04 in its entirety and insert the following:

Builder’s Risk Insurance: Before commencement of the Work, the Contractor shall provide Builder’s Risk Insurance on a multiple peril form in the full amount of the total construction and material contract. Such insurance shall contain an appropriate rider to include as Additional Named Insureds, the Owner, the Engineer and his consultants, and each of their officers, employees and agents, all subcontractors, the equipment contractors and all of their subcontractors on the construction premises. Such insurance may have a deductible clause but the deductible amount shall be borne by the Contractor and shall not exceed $1,000.00.

SGC 6.05 PROPERTY LOSSES; SUBROGATION

Paragraph 6.06 of the General Conditions shall be deleted in its entirety.

SGC 7.03 LABOR; WORKING HOURS

Add the following to 7.03.C of the General Conditions to read as follows:

Working hours shall be restricted to the hours of 7:00 a.m. to 8:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. Work will not be permitted on Sundays and holidays.

SGC 7.07 CONCERNING SUBCONTRACTORSAND SUPPLIERS

At the end of the paragraph 7.07.L add the following:

In accordance with Minnesota Statute 471.425, the Contractor shall pay any subcontractor within ten days of the Contractor's receipt of payment from the municipality.

SGC 7.11 LAWS AND REGULATIONS

Add Paragraph D: DATA PRACTICES ACT

The Contractor must comply with the Minnesota Government Data Practices Act, Minnesota Statutes Chapter 13, as it applies to 1) all data provided by the Owner pursuant to this Agreement, and 2) all data, created, collected, received, stored, used, maintained, or disseminated by the Contractor pursuant to this Agreement. The Contractor is subject to all the provisions of the Minnesota Government Data Practices Act, including but not limited to the civil remedies of Minnesota Statutes Section 13.08, as if it were a government entity. In the event the Contractor receives a request to release data, the Contractor must immediately notify the Owner. The Owner will give the Contractor instructions concerning the release of the data to the requesting party before the data is released. Contractor agrees to defend, indemnify, and hold the Owner, its officials, officers, agents, employees, and volunteers harmless from any claims resulting from Contractor's officers', agents', owners', partners', employees', volunteers', assignees' or subcontractors' unlawful disclosure and/or use of protected data. The terms of this paragraph shall survive the cancellation or termination of this Agreement.

SGC 7.13 SAFETY AND PROTECTION

Add a new paragraph immediately after 7.13.J of the General Conditions, which is to read as follows:

The Contractor shall provide all necessary temporary barricades, fences and other protection as required for the proper execution of the work and for the protection of his employees, employees of the Owner, other construction personnel, and the general public according to all Federal, State, and Local regulations. This may include increased signing as necessary. The Contractor may need to furnish, erect, and maintain lights to provide a safe work environment according to all state and federal codes. All utility trenches shall be backfilled at the end of each working day and driveway access provided to individual residences to the satisfaction of the Engineer. The Contractor shall immediately call "911" if a gas utility line is struck or damaged.

SGC 7.16 SUBMITTALS

Add a new paragraph immediately after 7.16.B.1 of the General Conditions, which is to read as follows:

The Contractor shall present to the Engineer three (3) copies of detailed, dimensioned manufacturer's drawings of all materials, apparatus and machinery, and for such fittings and devices as described in the Supplementary General Conditions. In case of lack of approval, the Contractor shall submit new drawings, corrected as required by the Engineer. All such drawings shall be submitted to the Engineer with a time allowance of ten (10) days for consideration.

All shop drawings shall be submitted through the Prime or General Contractor and be accompanied by a letter of transmittal. The Prime or General Contractor shall approve all shop drawings before transmitting them to Engineer for approval.

SGC 8.01 OTHER WORK AT SITE

Add the following to 8.01.D of the General Conditions to read as follows:

The Contractor shall cooperate with all parties to facilitate the prompt completion of all contracts.

Add the following immediately after 8.01.F of the General Conditions, which is to read as follows:

D. The Contractor is hereby advised that the following work maybe performed on the site by others during the contract time.

1. The individual lot owners or their agents may be site grading and/or constructing buildings on the lots adjacent to the proposed streets.

2. Private utility companies may be installing and/or relocating underground facilities on or adjacent to the project.

E. If Owner performs work for the Contractor, the Contractor must payOwner for such work with no deduction in Contract amount.

SGC 9.11 EVIDENCE OF FINANCIAL ARRANGEMENTS

Paragraph 9.11 of the General Conditions shall be deleted in its entirety.

SGC 10.02 VISITS TO SITE

Add a new paragraph immediately after 10.02.B of the General Conditions, which is to read as follows:

C. Throughout the construction phase, regular weekly meetings will be held by the Engineer on site to review progress and to discuss items necessary for an orderly completion of the project. The weekly construction meetings shall include the Engineer and Contractor. The Contractor's representative must be able to make decisions for the Contractor pertaining to the project. All project conflicts shall be brought to these meetings, including requests for additional payment. Meeting minutes will be provided to all participants as a record of the meeting.

SGC 11.02 CHANGE ORDERS

Add a new paragraph immediately after 11.02.A of the General Conditions, which is to read as follows:

Any requests for "Change Orders" shall be submitted to the Engineer in writing within seven (7) days of the occurrence. Any requests shall be approved by the Engineer prior to the work commencing.

SGC 12.01 CLAIMS

The first sentence of Paragraph 12.01.B of the General Conditions shall be deleted and the following inserted in its place:

Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to the Engineer and the other party to the Contract promptly but in no event later than ten (10) days after the start of the event giving rise thereto.

Add the following paragraphs to 12.01F of the General Conditions to read as follows:

Except as specifically authorized in writing by the Engineer at the time additional work is done beyond the original scope of the Contract Documents, the Contractor shall make no claims for additional compensation. The Contractor's plea of ignorance of foreseeable conditions which will create difficulties or hindrances in the execution of the work will not be acceptable to the Owner as an excuse for any failure of the Contractor to fulfill the requirements of the Contract Documents, and shall not be a basis for the Contractor's claim for additional compensation.

Any discrepancies in or conflicts between the items described in these Contract Documents must be submitted in writing to the Engineer for adjustment prior to proceeding with the work as any claims for additional compensation to achieve compliance with the requirements of those items will not be allowed or considered.

SGC 13.01B5F COST OF THE WORK

Paragraph 13.01B5F of the General Conditions shall be deleted in its entirety.

SGC 13.01C COSTS EXCLUDED

Insert the following after Paragraph 13.01C.7:

8. Sales, consumer, use and other similar taxes related to the Work for which Contractor is liable.

SGC 13.03 UNIT PRICE WORK

Delete paragraph 13.03.E in its entirety and insert the following in its place.

There will be no adjustment in unit price for increased or decreased quantities. In addition, the Owner reserves the right to reduce certain quantities or delete certain items from each section of the bids as the Owner sees fit, either before or after the Award of Contract. There will be no additional compensation due to remobilization of equipment as necessary to complete punch list items or other items not completed by the Contractor. There will be no additional compensation due to restocking charges for materials not used on the project.

SGC 14.02 TESTS AND INSPECTIONS

Add the following paragraphs to 14.02.A of the General Conditions to read as follows:

The Contractor shall provide a minimum twenty-four (24) hours' notice to the Observer for any testing that must be observed or accomplished by someone other than the Contractor's personnel. All final tests and inspections shall be performed under the observation of the Resident Project Observer.

All tests on material to be placed shall be completed prior to the placing of any material. Tests shall be made in accordance with the American Society for Testing and Materials (ASTM) standard and tentative specifications that apply, except as otherwise specified.

Signed copies of all reports on tests shall be sent at once to the Owner, Engineer and Contractor. Inspection and testing shall in no way relieve the Contractor or supplier from the responsibility of furnishing materials and workmanship in accordance with the plans and specifications.

SGC 15.01 PROGRESS PAYMENTS

Amend paragraph 15.01B.4 of the General Conditions to read as follows:

The amount of retainage with respect to all progress payments will be as follows:

Minnesota Contractors	5%
Exempt Non-Minnesota Contractors	5%

Non-Exempt Non-Minnesota Contractors 5% + 8%* = 13%
*State Surety Deposit

Non-Minnesota Contractors are advised to file Form SDE with the Minnesota Department of Revenue to determine their exemption status.

No reduction in retainage will be allowed until final acceptance of entire project, unless approved by the Engineer.

Delete paragraph 15.01.D.1 in its entirety and replace with the following paragraphs:

1. Thirty days (30) after presentation of the Application for Payment to owner with Engineer's recommendation, the amount recommended (subject to the provision of paragraph 15.01.D and any Owner set-offs) will become due and when due will be paid by Owner to Contractor, unless extenuating circumstances exist which would preclude such payment by Owner to Contractor. If such extenuating circumstances exist, then payment shall be made within forty-five (45) days after Owner receives presentation of the Application for Payment.

2. Pursuant to Minnesota Statute 471.425, Subdivision 4a, the Contractor must pay any subcontractor within ten (10) days of the Contractor's receipt of payment from the City for undisputed services provided by the subcontractor. The Contractor must pay interest of one and one-half percent (1 ½ %) per month or any part of a month to the subcontractor on any undisputed amount not paid on time to the subcontractor. The minimum monthly interest penalty payment for an unpaid balance of $100.00 or more is $10.00. For an unpaid balance of less than $100.00, the Contractor shall pay the actual penalty due to the subcontractor. A subcontractor who prevails in a civil action to collect interest penalties from the Contractor shall be awarded its costs and disbursements, including attorney's fees, incurred in bringing the action.

SGC 15.05 FINAL INSPECTION

Add the following after the second sentence of paragraph 15.05.A of the General Conditions:

If, after such measures are taken, subsequent inspections by the Engineer reveal that any of the previously identified construction items remain incomplete or defective, the Engineer will again notify the Contractor in writing of the remaining construction items. All costs associated with any subsequent inspections in which said remaining particulars are revealed, will be documented by the Engineer and paid by the Contractor to the Owner.

SGC 15.06 FINAL PAYMENT

Add a new paragraph immediately after paragraph 15.06.A.3 of the General Conditions, which is to read as follows:

4. Before final application for payment is made for the work, the Contractor must make satisfactory showing of compliance with M.S.A. 290.92, which requires the withholding of state income taxes for wages paid to employees on this project. Receipt by the Engineer of a certificate of Compliance from the Commissioner of Taxation to the Owner will satisfy this requirement. The Contractor is advised that before such certificate can be issued, the Contractor must first place on file with the Commissioner of Taxation an affidavit that the Contractor has complied with the provisions of M.S.A. 290.92. The required affidavit form will be supplied by the Commissioner of Taxation, Centennial Building, St. Paul, Minnesota, on request.

   Final payment will not be made until the Contractor shall have filed with the Engineer evidence in the form of an affidavit or such other evidence as may be required that all claims against him by reason of the Contract have been fully paid or satisfactorily secured. This shall be in the form of IC134 forms, paid-in-full final lien waivers from the Contractor, subcontractors, and major suppliers, and a Consent of Surety shall precede

or accompany the final application for payment. In case such evidence is not furnished, the Owner may retain out of any monies due said Contractor sums sufficient to cover all lienable claims unpaid. In addition, a two (2) year maintenance bond is required from the Contractor. Said maintenance bond is to be dated to begin the date the City Council formally accepts the project. . If the foregoing conditions are satisfied, the Owner will release all retainage no later than 60 days after substantial completion, as defined in state law. The Contractor must pay all remaining retainage to its subcontractors in accordance with M. S. A. 337.10.

SGC 15.08 CORRECTION PERIOD

Amend the first sentence of paragraph 15.08.A of the General Conditions to read as follows:

If within two (2) years after the date of final acceptance of the project by the City Council; or such longer period of time as may be prescribed by Laws or Regulations; or by the terms of any applicable special guarantee required by the Contract Documents; or by any specific provision of the Contract Documents, any Work that is found to be defective, or if the repair of any damages to the land or areas made available for the Contractor's use by the Owner or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, the Contractor shall promptly, without cost to the Owner, and in accordance with the Owner's written instructions:

(i) Repair such defective land or areas, or

(ii) Correct such defective Work or, if the defective Work has been rejected by the Owner, remove it from the Project and replace it with Work that is not defective, and

(iii) Satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting there from.

The two (2) year maintenance guarantee shall be included in and be a part of the Contractor Security (Performance Bond) previously specified. The provisions of this section shall not be construed as restricting Contractor's liability for breech of contract by reason of non-conformance with the specification for defects or faulty workmanship.

With regards to any surface concrete work, including but not limited to sidewalks, curb, gutter, and driveway aprons within the project area, the Contractor shall assume full responsibility for any warranty work unless written approval is provided by the Owner releasing the Contractor from the responsibility for damages.

The intent of this provision is to release the Contractor from accepting monetary losses for destruction of concrete sidewalk, curb, gutter, and driveway aprons due to damages and circumstances out of the control of the Contractor. At no point during the two (2) year warranty period shall this relieve the Contractor's responsibility for correction of the defective work as stated in the preceding paragraph, or as caused by poor construction and defective materials. The Owner or Engineer shall make the final determination of what material is defective within the project area at any point within the two-year warranty period.

SGC 17.01 METHODS AND PROCEDURES

Article 17.01, Methods and Procedures, of the General Conditions shall be deleted in its entirety and replaced with the following paragraphs:

In an effort to resolve any conflicts that arise during the design or construction of the project or following the completion of the project, the Contractor and the Engineer agree that all disputes between them arising out of or relating to this agreement shall be resolved, if possible, at the lowest possible staff level. If the dispute cannot be resolved between the Contractor and the Engineer the dispute shall be submitted to non-binding mediation.

The rights and remedies available to the Contractor shall be limited to breach of Contract, and no other cause of action, including, without limitation, negligence, misrepresentation or other tort

theory. The Owner or Contractor may assert any such breach of contract claim in any court of competent jurisdiction. Neither the Owner nor the Contractor shall be entitled to a jury trial in any such action. The right and remedies to the Owner hereunder shall be in addition to and shall not be constructed in any way as a limitation of any rights and remedies available to the Owner, which is otherwise available by law or contract, by special warranty or guarantee, or by other provision of the Contract documents. The provision of this paragraph shall be as effective as if repeated specifically in the contract documents in connection with each particular duty, obligation, right and remedy to which it may apply. All representations, warranties and guarantees made in the Contract documents shall survive final payment, termination or completion of this agreement.

No waiver or failure to enforce any part or provision of the contract documents, including but not limited to the change order process, shall be deemed to be waiver by the Owner of any subsequent default or breach of the same or any other part of provision contained herein, or right to enforce the same or any other part or provision contained herein.

DIVISION 1

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DIVISION 1

GENERAL REQUIREMENTS

SUMMARY OF WORK

The 2026 PMP Street & Utility Improvements includes but is not limited to the complete construction of public improvements for the rehabilitation of the project streets and associated improvements. Individual elements of work shall include, but are not limited to:

1. Removal/milling/reclamation of bituminous pavement, concrete curb and gutter, sidewalk and driveways, pipe, and other miscellaneous items.
2. Clearing and grubbing.
3. Street excavation and preparation.
4. Sanitary and storm sewer CIPP lining.
5. Watermain construction.
6. Storm sewer construction.
7. Miscellaneous utility construction improvements.
8. Stormwater pond BMP construction.
9. Storm pump station construction.
10. Concrete and bituminous walk construction.
11. Concrete curbing and driveway pavement construction.
12. Basketball court construction.
13. Shoreline stabilization construction.
14. Bituminous street and trail construction.
15. Turf restoration and erosion control construction.
16. Traffic Control.
17. Other Miscellaneous work shown on the plans or specified herein.

The project shall include the furnishing of all labor, materials, tools, and equipment necessary to complete this work as shown on the plans and specified herein within the City of Arden Hills, Ramsey County, Minnesota.

The Owner is the City of Arden Hills, Ramsey County, Minnesota. All work will be completed within property under the control of the Owner, in public rights-of-way, easements obtained by the Owner, or on property for which the Owner has been granted a right-of-entry.

TIME OF COMPLETION

The project schedule anticipates a contract award in April 2026 (subject to change).

Substantial Completion shall be on or before **October 2, 2026** and include all utility, street, and restoration improvements, and cleanup.

Final Completion for work including all punch list items, removal of traffic control, and removal of erosion/sediment control shall be completed on or before **October 16, 2026.**

Any requests from the Contractor for modification of the plans and specifications shall be accompanied by an estimate of the time savings or extension. No extension of time will be acknowledged at the end of the project for failing to notify the Engineer at the time that the delay occurred.

The Contractor shall diligently, and without delay, complete all work as described in this Contract and in the Engineer's punch list(s) to meet the Substantial and Final Completion dates of all Work, including execution and submittal of all documentation for final payment.

WORK SEQUENCE

The Contractor shall provide sequencing for this project in accordance with the following requirements:

1. Avoid the use of heavy equipment on a newly paved bituminous base course.

2. Perform his work in such a manner as to cause the least interference with adjoining property owners and the general public.

3. The streets will remain open to local traffic during construction. Seven (7) days' notice to City staff shall be provided prior to installing traffic control signs (advanced warning signs shall be placed seven (7) days in advance). The Contractor shall schedule work continuously to avoid delays.

4. All proposed haul roads must be approved by the City of Arden Hills, Ramsey County/MnDOT Right-of-Way Department (for any haul routes proposed along County/MnDOT roadways). Any damage to existing streets due to unapproved construction use will be repaired at the Contractor's expense.

5. A preconstruction conference shall be conducted within seven (7) days of the Effective Date of the Agreement, and Work at the site shall start within seven (7) days of receiving the Notice to Proceed. The Contractor must also submit a complete work schedule for the entire duration of the project prior to the preconstruction conference.

6. An updated monthly work schedule must be included with any partial payment request. The lack of a schedule may be cause for withholding of progress payments and could result in a work stoppage. The Contractor must notify the Engineer of any and all delays within ten (10) days of the occurrence. These may be considered for an extension to the completion dates.

7. A three-week look ahead schedule shall be provided by the Contractor at each weekly construction meeting.

8. Additional sequencing restrictions/requirements, and milestones that may dictate project phasing, are listed in the Agreement of this Project Manual and in the Plans. The Contractor may present alternative phasing to the Owner and Engineer for review, if they see benefit in changes to the work sequencing. The Owner and Engineer will review any proposed changes in sequencing/phasing by the Contractor, and the Owner and Engineer may approve or reject the changes based on their sole discretion.

CONSTRUCTION LIMITS

The Contractor shall confine operations to the limits of the construction area as shown on the plans. The City will endeavor to have obtained necessary rights-of-entry, rights-of-way, and easements prior to the Contractor commencing work. Failure to acquire all rights-of-entry, rights-of-way, and easements prior to the start of construction shall not be cause for a request of time extension or additional monies by the Contractor.

Should special and/or extraordinary construction methods need to be employed by the Contractor for the completion of the project such as, but not limited to, trench box construction, any special and/or extraordinary construction methods used shall be considered incidental to the project.

SOIL CONDITIONS

The Contractor is advised to determine, to his own satisfaction, the exact soils and ground water conditions prior to submitting his bid. In wet trenches, the Contractor shall dewater the trench by an acceptable method. No additional payment will be made for use of granular or aggregate material to aid in dewatering.

CEAM SPECIFICATIONS

The 2025 Edition of the City Engineers Association of Minnesota Standard Specifications: 2600 Trench Excavation and Backfill/Surface Restoration; 2611 Watermain and Service Line Installation; 2621 Sanitary Sewer and Storm Sewer Installation; 2631 CIPPS Sewer Pipe Rehabilitation – Cured In Place Pipe Systems; 2641 Pipeline Rehabilitation – Pipe Bursting Method ("CEAM Specifications") shall apply except as noted herein or the special provisions.

MnDOT SPECIFICATIONS

The 2025 Edition of the Minnesota Department of Transportation (MnDOT) Standard Specifications for Construction ("MnDOT Specifications") shall apply except as noted herein.

Where the Minnesota Department of Transportation specifications are referred to herein and where a reference to the word "State" is mentioned, it is understood that the word "Owner" is substituted. All reference to the word "Engineer" shall be interpreted as the City Engineer for the Owner.

In no cases shall any part of Division I (General Requirements and Covenants) of the MnDOT Specifications, Sections 1201 through 1307 apply to this contract unless specifically stated elsewhere in these specifications.

1402 – CONTRACT REVISIONS

The provisions of MnDOT 1402 are modified and/or supplemented with the following:

Add the following new paragraph to MnDOT 1402:

1402.7 "OR-EQUAL" CLAUSE

Whenever a material or article required is shown on the Plans or in the Specifications by using the name of a product or of a particular manufacturer, it is to be understood that other products or materials which will adequately perform the required function may be considered equal and satisfactory in the Engineer's opinion. A comparable product shall not be purchased or installed without the Engineer's approval. A "Contract Change Order" shall be used if the Contract is to be modified.

1404 – MAINTENANCE OF TRAFFIC AND (2563) TRAFFIC CONTROL

The provisions of MnDOT 1404 are modified and/or supplemented with the following:

The Contractor shall provide to the Engineer, at least seven (7) days in advance of erecting traffic control devices, a traffic control plan that indicates placement of traffic control devices, schedule and duration of time for the traffic control, including identification of flag person(s) for temporary lane closures and proposed detours of traffic.

The Contractor shall furnish, erect and maintain traffic control devices (barricades and ballasts, warning signs, flashers, cones and drums, etc.) to adequately warn and protect the public from hazardous protrusions, materials, excavations, etc., resulting directly or indirectly from the construction. Traffic control devices shall be in accordance with MnDOT 1710.

Traffic control shall be the sole responsibility of the Contractor and shall conform to the requirements of the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD), including the current edition of the Field Manual for Temporary Traffic Control Zone Layouts. The Contractor shall be required to submit in writing a copy of the traffic control plan to the Engineer at least forty-eight (48) hours prior to a proposed partial blockage or closure of any street or public right-of-way.

The Contractor shall furnish and install advanced notification signage (static signs) for every phase prior to the start of construction. The signage shall specify the intended start date, be compliant with the MUTCD, and be placed a minimum of 7 days in advance and shall be placed at the entrance to each roadway block for each phase.

The Contractor shall maintain traffic through the intersections whenever possible.

The minimum traffic control requirements are identified in the plans. The Contractor shall submit their intended traffic control plan to the Engineer for approval. The contractor shall coordinate with Ramsey County and/or MnDOT, if their jurisdictional roads are to be used for placement of temporary signage and/or utilized as a detour route, and shall obtain any required permits from each organization.

The Contractor shall furnish names, addresses, and phone numbers of at least three (3) individuals responsible for the placement and maintenance of traffic control devices. At least one of these individuals shall be "on call" twenty-four (24) hours per day, seven (7) days per week during the times any traffic control devices, furnished and installed by the Contractor, are in place. The required information shall be submitted to the Engineer at the preconstruction conference. The Contractor shall also furnish the names, addresses, and phone numbers of those individuals to the following:

1. City of Arden Hills – Public Works	(651) 792-7851
2. Ramsey County Sheriff's Department	(651) 767-0640
3. Lake Johanna Fire Department	(651) 483-0767
4. Mounds View School District	(651) 621-6000

Traffic control devices shall be inspected daily or as directed by the Engineer. Warning lights shall be checked weekly by the Contractor or its representative for proper operation and cleaned as required. All broken or ineffective traffic barriers, warning signs, and warning lights shall be replaced immediately.

Measurement and Payment: Traffic Control shall be measured by the LUMP SUM and paid in accordance with the following schedule.

1. On the first partial estimate that shows work performed on at least one major contract item, 25 percent of the amount bid for Traffic Control will be paid, but not more that 3 percent of the original Contract amount.
2. On subsequent partial estimates, payment shall be made at the same percentage as the value of work completed to date relative to the original Contract amount, except that payment shall not be reduced from the original 25 percent. Materials on hand shall be excluded from the payment ratio computation.
3. At such time that 95 percent of the original Contract amount is earned, full payment for Traffic Control shall be made.

1407 – FINAL CLEANUP

The provisions of MnDOT 1407 are modified and/or supplemented with the following:

During the progress of the work, the area affected shall be kept clean and free of all rubbish and surplus materials at all times. All unneeded construction equipment shall be removed from the site and all damage repaired so that the public and adjacent property owners are inconvenienced as little as possible.

Where materials or debris have washed or flowed into or have been placed in water courses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be removed and satisfactorily disposed of during progress of work. All ditches, channels, drains, etc. shall be kept in a clean and neat condition. All catch basins and sumps shall be cleaned just prior to final acceptance of the project.

Any material deposited on streets adjacent to the project from construction or hauling operations shall be cleaned as directed by the Engineer. If the Contractor fails to clean adjacent roadways within twenty-four (24) hours of notification, the Engineer shall make arrangements to have the roadways cleaned by the City and bill the Contractor $500.00 per occurrence. The $500.00 fee for street sweeping will be deducted from project retainage for each occurrence.

It is expected that the existing streets and private properties adjacent to the project will remain clean and free of soil and debris throughout the duration of the project. All roadways, driveways, parking areas, lawns,

etc. should be inspected on a minimum daily basis to prevent soil and debris from building up. Any soils or debris shall be removed immediately upon discovery. If, in the opinion of the Engineer, the areas adjacent to the construction area are not being sufficiently cleaned, the Engineer shall arrange to have the work completed by a separate Contractor. All costs associated with cleaning the area shall be deducted from the monies due the Contractor.

On or before the completion of work, the Contractor shall, unless otherwise directed in writing, remove all temporary works, tools and machinery or other construction equipment placed by the Contractor. The Contractor shall remove all rubbish from any grounds which the Contractor has occupied and shall leave all the premises and adjacent properties affected by the operation in a neat and restored condition satisfactory to the Engineer.

Sweeping of streets and parking lots that are impacted by the construction shall be the responsibility of the Contractor. The Contractor shall provide street and parking lot sweeping when requested by the Engineer, at no additional cost to the Owner. The sweeper shall be a pick-up style sweeper.

Unless the proposal includes a contract bit item for cleanup, cleanup shall be incidental to the contract. Failure to perform clean-up may result in the stoppage of work until clean-up is completed. No additional compensation shall be made for down time resulting from a work stoppage to perform clean-up.

1507 – UTILITY PROPERTY AND SERVICE

The provisions of MnDOT 1507 are modified and/or supplemented with the following:

Plans shall contain information depicting the relative location of existing utilities to the extent this information is available from the respective utility companies. The Owner does not, however, guarantee the locations as shown on the plans, and it is the Contractor's responsibility to ascertain the final location of these utilities and to notify the utility companies prior to commencing construction. The Contractor shall be responsible for the coordination of utility locates.

The subsurface utility information shown on the plans concerning type and location of private utilities has been designated utility quality level D. The quality level was determined according to the guidelines of CI/ASCE 38-02, entitled "Standard Guidelines for the Collection and Depiction of Existing Subsurface Data".

All bidders are expected and assume the responsibility to contact the affected utilities prior to submitting the bid to determine the extent of their facilities within the project area and the scope and anticipated schedule of the facility relocation, removal, or adjustment. The Contractor shall be responsible for any requirements imposed by utility companies within the project area.

The Contractor shall pothole to locate private utilities, as required, prior to construction. This work shall be considered incidental to project costs. The following utility owners, in addition to others, may have existing facilities that may be affected by the work under this Contract. The Contractor shall coordinate work efforts with utility relocations in an effort to prevent delays.

City of Arden Hills, Jeff Frid (water, sewer, storm sewer)
Phone: 651-792-7852
jfrid@cityofardenhills.org

Xcel Energy, Scott Widmer (Gas)
Phone: 651-261-3087
scott.a.widmer@xcelenergy.com

Xcel Energy, Scott Tomford (Electric)
Phone: 763-439-3418
scott.tomford@xcelenergy.com

Gateway Fiber, TBD (Telecommunications)

TBD

Lumen (CenturyLink), Jason DeRosa (Telecommunications)
jason.derosa@lumen.com

MCI Communications, Greg Allen (Telecommunications)
Phone: 651-262-6600
greg.allen@verizon.com

Comcast, Luke Bastil (Telecommunications)
Phone: 651-262-6600
luke_bastil@comcast.com

Ramsey County Public Works, Joe Grothjan (Fiber & Traffic Signals)
joseph.grothjan@co.ramsey.mn.us

Zayo, Steve Senger (Telecommunications)
steven.senger@zayo.com

1507.2 – NOTIFICATION

It may be necessary to relocate existing private utilities to facilitate construction. It is the Contractor's responsibility to coordinate his work with the non-municipal utility companies and preserve the existing condition of said utilities. The Owner will not be responsible for any delay that the Contractor may encounter due to the utility company involved failing to promptly do their necessary work. All crossings shall be thoroughly backfilled and compacted, using mechanical tampers to prevent any displacement or settlement of the utility lines. No compensation will be allowed the Contractor for replacement of damaged utilities.

State law requires that the Contractor to contact Gopher State One Call (651-454-0002) for utility locations before doing any underground excavation. All costs associated with Gopher State One Call notification and administration and coordination with facility operators shall be considered incidental.

1508 – CONSTRUCTION STAKES, LINES, AND GRADES

The provisions of MnDOT 1508 are modified and/or supplemented with the following:

The Engineer will provide horizontal and vertical control construction stakes as follows:

A. Sanitary Sewer, Forcemain and Storm Sewer: Staking will be furnished and set by the Engineer at 50.0-foot spacing (usually offset for construction) for the control of the underground construction herein described. Cuts to the proposed pipeline grade will be furnished by the Engineer. Manholes and catch basins will be staked with an offset and a witness with a cut to the lowest structure invert. Location staking shall be provided for service wyes for new construction.

    1. No staking will be provided for service wyes for reconstruction projects or where existing services are being connected to the new sewer line.
    2. This project will not include any staking for sanitary sewer or forcemains.
    3. This project will only include staking of new/replacement storm structures and any significant section of storm sewer pipe.

B. Watermain: The staking interval for watermain shall be 50.0-feet. Cuts to the proposed pipeline grade will be furnished by the Engineer. Location staking shall be provided for valves and fittings. Hydrants will be staked with an offset and a witness with a cut to the ground elevation at the hydrant.

1. No staking will be provided for service corporation stops for reconstruction projects or where existing services are being connected to the new watermain.

C. Grading: Intermittent reference stakes will be provided for the grading of the new stormwater pond BMP to provide necessary alignment and grade references to construct the pond.

D. Street Grading and Top of Curb:

1. A control line (usually offset from the curb line) with cuts and fills to proposed grade at 50.0-foot spacing on tangents, and 25.0-foot spacing on horizontal or vertical curves, shall be furnished and set on both sides for control of the construction herein described.

(a) All locations on this project are spot curb replacements and shall be installed to provide positive drainage meeting the street's original design intent. No curb stakes will be provided on this project.

2. Unless otherwise stated in the applicable section of the Specifications or waived by the Engineer, the Contractor shall provide Blue Tops prior to final paving for subgrade and aggregate base construction

E. Sidewalks and Trails:

1. A control line (usually offset from the edge of walk) with cuts and fills to proposed grade at 50.0-foot spacing on tangents, and 25.0-foot spacing on horizontal or vertical curves, shall be furnished and set on one side for control of the construction herein described.

(a) Staking will not be provided for existing sidewalk and trail replacements, except where the design intent deviates from the existing conditions. Walks and trails shall be graded to match the existing conditions and drainage patterns, except as noted in the plan drawings.

(b) Stakes will be provided for the trail replacement along Highway 96 and the realigned trail on the north side of Cummings Park Drive only.

F. The Engineer will provide horizontal and vertical control points on the project's datum.

G. Contractor is responsible to have all areas where stakes need to be set to be clear of debris. The contractor needs to also provide a clear line of sight for staking.

H. In the event of apparent or questionable errors or inconsistencies in such stakes set for control of line and/or grade, the Contractor shall promptly notify the Engineer of such error or inconsistency and shall not proceed with the work until such stake, grade, or mark shall have been verified or corrected by the Engineer.

I. All other line and grade staking shall be the responsibility of the Contractor. The Contractor shall furnish sufficient equipment and personnel for determination of plan grades, cross sections, course thicknesses, etc. The survey cost of establishing stakes requested by the Contractor for the convenience of the Contractor, beyond those cited as basic project control, will be charged to the Contractor or withheld from the amounts due to the Contractor.

It shall be the Contractor's total responsibility to accurately construct the project as specified in accordance with the construction stakes. Construction stakes will not be placed by the Owner until a written request is received from the Contractor giving the Engineer forty-eight (48) hours' notice, describing where and when he wants the construction stakes placed for the next week's construction. The stakes will be set only one (1) time and it will be the responsibility of the Contractor to preserve the stakes. Staking requests submitted after 2pm shall be recorded as being received the next business day.

The Engineer shall have the right to order the Contractor to have construction stakes replaced if the Engineer determines that a significant number of stakes have been destroyed.

The replacement of any construction stakes will be done by the Owner at the Contractor's expense and for which the Contractor will be billed.

The Contractor shall notify the Engineer of any property corner, whether the Owner has marked them or

not, which the Contractor may disturb in sufficient time to allow the Engineer to establish ties to the corner. The replacement of property or section corners shall be by the Owner. Any property corners that need to be replaced outside of the construction limits will be at the Contractor's expense and for which the Contractor will be billed.

No additional compensation shall be allowed by the Contractor for any claims of crews being held up because of lack of line and grade stakes.

1511 – INSPECTION OF WORK

The provisions of MnDOT 1511 are modified and/or supplemented with the following:

Any person representing federal or state agencies, the Engineer, or Owners shall have the right-of-entry to inspect the work being performed by the Contractor. If the case warrants, the Contractor shall provide proper facilities for such access and inspection.

The Contractor shall notify the resident Observer anytime he anticipates working on this project. No work will be allowed without notifying the Observer a minimum of twenty-four (24) hours beforehand.

1603 – MATERIALS; SPECIFICATIONS, SAMPLES, TESTS, AND ACCEPTANCE

The provisions of MnDOT 1603 are modified and/or supplemented with the following:

Owner will employ and pay for services of an independent testing laboratory to perform specified inspection and testing. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of the Contract Documents. Any retesting due to failures shall be at the expense of the Contractor.

1603.2 – SAMPLING AND TESTING

The first paragraph of MnDOT 1603.2 is hereby deleted and replaced with the following:

The rates of testing to be completed may be adjusted as determined by the Engineer. The Contractor will be responsible for coordination of the following tests and communication with Engineer. Contact information will be distributed at the pre-construction meeting.

The general testing schedule minimums are provided below. The Engineer may amend or modify this schedule during the project.

Type	Testing	Minimum
Trench Backfill	In-place density	1 per 3-foot depth per 300 LF
Subgrade	Density and moisture	1 per 500 SY
Subgrade	Test rolling	Areas > 500 SF
Select Granular	Gradation	1/500 Ton
Select Granular	Density and moisture	1/500 SY
Aggregate Base	Gradation and percent crushed	1/500 Ton
Aggregate Base	Density and moisture	1/500 SY
Aggregate Base	Test rolling	Areas > 500 SF
Concrete	Slump	1/First 25 CY, 1/50 CY thereafter
Concrete	Air entrainment	1/First 25 CY, 1/50 CY thereafter
Concrete	Cylinders	1/First 25 CY, 1/50 CY thereafter
Bituminous	In-place density	If required by Engineer
Bituminous	Asphalt content	1/500 Ton
Bituminous	Gradations/extraction	1/500 Ton

Coring of the final wear course bituminous pavement is NOT allowed, unless otherwise requested by

the City.

Testing field work shall be completed to assure quality of materials and/or workmanship. The Contractor will assist the Owner in coordination of the tests to be performed, incidental to the project.

Engineer will report all test results, either passing or failing and provide to the Observer, Owner, and Contractor. Failing test results shall be retested to confirm compliance with the project specifications.

Subject to prior approval by the Engineer, the Contractor may exceed the maximum slump requirements only with the addition of a water reducing agent (super plasticizer). The use of water to exceed the maximum slump requirements is not allowed. The use of plasticizers and/or water reducers shall be at the Contractor's expense.

The Contractor shall make an earnest effort to dry soils that exceed the optimum moisture content requirements as specified in MnDOT 2105.3.B.2. This work shall be incidental to the project.

1606 – STORAGE OF MATERIALS

The provisions of MnDOT 1606 are hereby supplemented with the following:

The Contractor shall be responsible for identifying and providing a project storage area. The area shall be cleaned up and fully restored to the pre-existing condition prior to closing out this project. The cleanup, restoration, and erosion control of the project storage area shall be the Contractor's responsibility; no compensation will be made for this work.

The only materials that will be allowed to be stockpiled within project limits are materials which will be incorporated into the project and then only in the quantity needed. Materials cannot be stockpiled which are for use on other projects. This specification applies to manufactured and natural materials (including material stockpiled for crushing).

If the Contractor elects to crush excavated materials within the project limits, the quantity of crushed material will be limited to only the quantity required for this project. The Contractor will not be allowed to crush materials other than those found within the project limits, unless approved in writing by the Engineer. The Contractor will not be allowed to remove crushed material from the project limits, unless approved in writing by the Engineer.

No payment shall be made for materials on hand.

1701 – LAWS TO BE OBSERVED

The provisions of MnDOT 1701 are modified and/or supplemented with the following:

Environmental Program Delivery

After the Contract award, the Project Manager, the Contractor designated erosion control supervisor, all supervisors of subcontractors or supervisors of individual work activities shall attend an Environmental Training session provided by project's Environmental Compliance Manager (ECM). The training will consist of an approximately one (1) hour commitment and will be provided by the ECM and Regulatory Agency staff. Training will consist of a Project overview, an overview of Project specific environmental commitments and documents, NPDES rules and regulations, water appropriations, decontamination protocols, plan content, example past means, methods and amendment processes, and general goals of the construction. This is to ensure contactor awareness of compliance costs and incorporation of best management practices when working within Areas of Environmental Sensitivity (AES).

Contractor personnel that are required attend the training include: the Project Manager and the designated erosion control supervisor, per MnDOT 1717. Other Contractor personal invited are Contractors' lead staff preparing the bid, potential Project construction supervisors overseeing the work of the Prime Contractor and all subcontractors, proposed environmental quality control managers or proposed erosion control

supervisor (if different from the Contractor Project Manager or Environmental Compliance Officer), proposed specialty contractor's supervisors performing specific work of dewatering and working in environmentally sensitive areas.

Routine Environmental Audit

The City will audit contractors and installers with approved SWPPPs on a monthly or weekly basis or as deemed necessary by the Engineer to determine if the SWPPP is being properly implemented. The City will rely on the provisions of MnDOT 1807 if the audit indicates non-conformance. Corrective action, up to and including the Contractor hiring a third-party Quality Control Inspector, may be required as a disciplinary step, at no cost to the City.

1702 – PERMITS, LICENSES, AND TAXES

Owner will obtain the following permits:

1. Rice Creek Watershed District (RCWD) Permit(s)
    a. Erosion & Sediment Control Plan Permit (Rule D)
    b. Floodplain Alteration Permit (Rule E)
    c. Appropriation of Public Waters Permit (Rule J)
    d. Wetland Alteration Permit (Rule F)
2. Wetland Conservation Act (WCA) Aquatic Resource Impact Permit(s)
3. Minnesota Department of Natural Resources (MnDNR) Public Waters Work Permit Amendment
4. Minnesota Department of Health (MDH) Watermain Plan Review Permit
5. Ramsey County Right of Way Excavation Permit(s)

Any other permits shall be obtained and paid for by the Contractor and shall be considered incidental, including the NPDES Construction Stormwater Permit, and permitting from Ramsey County and/or MnDOT for the temporary placement of traffic control signage and/or traffic detour(s).

The Contractor is responsible for submitting the NPDES permit application and the required permit fee to MPCA. Construction shall not begin until the Owner and Contractor receive written notification that the NPDES permit for the project is in effect. The Contractor is responsible to modify the SWPPP as needed during construction in order to maintain constant compliance with the terms of the NPDES permit for the entire project duration.

The Contractor shall compile all SWPPP modifications, inspection reports, and other related documentation into a single document (three-ring binder or similar), henceforth referred to as the Project SWPPP. The Project SWPPP shall remain on site at all times and must be made available for review immediately upon request by Owner or other inspector. Upon completion of the project, the Contractor shall provide a copy of the entire Project SWPPP to the Owner prior to final payment being issued. The Contractor shall abide by all permit requirements until the site has achieved final stabilization and the Notice of Termination form has been submitted to MPCA.

The provisions of MnDOT 1702 are modified and/or supplemented with the following:

In the event the Owner is fined by the Minnesota Pollution Control Agency, Environmental Protection Agency or Minnesota Department of Health as a result of the Contractor's actions or lack of actions, the Owner will deduct from payment due the Contractor corresponding amounts to cover the cost of such fines, including the costs of related Engineering and legal fees.

1706 – EMPLOYEE HEALTH AND WELFARE

The provisions of MnDOT 1706 are modified and/or supplemented with the following:

The Contractor, at their own expense, shall provide and maintain temporary toilet facilities at the site during the construction period sufficient for the scheduled workforce. The Contractor and Engineer shall agree to the location of the temporary toilet facilities.

1707 – PUBLIC CONVENIENCE AND SAFETY

The provisions of MnDOT 1707 are modified and/or supplemented with the following:

The Contractor shall provide any barricades, fences or other means of protection necessary to properly execute the work and adequately protect the Contractor's employees, employees of the Owner, employees of the Engineer, and members of the public according to federal, state, and local regulators. All utility trenches shall be backfilled at the end of each working day. All labor and materials necessary to comply with these provisions are incidental, and no payment shall be made.

Add the following new paragraph to MnDOT 1707:

Noise Control: Comply with local and state ordinances on noise abatement.

The Contractor shall eliminate noise to as great an extent as possible at all times. The Contractor shall not exceed noise levels of 85 decibels within close proximity of existing residential areas. Air compressing plants, generators or other noise emitting equipment shall be equipped with silencers and the exhausts of all gasoline motors or other power equipment shall be provided with mufflers. The Contractor shall provide a plan to the Owner for review and approval detailing noise abatement measures to be implemented and a mitigation plan if noise levels are exceeded. If noise levels are exceeded, the Contractor will be responsible to implement an approved mitigation plan.

Coordination with Service Providers

The Contractor shall coordinate with the postal service, recycling services, garbage collection services, and school bus services to maintain continual uninterrupted service to all residences and businesses throughout the duration of the project.

The Contractor shall haul recycling and garbage for residents to a designated pick-up location in the morning, as required by the subject service provider, and haul the containers back to each residence the same evening. The Contractor shall label recycling and garbage containers with the corresponding address prior to moving to a pick-up location. All equipment, materials, and labor required to coordinate with recycling and garbage service providers and maintain services shall be incidental to the Contract. Garbage pick-up day is Wednesday throughout the project area.

Temporary Mailboxes shall be furnished and installed at a central project location during the project for each phase of construction where the postal service will not be able to reach the original mailbox locations. The Contractor must coordinate the location and addresses of the temporary mailboxes with the postal service. Temporary Mailboxes, including the installation, maintenance during construction, removal, and coordination with the postal service, shall be considered incidental to the salvaging and reinstallation of mailboxes on the project. Salvage Mailbox Support and Install Mailbox Support shall both be measured and paid per EACH and will include removing and salvaging the existing post and mailbox from its original location, storing the post and mailbox in a safe location, and installing the post and mailbox back in its original location to the satisfaction of the Engineer and Owner. Any mailboxes that are damaged during the salvaging and reinstalling process must be replaced at the Contractor's cost.

Gateway Fiber is anticipated to be installing a new fiber system within the project area in early 2026. The contractor shall coordinate their schedule with Gateway Fiber's contractor to avoid conflict, if applicable.

Xcel Energy Gas is anticipated to be replacing the gas mains and services to the homes throughout the entirety of the residential neighborhood portion of the project area. They indicated this work is anticipated to begin as early in April as possible and will take approximately 10 weeks to complete. The contractor shall coordinate their schedule with Xcel's contractor to avoid conflict, where applicable.

Coordination with Property Owners (Arden Manor Park)

The Contractor shall coordinate with the Arden Manor Mobile Home Manager in advance of construction mobilization to the Arden Manor Park project area. The Mobile Home Manager shall be notified of the anticipated construction schedule submitted as part of the preconstruction meeting and shall be notified 7 calendar days in advance of mobilization to the project area.

Contact: Peter; Arden Manor Mobile Home Manager; 651-636-0553 or 763-244-6711

In the proximity of the Arden Manor Park project area, the contractor may utilize the following general areas for staging of materials, equipment, and vehicles: approximately 20-ft directly north of the basketball court, approximately 20-ft directly east of the basketball court, and approximately 20-ft directly south of the basketball court and the playground. Absolutely no staging of materials/equipment or parking of construction vehicles will be allowed on the bumped out/looped private driveway off of Prior Ave that leads to the Arden Manor Park trail access easement or on any Arden Manor street (these are all private streets).

All turf and/or paved areas that are impacted by staging shall be restored as by the Contractor as part of the project, even if they are outside of the identified construction limits. All costs associated with required restoration shall be included in the Lump Sum price bid.

The Arden Manor Park project area is required to have safety fence installed around the perimeter of the entire work area (including any staging areas) at the conclusion of each work day. This shall be included in the Lump Sum price bid.

1712 – PROTECTION AND RESTORATION OF PROPERTY

The provisions of MnDOT 1712 are modified and/or supplemented with the following:

Add the following new paragraph to MnDOT 1712.1:

Existing Improvements: Protect in place, and/or remove and reinstall all fences, street signs, lawn irrigation systems, invisible dog fence systems, retaining walls, and other items required to construct the proposed improvements. **The work associated with protecting, and/or removing and reinstalling all fences, street signs, lawn irrigation systems, invisible dog fence systems, retaining walls, and other items shall be considered incidental to the project unless specific bid items are provided in the Proposal Form.**

Provide and use only rubber-tired dozers, front-end loaders and other necessary equipment on all work where street pavements or portions of pavements are undisturbed for the protection of the pavements or in such locations as the Engineer may direct. No compensation will be allowed the Contractor for resurfacing or replacing damaged pavements.

Protect adjoining properties and structures from hazards in connection with performance of the work. The Contractor is responsible for any and all damages to properties and structures that occur as a result of his operations.

1717 – AIR, LAND, AND WATER POLLUTION

Pollution of natural resources of air, land, and water by operations under this Contract shall be prevented, controlled, and abated in accordance with the rules, regulations, and standards adopted and established by the Minnesota Pollution Control Agency (MPCA). The provisions of MnDOT 1717 are modified and/or supplemented with the following:

1717.1 – GENERAL

The provisions of 1717.1.D are modified and/or supplemented as follows:

Dust Control: The Contractor shall be responsible for dust control. Water is available to the Contractor for this use for purchase, but suitable arrangements must be made with the Owner to determine locations where water may be obtained.

Water for construction purposes may be obtained from the City Public Works Department via hydrants on-site as approved by the Engineer. The Contractor must obtain a meter from the City Public Works Department and pay a deposit for the meter. The Contractor will pay for the water used for construction purposes at the rate determined by the City.

The Contractor will be responsible for developing a dust control plan that shall include, but not be limited to, the following dust control measures:

1. Minimize period of exposed or graded areas.
2. Spraying construction areas and haul roads with water or calcium chloride.
3. Minimize use of vehicles on unpaved surfaces.
4. Covering or spraying material piles and trucks.
5. Street sweeping.
6. Using natural or artificial wind breaks.

The Owner has the right to perform this work at the Contractor's expense if the work is not completed in a timely manner according to the Engineer. The Owner will deduct from payment due to the Contractor for all corresponding amounts to cover the cost for dust control measures.

1717.2 – STORMWATER MANAGEMENT AND EROSION CONTROL

The provisions of MnDOT 1717.2 are modified and/or supplemented as follows:

Erosion control shall be placed and maintained by the Contractor. The Contractor shall use the appropriate means of control for individual situations. The erosion control types may include but are not limited to silt fence, fiber blanket, rock construction entrances, diversion ditches, and catch basin inlet protection, all of which will be considered incidental to the project cost unless a bid item is provided in the Proposal Form. Failure to maintain the erosion control will be sufficient cause to withhold further payments on the project until the maintenance is complete.

The erosion control measures for the project have been identified in the plan set; however, modifications can be made depending on actual site conditions.

All manholes shall be protected from surface water drainage. All storm sewer systems shall be protected from sedimentation, along with downstream ponding areas. All catch basins must be protected with approved means of protection immediately following construction.

Prior to final acceptance of the project, the Contractor shall remove all erosion control items.

1801 – SUBLETTING OF CONTRACT

The provisions of MnDOT 1801 are modified as follows:

For Projects in excess of $50,000, the Contractor may sublet work only to subcontractors that meet the definition of "responsible contractor" in Minnesota Statutes §16C.285, subdivision 3. The Contractor obtain verifications of compliance with §16C.285 from subcontractors using a form provided by the Owner. The Contractor must provide such verifications to the Owner upon the Owner's request.

1903 – COMPENSATION FOR ALTERED QUANTITIES

The provisions of MnDOT 1903 are hereby deleted and replaced with the following:

There will be no adjustment in unit price for an under-run or over-run of the estimated quantity. There will be no adjustment in unit price for increased or decreased quantities. In addition, the Owner reserves the right to reduce certain quantities or delete certain items from each section of the bids as the Owner sees fit, either before or after the Award of Contract. There will be no additional compensation due to remobilization of equipment as necessary to complete punch list items or other items not completed by the Contractor. There will be no additional compensation due to restocking charges for materials not used on the project.

The Owner may add work to the project in areas located inside the established construction limits. Any additional work shall be paid for under unit bid prices.

PROTECTION OF FISH AND WILDLIFE RESOURCES

Compliance with Environmental Documentation

The Project is located in an area with protected fish & wildlife resources and/or threatened & endangered species. The Contractor must protect these resources in accordance with State and Federal regulations and must implement all applicable avoidance and minimization measures (AMMs).

See project specific information related to protected and/or threatened & endangered species in Appendix D – RARE SPECIES INFORMATION. All additional protection measures for these species identified herein shall be considered incidental.

BLANDING'S TURTLE PROTECTION

Blanding's turtles may be present at the Project Site. The Contractor must keep a copy of the Minnesota Department of Natural Resources (DNR) Blanding's Turtle flyer prominently displayed on the job site at all times and train all staff, including any Subcontractors, in proper procedures if any Blanding's Turtles are encountered. The Contractor must provide a copy of the MN DNR's flyer to all Subcontractors performing Work.

The DNR's flyer is available at the DNR's website
http://files.dnr.state.mn.us/natural_resources/animals/reptiles_amphibians/turtles/blandings_turtle/flyer.pdf

Contractor must immediately (within 24 hrs) report all turtle sightings to the Department's wildlife ecologist, https://www.dot.state.mn.us/environment/wildlife.html.

Contractor, subcontractors must move turtles which are in imminent danger, by hand, out of harm's way. Turtles outside project Construction limits, which are not in imminent danger, should be left undisturbed.

Contractor must install silt fencing or similar turtle-proof barriers around all soil stockpiles, gravel pads, and other areas of exposed soil to prevent turtle access from May 15 to July 15. Silt fencing or similar turtle-proof barriers must be removed prior to project closeout. Filter logs do not count as a turtle-proof barrier.

Contractor must inspect trenches, holes, or similar depressions prior to beginning work each day to ensure turtles have not entered these areas. Turtles that have entered these areas are in imminent danger and must be removed, by hand.

The DNR's Blanding's Turtle Flyer with an illustration of an adult Blanding's Turtle must be conspicuously posted adjacent to the Engineer's field office.

Work Restrictions – All aquatic impacts must be avoided during hibernation season, between October 15th and April 15th, unless the area is unsuitable for hibernation.

BAT PROTECTION

The Project is located in a County inhabited by protected bat species. The Contractor must ensure all operators, employees, and Contractors working in areas of known or presumed bat habitat are aware of environmental commitments and avoidance and minimization measures (AMMs) to protect both bats and their habitat. The Contractor must notify Project Subcontractors during the preconstruction meeting.

Contractor must direct temporary lighting, if used, away from wooded areas during the bat active season (April 1 to Oct 31, inclusive).

Contractor must immediately report (within 24 hrs) all bat sightings, live or dead, to the Department's wildlife ecologist, https://www.dot.state.mn.us/environment/wildlife.html.

Tree Clearing Requirements:

Tree clearing is required to be completed on or before March 31st, 2026, except as indicated for individual trees in an urban setting provided all other conditions/restrictions are met.

Tree grubbing may take place outside of the clearing dates identified above, provided it meets all other requirements of the contract.

Contractor must ensure tree removal is limited to that specified in the Plans. The Contractor must provide all Subcontractors preforming Work with the clearing limits and how they are marked in the field (e.g., install bright colored stakes, flagging, or fencing) prior to any tree clearing to ensure that all clearing stays within identified clearing limits.

BALD EAGLE PROTECTION

Bald Eagles are protected by the Bald and Golden Eagle Protection Act. No Bald Eagle nests are known within the project limits. However, if a Bald Eagle nest is discovered during Project activities, Contractor must immediately report Bald Eagle nests to the Department's wildlife ecologist, https://www.dot.state.mn.us/environment/wildlife.html.

CONTRACTOR'S USE OF PREMISES

General

Based on personal examination of the site, the Contractor must satisfy himself as to all local conditions affecting the performance of the contract. The Contractor is considered to accept such conditions as found to exist.

Existing Underground Utilities

Existing underground utilities, as shown on the drawings are located in accordance with available data but locations shall be determined by each Contractor as the work proceeds. Excavation work shall be done carefully to avoid damaging existing utilities. The Contractor shall provide for protection, temporary removal and replacement, or relocation of identified obstructions as required for the performance of the work required in these contract documents. No extra payment will be made for this work unless specified in the proposal or special provisions.

Obstructions not shown on the drawings or indicated in the specifications, and requiring relocation, shall be exposed by the Contractor without injury, or if injured, shall be repaired by Contractor at his expense. Removal of such obstruction or its relocation shall be made by the Contractor according to the provisions of the General Conditions.

Existing Facilities

The Contractor shall take complete field measurements affecting all existing construction in this project and Contractor shall be solely responsible for proper fit between his work and existing structures and equipment. The Contractor shall examine all work to which he will connect, and if any misalignment is found, he shall arrange his work so that the misalignment is corrected to the satisfaction of the Engineer.

Dimensions given on the drawings for existing structures are based on existing construction drawings. It shall be the responsibility of the Contractor to verify the accuracy of these dimensions. Discrepancies in dimensions shall be brought to the attention of the Engineer prior to start of new construction.

The Contractor is responsible for any damage to existing structures, work, materials, or equipment because of his work and shall repair or replace any damaged structures, work, materials, or equipment to the satisfaction of and at no additional cost to the Owner or Engineer.

The Contractor shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, or other public or private property, which may be caused by transporting equipment, materials, or men to or from work. The Contractor shall make acceptable arrangements with the group having jurisdiction over damaged property for its repair or replacement.

Construction Trailer

The Owner will work with the Contractor to determine a suitable location for a construction trailer within the project area, should the Contractor desire to have a trailer on-site for the duration of the project. No direct compensation will be paid for use of a trailer with the project. Employees of the Contractor will be permitted to park their personal vehicles within the project area but not blocking open roadways or driveways.

Park grounds outside the construction limits shall not be utilized for material storage by the contractor. Smoking is not permitted within City Parks. Trash generated by the Contractor's use of the premises shall be removed by the Contractor; City refuse facilities are for use by park patrons only.

The Contractor will be responsible for any repairs deemed necessary by the Owner to remedy damage sustained from the placement of the trailer.

Unfavorable Construction Conditions

During excessive moisture or other unsuitable construction conditions, the Contractor shall confine his work to areas which are not adversely affected by the weather. No portion of the work shall be constructed under conditions that would adversely affect the quality of the project unless special means or precautions are taken by Contractor to perform the work in a proper and satisfactory manner.

Methods of Operation

The Contractor shall inform the Engineer in advance concerning his plans for carrying out each part of the work, but the Contractor alone shall be responsible for the safety, adequacy, and efficiency of his plan, equipment, and methods.

Any method of work suggested by the Owner, Engineer, or Engineer's subconsultant but not specified, shall be used at the risk and responsibility of the Contractor. The Owner, Engineer, or Engineer's sub-consultant will assume no responsibility for the Contractor's means and methods.

Review by Owner, Engineer, or Engineer's subconsultant of any plan or method of work proposed by the Contractor shall not relieve the Contractor of any responsibility for the plan. Plan review shall not be considered as an assumption of any risk or liability by the Owner, Engineer, or Engineer's subconsultant, or any officer, agent or employee thereof. The Contractor shall have no claim because of the failure or inefficiency of any plan or method so reviewed.

Conduct of Work

The Contractor shall observe that the Owner reserves the right to do other work in connection with the project or adjacent to the project, by contract or otherwise. Contractor shall conduct his work to impose no hardship on the Owner or others engaged in other work.

The Contractor shall be responsible to others engaged in the work or work adjacent to this project for all damage or injury to work, to persons or property, or for loss caused by failure to finish the work within the specified time for completion. The Contractor shall adjust and coordinate his work with the work of others so that no discrepancies shall result in the overall project.

CONTRACT CLOSEOUT PROCEDURES

Minnesota Statute 471.425, Subd. 4a requires contracts of a municipality to have the prime contractor pay any subcontractor within ten days of the prime contractor's receipt of payment. The contract also must require that the prime contractor pay interest of 1.5 percent per month or any part of a month to the

subcontractor for any undisputed amount not paid to the subcontractor within ten days.

Final payment will not be made until the Contractor shall have filed with the Engineer evidence in the form of an affidavit or such other evidence as may be required that all claims against him by reason of the Contract have been fully paid or satisfactorily secured. This shall be in the form of paid-in-full lien waivers from each supplier and subcontractor along with the IC134 Form. In case such evidence is not furnished, the Owner may retain out of any monies due said Contractor sums sufficient to cover all lienable claims unpaid.

Before final payment is made for the work on this project, the Contractor must make a satisfactory showing that he has complied with the provisions of Minnesota Statutes Annotated 290.92 requiring the withholding of state income taxes for wages paid the employees on this project. Receipt by the Engineer of a certificate of compliance from the Commissioner of Taxation will satisfy the requirement.

HOLD HARMLESS AND INDEMNIFICATION

To the fullest extent permitted by law, the Contractor agrees to indemnify the City of Arden Hills, its officers, employees, agents, and others acting on their behalf, to hold them harmless, and to defend and protect them, from and against any and all loss, damage, liability, cost and expense (specifically including attorneys' fees and other costs and expenses of defense), of any sort whatsoever, based upon, resulting from, or otherwise arising in connection with any actions, claims or proceedings (of any sort and from any source whatsoever) brought, or any loss, damage or injury of any type whatsoever sustained, whether or not also caused in part by a party indemnified hereunder, by reason of any act or omission of Contractor, its officers, employees or agents, or any other person(s) or entity(ies) for whose acts or omissions Contractor may be legally responsible, in the performance of any of Contractor's obligations (whether expressed or implied) under this Contract.

TECHNICAL SPECIFICATIONS & SPECIAL PROVISIONS

for

2026 PMP Street & Utility Improvements

City of Arden Hills

Arden Hills, MN

01 57 13 TEMPORARY- EROSION & SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm water management as indicated on the plans, as specified herein or as directed by the Engineer.

B. The Contractor and Owner shall identify a person(s) knowledgeable and experienced in the application of erosion and sediment control Best Management Practices (BMPs) who will oversee the implementation of the SWPPP.

C. Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001)

1. The **Owner** has developed a **Storm Water Pollution Prevention Plan (SWPPP)** in accordance with Part III (Storm Water Discharge Design Requirements) of the National Pollutant Discharge Elimination System (NPDES)/State Disposal System Permit. The SWPPP is included in the project plans.

2. As a condition of the Award, the Contractor shall be a co-permittee and assume the role of "**Operator**" under the NPDES Permit.

3. This contract requires strict adherence to the NPDES – Storm Water Permit for Construction Activity. It is the contractor's responsibility to make himself/herself familiar with it. Copies of the NPDES – Storm Water Permit for Construction Activity are available by request from the City of Arden Hills or via the internet at http://www.pca.state.mn.us/water/stormwater/stormwater-c.html and by selecting *Permit and program forms* in the *Permit and forms* section.

4. The Contractor will initiate the permit and pay the required fee and submit the NPDES Permit using the data shown in the SWPPP located on Plan Sheets.

5. **Permittee(s)** shall ensure that their **SWPPP** meets all terms and conditions of this permit and that their activities do not render ineffective another party's **erosion prevention and sediment control BMPs.**

6. The Contractor shall maintain copies of the SWPPP on the project site at all times and comply with all provisions contained therein, including performing the required inspections of the erosion control devices and maintaining an Inspector's Log for the MPCA Storm Water Permit. An Inspector's Log form is attached at the end of this Section.

7. The Contractor shall be responsible for keeping the on-site SWPPP documents current and updated to reflect changing conditions as construction progresses.

8. Process Summary:

(a) Owner issues *Notice of Award* to Contractor.

(b) The Contractor shall review the SWPPP and may propose changes or a new SWPPP to the Engineer and Owner for review, comment, and Authorization. Changes may be recommended by the Contractor, Engineer, and/or Owner at any time during the construction period to address changing conditions.

(1) The responsibility for SWPPP amendments proposed by the Contractor lies with the Contractor. If the Engineer and/or Owner authorize the revisions with no exception taken, such action shall not absolve the responsibilities of the Contractor in any way.

(2) During the review and modification period, on-site Erosion Control shall comply with or exceed the current SWPPP. Pending review by the Engineer and/or Owner shall not alleviate the Contractor's responsibility to install necessary BMPs to address site issues.

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(3) Once a SWPPP is modified and/or amended, the Contractor shall distribute new copies to the Owner, the Engineer, the on-site project supervisor and the resident project representative.

(c) Contractor acknowledges the Notice of Award and provides the Owner with the contact information for the Contractor's designated SWPPP contact to be used by the Owner for the on-line Stormwater Permit Application. Required information includes; Name, Title, Business Mailing Address, Phone Number and Email for the designated individual.

(d) Within 7 days of acknowledgement of the Notice of Award by the Contractor, the Owner/Contractor shall submit the On-line Stormwater Permit Application to the MPCA.

(e) No earth disturbing work shall begin until the permit coverage date shown on the Coverage Card issued by the MPCA.

(f) Work shall follow the sequence of major activities outlined in the SWPPP.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for erosion and sediment control shall be paid according to the referenced specification or as modified below:

1. Payment for all work associated with Erosion and Sediment Control shall be at the contract unit price bid for that item and shall be considered full compensation for furnishing, installing, maintaining and utilizing storm water best management practices and any work specified in conjunction therewith as well as removing temporary sediment control devices when no longer necessary.

2. For temporary erosion control best management practices, (80%) of payment shall be made upon installation. The remaining 20% shall be made upon complete removal of the control measure, removal of any accumulated sediment and surface restoration.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the unit price bid for the associated erosion control and excavation items. Such items of work include but are not limited to:

1. Complying with the Minnesota Pollution Control Agency (MPCA) - General Storm Water Permit for Construction Activity (MN R100001)

2. Providing trained Construction SWPPP Manager and BMP Installer.

3. Inspect, maintain, repair, and remove (if necessary) temporary surface stabilization practices throughout the duration of the project.

4. Maintaining clean exit areas or roads from the site.

5. Sweeping adjacent streets clean of excess soil.

6. Cleaning storm sewers, drain tiles and culverts that have been partially or completely obstructed by sediment that originated from the site.

7. Geotextile fabric for rock installation.

8. Geotextile fabric to wrap prefabricated inlet protection devices.

9. Aggregate to anchor and act as a filter for prefabricated inlet protection devices.

10. Aggregate associated with the construction of temporary sediment traps.

11. Emergency erosion control mobilization.

12. Changing the type of inlet protection for different phases of construction.

C. No additional payment shall be made for Erosion Control BMPs necessary to accommodate Contractor phasing of the project.

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1. If the contractor's construction operations necessitate, the contractor shall provide additional temporary erosion control measures for areas of soil disturbance to meet the requirements of the Stormwater Pollution Prevention Plan and the Construction Stormwater Permit. Additional costs associated with temporary erosion control measures to meet these requirements due to the contractor's progression of work/schedule shall be the responsibility of the contractor and at no cost to the owner.

1.3 SPECIFICATION REFERENCES

A. MnDOT 1717 – Air, Land and Water Pollution

B. MnDOT 2573 – Stormwater Management.

C. MnDOT 2574 – Soil Preparation

D. MnDOT 2575 – Establishing Turf and Controlling Erosion

E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. SWPPP Plan Amendments

B. Contact information and training documentation for Construction SWPPP Manager and BMP Installer,

C. Weekly Erosion and Sediment Control Schedule meeting the requirements of MnDOT 1717.

D. Site Management Plans meeting the minimum requirements of MnDOT 1717. An updated Site Management Plan shall be submitted as needed to reflect changes to:

1. Types and/or Locations of BMPs
2. Material Storage and Spill Response
3. Fueling Plans
4. Locations for Stockpiles, Concrete Washout, and Sanitation Facilities and
5. Project Phasing

E. PDF copies of all SWPPP Documentation including but not limited to:

1. Field Copy of the SWPPP. If the Field Copy has been replaced during Construction with an updated SWPPP, a copy of both the final Field Copy and all intermediate copies shall be provided.
2. Inspection Logs including all supporting documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. For all materials not specifically discussed below no exceptions to the referenced specification are made.

B. Bale checks shall not be used.

C. Inlet Protection devices shall be prefabricated devices such as WIMCO style or approved equal. The device shall be capable of storing more than 1 cubic foot of sediment and contain an overflow opening for extreme conditions.

PART 3 - EXECUTION

3.1 GENERAL

A. Construction and/or installation of all appropriate erosion & sediment control devices shall be completed prior to any soil disturbing activities.

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B. Prior to construction, the Contractor shall observe and document the existing storm water outfall system and discharge area. Sediment deposits not documented prior to the construction may be assumed to have originated from the project site and be required to be removed and disposed of by the Contractor.

C. Prior to construction, the Owner, Engineer and Contractor shall review the project to identify critical areas that could require rapid stabilization during the construction process, and develop mitigation and rapid stabilization plans to be incorporated into the SWPPP.

D. Exit areas of roads shall be kept clean of excess soil by routine sweeping.

3.2 CONSTRUCTION REQUIREMENTS

A. The Contractor shall provide one or more trained Construction SWPPP Manager(s). The Construction SWPPP Manager shall be a knowledgeable and experienced in the application of erosion prevention and sediment control BMPs and will oversee the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion prevention and sediment control BMPs. A Construction SWPPP Manager must be available for an on-site inspection within 72 hours upon request by the Owner and/or MPCA. Failure to provide a trained Construction SWPPP Manager or failure of the Contractor to rectify the situation within 24 hours of written notice if the provided Construction SWPPP Manager fails to adequately perform the duties of Construction SWPPP Manager may result in the Owner or Engineer arranging for performance of these duties by others.

B. If Contractor fails to install and/or perform the appropriate erosion and sediment control practices, as determined by the Engineer, the Engineer may issue a written order to the Contractor. Failure to perform this work within 24 hours of written notification may result in the Owner or Engineer arranging for completion of the work by others.

C. When the Engineer determines that the erosion and/or sediment control practices installed by the Contractor have failed, the Contractor shall correct the cause and alleviate all sediment deposition, to the fullest extent possible. If the corrective action is not taken in a timely manner, the Engineer may issue a written order to the Contractor. Failure to perform this work within 24 hours of notification of non-compliance may result in the Owner or Engineer arranging for completion of the work by others.

D. **A contract deduction shall be made equal to the total of all costs incurred by the Owner due to failure of the Contractor to take corrective action within the timeframe of any written notice of non-compliance. Such costs include but are not limited to: labor, materials, equipment and administrative costs.**

3.3 TRAINING

A. Contractor shall ensure the individual(s) designated by the Contractor for this project to perform the Construction SWPPP Manager and Installation Supervision duties have been trained in accordance with Minnesota Pollution Control Agency (MPCA) General Storm Water Permit for Construction Activity (MN R100001) training requirements.

B. Documentation incorporated by the Contractor into the SWPPP must include either:

1. Proof of a current certification through the University of Minnesota Erosion and Stormwater Management Certification Program, or

2. Documentation of training satisfactory to the MN Pollution Control Agency showing training is commensurate with the individual's job duties.

3.4 TERMINATION OF COVERAGE

A. Upon completion of all final stabilization, the Contractor shall provide the Engineer a signed MN MPCA Notice of Termination (NOT) form and a PDF copy of the SWPPP Documentation. Final payment shall not be made for the project until the NOT is submitted and the SWPPP Documentation is received.

B. The NOT form is available on the MPCA website at: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/construction-stormwater/index.html

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******END OF SECTION******

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SECTION 02 32 19 - EXPLORATORY EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to conducting a subsurface investigation as shown on the drawings, as specified herein, and/or as specified by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. The unit price bid for exploratory excavation will include all costs of labor, equipment, and ultimate disposal required to complete the work, as specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:

1. Exploratory excavation without prior authorization and approval by the Engineer.

2. Exploratory excavation to locate and connect to existing pipes unless the Engineer agrees that excavation beyond what could be considered reasonable is required.

3. Materials for re-grouting of inverts.

B. All costs of off-site disposal of excess excavated material and debris including but not limited to hauling, fees, and permits for such disposal.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2123.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to this specification is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The Contractor shall:

1. Perform underground utility exploration as directed by the Engineer which involves excavation to locate pipelines for location and elevation verification, including to verify required structure build heights and associated pipe inverts prior to ordering precast concrete structures.

2. Clean debris and gravel which is present before the Project, out of existing manholes and catch basins along the Project and to regrout the inverts, as directed by the Engineer.

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3. Other work associated with the Project, as directed by the Engineer.
4. Where exploratory excavation is performed in a location that will not be disturbed later, the backfill will be placed and compacted to the density specified elsewhere in these Specifications for the type of utility located.

******END OF SECTION******

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SECTION 02 41 13 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the removal of pavement and miscellaneous structures as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. The unit price bid for removing pavement and miscellaneous structures will include all costs of labor, materials, equipment, and ultimate disposal required to complete the work, as specified.

2. The UNIT PRICE bid for salvaging and/or reinstalling items as specified in the schedule of unit prices shall include all costs for carefully salvaging, protecting, storing, and if specified, reinstalling the item. Payment for items reinstalled shall be made upon successful reinstallation of the item to its full function in a condition matching or improving its original condition. Any item designated for salvage that is too damaged to be reinstalled will be replaced with new at no additional cost to owner.

3. Remove Curb & Gutter

   (a) This item shall be measured and paid per LINEAR FOOT (LF) per the referenced specification, including the saw cutting required to remove the existing curb.

      (1) It is assumed that this bid item will be utilized for concrete curb and gutter spot replacements around all catch basin casting replacements, pedestrian ramp curb replacements, and for deficient curb, as marked in the field by the Engineer.

4. Remove Bituminous Walk

   (a) The UNIT PRICE bid for removing bituminous trail pavement as specified in the schedule of unit prices shall include all costs for carefully removing the bituminous pavement, while salvaging the existing aggregate base in place, and disposing of the removed pavement offsite. If care is not taken to leave the existing aggregate base in place, the costs for replacing/supplementing the aggregate base with new aggregate base class 5 shall be considered incidental to the bid item.

   (b) No other exception to the referenced specification is made.

5. Salvage Sign

   (a) Salvaging of signs shall include all costs for removing and carefully storing the sign panels, brackets, and posts until such time for reinstallation.

   (b) No other exception to the referenced specification is made.

6. Remove Curb Stop Box

   (a) Removal of the curb stop box shall include all costs for excavating and removing an existing curb stop box standpipe for the purpose of replacement to ensure a new, plump curb stop box that is operable from the surface.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:

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1. Saw cutting - bituminous and/or concrete, driveways, sidewalks, pavements, curb & gutter, and other impervious surfaces.
2. Removing storing and reinstalling mailboxes, street/traffic signs, or similar structures which must be moved to construct the project.
3. Off-site disposal of excess excavated material and debris.
4. Removal and off-site disposal of bituminous or concrete, unless designated for salvaging.
5. Removing, salvaging, and storing, or disposing of manhole and catch basin castings.
6. Loading, hauling, stockpiling, and placing as directed (i.e., leveling) designated salvage items to a location directed by the Owner.
7. Fees and permits for the disposal of materials.
8. Removal and disposal of existing sanitary sewer pipe, storm sewer pipe, watermain, and service pipes.
9. Bulkheading the ends of existing pipes designated by the Engineer to be abandoned in place.
10. Protection from damage of structures or other surface improvements that are not to be removed, and subsequent repair and/or replacement if damaged by Contractor operations.
11. Re-sawing bituminous and/or concrete edges as needed to provide straight and vertical edges just prior to constructing new pavement.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:
   1. MnDOT 2104.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to this Section is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Remove existing bituminous, curb and gutter, walks, drives, steps, and other specified items where shown on the plans and/or required for the construction of the project.

B. Saw cut bituminous and concrete surfaces before excavation, to produce a clean-cut breakage joint.

C. Dispose of all concrete and bituminous removal items, rubbish, and debris outside of the construction zone. It will be the Contractor's responsibility to secure all required permits and pay all fees associated with the disposal of the material and secure the disposal site.

D. Remove existing mailboxes, street/traffic signs, and similar structures that must be removed to construct the project. Restore these facilities to the original location or a location designated by the Owner when work has progressed past the location of the structure.

E. The Contractor shall take full responsibility to protect structures or other surface improvements from damage that are not to be removed. If damage to these facilities occurs due to the construction of the project, the Contractor shall replace or repair them.

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F. The Owner will designate which existing hydrants, valves and boxes, manhole castings, and other items removed as part of the construction, are to be salvaged. All other items will be disposed of by the Contractor.

G. All existing watermain, sanitary sewer, and storm sewer pipes being removed and replaced by new improvements will be considered as debris and removed during the construction process.

H. Where existing pipes are to be abandoned in place, the pipe will be filled with sand or flowable fill as noted on the plans. The exposed pipe ends shall be bulkheaded shut with a watertight non-shrink concrete grout at a thickness of not less than one pipe diameter.

I. Saw cut bituminous and concrete surfaces before excavation and just prior to final construction as needed to produce a clean-cut breakage joint.

J. Pipes, fittings, and other apparatus needed for filling abandoned pipelines with sand or flowable fill will be completely removed and capped to 3 foot minimum below the finished surface.

******END OF SECTION******

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SECTION 31 01 21 - APPLICATION OF WATER

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the application of water as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. No direct payment is made for water required.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2130 will apply to this Section.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to this section is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Water is available for the Contractor's use at on-site City fire hydrants with the use of a meter. Meters will be provided by the City's Public Works Department with a deposit from the Contractor. The Contractor must use the meter when filling water from a City fire hydrant and will pay the City for the water used at the rate established by the City. The Contractor must also provide and use a backflow prevention device when filling from a City hydrant.

B. The Contractor must obtain approval from the Owner for using a hydrant source of water and must only use it for application on this project.

C. The Contractor will apply water as may be required to obtain proper compaction, for all dust control, street construction, embankment construction and turf establishment.

D. The Contractor shall NOT apply water in quantity or rate sufficient to cause erosion.

******END OF SECTION******

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SECTION 31 11 00 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to clearing and grubbing trees, stumps, and brush as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. No exception to the referenced specification is made.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for clearing and grubbing. Such items of work include but are not limited to:

1. Permits and fees for the disposal of materials.
2. Protecting existing improvements from damage.
3. Removal and disposal of shrubs, plantings, and trees (of less than 4” DBH)

1.3 SPECIFICATION REFERENCES

A. MnDOT 2101 will apply to this Section.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to this section is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Major tree clearing will be completed under a separate contract prior to this project commencing. The only remaining tree clearing of substantial trees will be individual trees as identified on the plan drawings.

B. Tree grubbing will be required for the individual trees cleared, as noted above, as well as grubbing for the major tree clearing at two locations near the southeast side of Karth Lake, as identified on the plan drawings. Grubbing of the trees that were previously cleared will include all stumps and any remaining non-qualifying brush (shrubs, plantings, and trees less than 4” DBH).

C. Tree clearing seasonal restrictions do not apply to grubbing.

D. Before tree trimming to remove overhanging branches, the Contractor shall inspect the branches to be trimmed for occupied bird nests and/or hollows that may be used by birds or bats.

1. If absent, tree trimming will be completed without time restrictions.

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2. If present, Contractor shall document with photos to the best of their ability and contact the Engineer before initiating tree trimming. Tree trimming may not proceed until authorized in writing by the Engineer.

E. All trees, stumps, brush, seed, grass, roots, or other undesirable material within the construction limits will be disposed of by the Contractor.

F. Disposal methods will be approved by the Engineer and shall meet all Local, State, and Federal regulations.

G. Burning or burial will not be allowed within city limits.

******END OF SECTION******

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SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performance of all work and services necessary or incidental to the excavation and embankment for roadways and pavements and construction of stormwater detention facilities as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Common Excavation:

(a) No direct payment for common excavation will be made. This shall be considered incidental to the related bid items.

2. Topsoil Borrow:

(a) No direct compensation will be made for salvaging, stockpiling, and replacing topsoil salvaged from within the construction limits.

(b) Measurement and payment for Furnishing and Installing Common Topsoil Borrow will be based upon the CUBIC YARD, LOOSE VOLUME - CY (LV).

(c) The quantities for topsoil borrow are strictly estimates and may be increased or decreased by any amount with no adjustment in unit price according to the extent of existing topsoil salvaged and other conditions revealed.

3. Excavation Channel and Pond:

(a) Measurement and payment for Excavation – Channel and Pond will be measured and paid per the cubic yard (EV) (P) and shall be compensation in full for any labor, equipment, or materials required to excavate the channel and pond areas.

(b) Channel Grade

(1) Grade up to each storm sewer apron, and around the installed riprap if applicable, to provide proper drainage into and array from each apron. This work includes clearing the accumulated debris and sediment to allow for completion of the channel grading.

(2) Contractor shall assume there may be limited access and space to some areas that are part of this project and shall account for the equipment and their access.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for work. The costs will be included in the unit price bid for the associated excavation items. Such items of work include but are not limited to:

1. Disposal of bituminous/aggregate reclamation material that is determined by the Engineer to be unsuitable for re-use.

2. Salvaging, separating, separately stockpiling, and re-spreading topsoil material in turf areas to the depths specified or indicated on the plans.

3. Salvaging and separately stockpiling suitable aggregate base material, as determined by the Engineer.

4. Separating, salvaging, stockpiling, and replacing clay borrow in roadway, structure, and embankment areas.

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5. Earthwork balancing including adjustments for shrinkage loss, and excess materials resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures will be included in the associated bid items.
6. Protecting existing improvements and previously accepted in-process improvements from damage.
7. Protecting infiltration areas.
8. The avoidance of wetlands.
9. Subcutting the existing topsoil before placing embankment in all roadway, patio, and trail locations.
10. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading, and/or other efforts necessary to repair the subgrade for failing to protect the integrity of the subgrade after it has been accepted (test rolled).
11. Restoring the borrow site by grading the area to drain properly to slopes not-to-exceed 6:1 and by restoring the topsoil to a minimum thickness of 6.0-inches will be included in the contract unit price for Common Borrow.
12. Removal and disposal of existing mulch, shrubs, plantings, stones/boulders, landscape rock, plastic landscape edging, paver/block landscape edging, and other minor landscape items designated for removal.
13. Gradation and compaction testing and geotechnical inspection services to meet requirements of source and field quality control if required

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:
   1. MnDOT 2105.
   2. MnDOT 2106.
   3. MnDOT 2574.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Gradation testing will be taken from material in stock at locations approved by the Engineer. All sampling methods will be approved by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All excess excavated material will become the property of the Contractor and will be removed from the site and disposed of at a site secured by the Contractor.

B. Frozen material will be considered unsuitable material unless otherwise authorized in writing by the Engineer.

C. Excavated material unsuitable for embankment and backfill construction will become the property of the Contractor and will be removed from the site and disposed of at a site secured by the Contractor.

D. Stabilizing aggregates for use in backfilling subgrade excavations will be material generally produced and referred to as “1½-inch dust-free aggregate" or other coarse aggregate found to be in general compliance by the Engineer. Aggregate Base, Class 5 may also be used at the direction of the Engineer.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

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A. At the end of each day, the Contractor will eliminate surface indentations, including those caused by sheep's foot rollers, tractor tires, and tracked equipment, and roll the surface with a steel wheel or rubber-tired roller except in those areas designated to be protected from compaction.

B. Subgrade excavation shall be performed, as directed by the Engineer, for the removal of any unstable soils that may be encountered. Such excavation will be backfilled with suitable excess common excavation material or stabilizing aggregate as directed by the Engineer. If the Contractor proceeds without approval from the Engineer or Owner, all work and material to restore the roadbed to the proper grade will be at the Contractor's expense.

C. Once the subgrade has been successfully test rolled, no traffic or construction equipment will be permitted to operate directly on the subgrade without the prior approval of the Engineer. The subgrade will be relatively smooth before the placement of the aggregate base. All equipment will be restricted to operating only in areas where the aggregate base has been installed to its full design depth.

D. Material suitable for curb backfill will be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material will be placed behind the curb to the subgrade level of the topsoil.

E. The Contractor shall salvage and stockpile all topsoil removed during the construction. This topsoil will be used where required for turf establishment as directed by the Engineer.

F. Sufficient excavated material will be utilized by the Contractor to replace lost volume due to soil shrinkage from trench excavation that may occur through the course of construction. The Contractor shall make their own determination of the amount of shrinkage that will occur.

G. In the subgrade, all embankments and subcuts shall be compacted using the Quality Compaction Method.

H. Topsoil unsuitable for pond or channel bottom construction may be used as embankment material above the designated high-water level in the plans.

I. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade will be scarified and dried over a reasonable period. When the material has reached acceptable moisture limits, the material will be returned and compacted into place to the proper elevation. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.

3.2 SOURCE QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

1. Gradation tests of select granular borrow in accordance with the MnDOT Schedule of Materials Control.

2. Gradation tests of stabilizing aggregate in accordance with the MnDOT Schedule of Materials Control.

B. Samples for testing will be taken from material in stock at locations approved by the Engineer. All sampling methods will be approved by the Engineer.

3.3 FIELD QUALITY CONTROL

A. "Blue Top" stakes will be provided by the Contractor at 50-foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed if approved by the Engineer.

B. The Owner may arrange for an pay all costs associated with having the following test performed:

1. One compaction test (including Standard Proctor) on subgrade per every 500 square yards of roadway per every 3 feet of subgrade excavation depth.

C. All testing will be performed by an independent testing laboratory approved by the Engineer.

D. The contractor shall cooperate fully with the individuals performing the tests.

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E. Samples for testing will be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods will conform to MnDOT Standards.

F. Should any of the specified tests fail, the Contractor shall arrange and pay for additional tests as may be necessary to satisfy the specified requirements.

******END OF SECTION******

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SECTION 31 23 13 - SUBGRADE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performance of all work and services necessary or incidental to the subgrade preparation as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. No direct payment will be made for subgrade preparation, except in the bituminous trail areas, as identified on the plans. Costs will be included in the unit price bid for the various excavation items.

2. Measurement and payment for subgrade preparation in the bituminous trail rehabilitation areas will be by the SQUARE YARD – SQ YD, PLAN QUANTITY – P, based on the area of existing or new aggregate base subgrade prepared for trail paving.

(a) Payment shall include the re-grading, placement, and preparation of the in-place aggregate base to the proper grades for the bituminous trail construction, within the bituminous trail rehabilitation areas. This includes supplementing the existing aggregate base with excess reclaim material, where necessary.

(b) This bid item shall also include the excavation, placement of 6-inches of excess reclaim material as new aggregate base, and preparation of the aggregate base to the proper grades for the bituminous trail areas where existing aggregate base does not exist. These locations include the Highway 96 trail segment (assuming the existing aggregate base will be excavated as part of the watermain work) and the re-aligned trail segment at the west end of Cummings Park Drive.

3. No additional exception to the referenced specification is made.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the various excavation items. Such items of work include but are not limited to:

1. Drying and adding water to the subgrade.

2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading, and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.

3. Test rolling the compacted subgrade.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2112 will apply to this Section.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to the referenced specification is made.

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PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. At the end of each day, and before the placement of aggregate base, the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cleats, and roll the surface with a steel wheel or rubber-tired roller.

B. The Contractor shall disc, scarify, shape and compact the street subgrade or existing base, adding water or drying as may be necessary to give uniform and desired density.

C. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade will be scarified and dried over a reasonable period. When the material has reached acceptable moisture limits, the material will be returned to the roadbed and compacted into place to the proper elevation. The roadbed will once again be test rolled. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.

D. Once the subgrade has been test rolled and accepted by the Engineer, no traffic or construction equipment will be permitted to operate directly on the subgrade without the prior approval of the Engineer. All equipment will be restricted to operating only in areas where the aggregate base has been installed to its full design depth. If inclement weather occurs after a test roll, and before placement of the aggregate base or first course of bituminous, the test roll will be voided and a new test roll will be performed.

E. The subgrade will be compacted in accordance with the Quality Compaction Method:

3.2 FIELD QUALITY CONTROL

A. “Blue Top" stakes will be provided by the Contractor at 50-foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "Blue Top" staking may be allowed if approved by the Engineer.

B. The compacted subgrade will be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The subgrade stability will be considered adequate when the surface shows less than 1.0 inch of yielding or rutting after one pass, or as otherwise approved by the Engineer.

C. The Owner shall arrange for and pay all costs associated with having the following testing performed:

1. Compaction test (including Standard Proctor) in accordance with the MnDOT Schedule of Materials Control.

D. All testing will be performed by an independent testing laboratory approved by the Engineer.

E. The Contractor shall cooperate fully with the individuals performing the tests.

F. Samples for testing will be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods will be in accordance with the MnDOT Schedule of Materials Control.

G. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 31 23 23 – CEMENT STABILIZED SUBGRADE

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performance of all work and services necessary or incidental to construct a cement stabilized subgrade consisting of in-place soil/aggregate base/reclaim material modified with Portland cement to improve strength, durability, and uniform support beneath paved surfaces, as indicated on the drawings or as specified herein.

B. Work includes soil preparation, cement application, mixing, moisture conditioning, compaction, curing, and protection. The aggregate base section shall be sufficiently stabilized to pass a test roll using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Measurement and payment for CEMENT STABILIZED SUBGRADE will be by the SQUARE YARD – SQ YD, based on the area of existing aggregate base subgrade sections prepared for street paving.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the various excavation items. Such items of work include but are not limited to:

1. Approved equipment for performing the required operations.
2. Soils preparation.
3. Cement material application, mixing, compacting, and curing.
4. Protection of stabilized areas.
5. Test rolling the stabilized aggregate base subgrade section.

1.3 SPECIFICATION REFERENCES

A. Section 31 20 00 – Earth Moving

B. Section 31 23 13 – Subgrade Preparation

C. Section 32 11 23 – Aggregate Base Courses

D. Section 32 12 00 – Flexible Paving

E. MnDOT 2112 will apply to this Section.

F. ASTM C150 – Portland Cement

G. ASTM C595 – Blended Hydraulic Cement

H. ASTM D698 – Standard Proctor Density

I. ASTM D1557 – Modified Proctor Density

J. ASTM D1632 – Compressive Strength of Soil-Cement

K. ASTM D558 – Moisture-Density Relations of Soil-Cement

L. ASTM D2487 – Unified Soil Classification System

M. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

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1.4 SUBMITTALS

A. Contractor proposed Mix Design

1. Cement source

2. Cement content (percent by dry weight of soil) and application rate

(a) Will be dependent on the soil's existing moisture content at the time of stabilization

B. Contractor proposed Construction Plan

1. Mixing method and equipment

2. Water application method

3. Compaction method and equipment

1.5 WEATHER LIMITATIONS

A. Do not construct subgrade when weather conditions detrimentally affect the quality of the materials. Do not apply cement unless the air temperature is at least 40 degrees Fahrenheit and rising. Do not apply cement to soils that are frozen or contain frost. Do not apply cement when conditions are too windy to allow even distribution of the cement to the subgrade. If the air temperature falls below 35 degrees Fahrenheit, protect completed treated areas against freezing. Remove and replace any damaged portion of the completed treated area with new material in accordance with this specification.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Soil

1. The soil for this work shall consist of on-site materials (including existing aggregate base) free of roots, sod, weeds, and stones larger than 2.5-inches.

B. Cement and/or Fly Ash

1. Portland cement conforming to ASTM C150, Type I or Type II.

C. Water

1. Water used in mixing and/or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

D. Mix Design

1. Cement content shall be identified by the Contractor based on the Geotechnical Report and the specific field conditions of the street segment(s) identified for stabilization, typically 3 to 6 percent by dry weight of soil.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Subgrade Preparation

1. Prepare subgrade and aggregate base course in accordance with Section 31 23 13 and Section 32 11 23 of these specifications.

2. Scarify the surface to the full treatment depth identified prior to cement application.

B. Cement Application

1. Apply dry cement uniformly over the prepared subgrade using calibrated spreading equipment.

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2. Application rate shall be as determined in the approved mix design.
3. Prevent displacement of cement by wind or water prior to mixing.
4. The mixing machine must give visible indication at all times that it is cutting, pulverizing and mixing the material uniformly to the proper depth over the full width of the cut.

C. Mixing

1. Mix cement and soil to the full treatment depth determined in the approved mix design using mechanical mixers capable of producing a homogeneous mixture through the full depth.
2. Add water as needed to achieve the target moisture content, within ±2 percent of optimum.
3. Continue mixing until no unmixed cement remains and soil clods are adequately pulverized.
4. Complete mixing and compaction within 2 hours of water addition unless otherwise approved.

D. Compaction

1. Complete compaction and shaping before the mixture begins to set, as specified in these contract documents.
2. Verify the grading/shaping is completed in conformity with the lines, grades, thickness, and typical cross-sections shown on the plan drawings.

E. Curing

1. Begin curing immediately after final compaction.
2. Cure using light water application to maintain surface moisture or through application of approved curing compound.
3. The curing period shall be a minimum of 3 days, and completed prior to placing pavement, unless otherwise approved.

F. Acceptance

1. Acceptance of cement stabilized subgrade will be based on test results, visual inspection (test roll), and compliance with this Specification and the Plans.

3.2 FIELD QUALITY CONTROL

A. The stabilized aggregate base subgrade will be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The subgrade stability must be approved by the Engineer.

B. Paving will not be authorized until the cement stabilized subgrade has been approved by the Engineer.

C. The Owner may arrange for the following tests:

1. Density tests in accordance with the MnDOT Schedule of Materials Control.

D. All testing will be performed by an independent testing laboratory approved by the Engineer.

E. The Contractor shall cooperate fully with the individuals performing the tests.

F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

1. The Contractor shall repair damaged areas by reworking, adding cement, remixing, and recompacting at no additional cost. In the event this is unable to rectify the damage, re-pulverizing of the aggregate material may be required.

******END OF SECTION******

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SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the dewatering of trenches as necessary to construct the elements shown on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. No measurement will be made for Dewatering. Payment for control of groundwater, surface water, or any other water present at the site. Payment will be at the Lump Sum Contract price bid. Payment will be compensated in full for all costs relative thereto, including, but not limited to permit approval, permit fees, investigation, design, installation, operation, maintenance repair, replacement, piping, monitoring, temporary bulkheads, temporary sheet pile installation, temporary piping, temporary pumping, settling basins and other permanent and temporary construction features.

B. Steel Sheet Piling (Temporary)

1. No direct payment will be made for temporary steel sheet piling associated with the storm lift station for Karth Lake. All costs relative thereto, including, but not limited to all labor, material, and equipment required to install and remove watertight temporary steel sheeting necessary to allow for dry installation of a new storm sewer system into Karth Lake, as shown in the plan details and specified herein, shall be included in the price bid for the associated Lump Sum Alternates.

C. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the dewatering items, as indicated. Such items of work include but are not limited to:

1. Interference of other underground structures and utilities.

(a) The removal and restoration, or protection of existing utilities that are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.

2. The costs of furnishing discharge piping including bends, and adapters.

3. Protection of existing improvements from damage.

4. Fees and permits for the disposal of materials.

5. Bulkheading the ends of existing pipes designated by the Engineer to be abandoned in place.

6. Protection from damage of structures or other surface improvements that are not to be removed, and subsequent repair and/or replacement if damaged by Contractor operations.

7. Excavation for, furnishing, and installing granular foundation, bedding, and trench backfill in lieu of necessary dewatering.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2451 will apply to this Section.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

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2.1 MATERIALS

A. No exception to this section is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The Contractor shall furnish and install all necessary discharge piping and obtain all permits, easements, rights-of-way, etc. to convey and discharge the water at a sufficient distance from the project area to eliminate recharge of the groundwater at the project site.

B. Water from dewatering operations will not be discharged where it will pond or cause damage to cropland or personal property due to the presence of standing or flowing water.

C. Unless otherwise provided in the contract documents; the Contractor shall be responsible for obtaining all necessary permits required for dewatering prior to the beginning of dewatering. The Contractor shall provide a plan for the discharge showing the discharge location, energy dissipation, and water quality treatment to the Engineer for approval before beginning discharge. The discharge rate, location, and water quality will meet all local, State, and Federal requirements.

D. Existing and/or proposed sanitary system(s) shall not be used as an outlet for the dewatering operations.

******END OF SECTION******

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SECTION 31 32 00 – SOIL STABILIZATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the shoreline stabilization geocell system as indicated on the drawings and as specified herein.

B. The geocell system is used for slope protection.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. SHORELINE STABILIZATION will be measured by the SQUARE YARD in place and will be paid at the unit price bid for all labor, materials, and equipment required to properly install a GEOWEB system to reinforce the shoreline specified and prevent erosion. Rolled Erosion Prevention and Seed Mixtures shall be paid separately, as specified in Section 32 92 00 – Turf and Grasses of these specifications.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated geotextile fabric-road construction items. Such items of work include but are not limited to:

1. Staking pattern design coordination with Presto.
2. Excavation required to install the geocell system.
3. Soil materials required to fill the installed empty HDPE cells.
4. Furnishing and installing materials required to link cells, and panels together, including but not limited to geoweb panels, key clips, tendon clips, rebar stakes, etc.

1.3 SPECIFICATION REFERENCES

A. Section 01 33 00 – Submittal Procedures

B. Section 01 57 13 – Temporary Erosion & Sediment Control

C. Section 31 20 00 – Earth Moving

D. Section 32 92 00 – Turf and Grasses

E. AASHTO M288

F. ASTM D792.

G. ASTM D1505

H. ASTM D1603

I. ASTM D1693

J. ASTM D5199

K. ASTM D5394

L. ASTM D5596

M. ASTM D5397.

N. ASTM D5721

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O. ASTM D5885

P. ASTM D6693

Q. ASTM D7328

R. ASTM E41

S. USACE Technical Report GL-86-19

T. EN 12224

U. EN ISO 10319

V. EN ISO 13426

W. EN ISO 13438

X. ISO 6721

Y. Presto GEOWEB Specification (located in Appendix E of these specifications)

1.4 SUBMITTALS

A. Shoreline Stabilization (GEOWEB)

1. Manufacturer's shop drawings including the following Manufacturer's product data, calculations, drawings and field representative qualifications.

(a) Cell depth

(b) Cell size

(c) Expanded section width

(d) Expanded section length

(e) Anchor system

(f) Cell to Cell connection system

(g) Material Properties

(h) Manufacturer's Data

(1) Installation manual

2. Manufacturer Calculations - provide a complete set of project calculations including a description of the static analysis performed to determine the slope and crest anchorage requirements. Presto will complete a project evaluation and design the staking pattern specific to the project site.

(a) Anchorage Calculations - the slope stabilization calculations shall be based on slope angle, vertical height, minimum interface friction angle, infill type and weight, sub grade weight, cohesion and friction angle and geocell size and depth.

(1) Provide one set for the manufacturer recommended anchorage method – ATRA Anchor, ATRA Speed Stake, Tendon and Pipe Deadman, or Tendon and Earth Anchor.

3. Manufacturer's Certificate of Analysis

4. Qualifications of Manufacturer's Field Representative

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCT SOURCES

A. MANUFACTURER

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1. Presto Geosystems, PO Box 2399, Appleton, Wisconsin 54912 2399.

   Phone: (920) 738 1328. Email: info@prestogeo.com. Website: www.prestogeo.com.

   Contact: Sam Justice.

B. SUPPLIER

1. Tenet Solutions, 1238 Grey Fox Rd, Arden Hills, Minnesota 55112.

   Contact: Chad Jensen. Phone: (763) 274 4026. Email: chad.jensen@asdcosupply.us.

2.2 MATERIALS

A. Manufacturing Certification

1. The Manufacturer shall have earned a certificate of registration, which demonstrates that its quality-management system for its geocell system is currently registered to the ISO 9001:2015 and CE quality standards.

B. GEOWEB GEOCELL materials shall conform to the cell properties of GW30V and the base materials, cell properties, strip properties, and cell seam strength tests shall conform to the following:

Parameter	Unit	Value
Cell Depth	Inch (mm)	6 (150)
Cell Size (Length x Width +/- 10%)	Inch (mm)	11.3 x 12.6 (287 x 320)
Expanded Section Width	Cells	8
	Feet (m)	Varies: 7.7 to 9.2 (2.3 to 2.8)
Expanded Section Length	Cells	18, 21, 25, 29 or 34
	Feet (m)	Varies: 15.4 to 35.1 (4.7 to 10.7)
Minimum Short-Term Seam Peel Strength	lbs (N)	480 (2,130)
Long-Term Seam Peel Strength (standard 4-inch sample width)	lbs (N)	160 (710)
Internal Junction Efficiency	%	> 100
Mechanical Junction Efficiency (ATRA Key Connection)	%	> 100
Peak Friction Angle Ratio (δ/Ø)		0.95
Polymer Density	lbs/ft3 (g/cm3)	58.4-60.2 (0.935 – 0.965)
Flexural Storage Modulus	Mpa	≥800
Carbon Black Content	%	1.5-2.0
Sheet Thickness Prior to Texture	mil (mm)	50 (1.27), -5% +10%
Sheet Thickness After Texture	mil (mm)	60 (1.52), -5% +10%
Texture Surface Density	per/in^2 (per/m^2)	140-200 (22-31)
Environmental Stress cracking Resistance	hrs	> 5,000
Environmental Stress Cracking Resistance (Accelerated)	hrs	≥ 400
Resistance to Oxidation	yrs	≥ 100
Resistance to Weathering	%	100

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C. Assembly of Cell Sections

1. Fabricate using strips of sheet polyethylene each with a length of 142 inches (3.61 m) and a width equal to cell depth.
2. Connect strips using full depth ultrasonic spot-welds aligned perpendicular to the longitudinal axis of strip.
3. Ultrasonic weld melt-pool width shall be 1.0-inch (25 mm) maximum.
4. Weld spacing for GW30V cell sections shall be 17.5 inches plus or minus 0.10 inch (445 mm plus or minus 2.5 mm).

D. Integral Components

1. The appropriate components shall be selected based on the recommendations from the project evaluation require to be completed by Presto.
   (a) ATRA® Tendon Clip
      (1) The tendon Clip is a molded, high-strength polyethylene device with a minimum pull through resistance of 420 lbs (191 kg).
      (2) The tendon clip is the anchorage connection method for securing sections with tendons and transferring the driving gravity forces to the cell wall and crest anchorage system.
      (3) The tendon clip includes a structurally reinforced post and locking member with frictional barbs to enhance interlock with the textured wall surface.
   (b) ATRA® Stake Clip
      (1) The stake clip is a molded, high-strength polyethylene device available in standard (0.5 inch) and metric (10–12 mm) versions.
      (2) Stake clips shall be installed as an end cap on standard (0.5 inch) and metric (10–12 mm) steel reinforcing rods to form ATRA® Anchors.
   (c) ATRA® Key
      (1) The keys shall be constructed of polyethylene and provide a high strength connection with minimum pull-through resistance of 275 lbs (125 kg).
      (2) Keys shall be used to connect sections together at each interleaf and end-to-end connection.
      (3) The keys shall include a structurally reinforced handle and frictional barbs to enhance interlock with the textured wall surface to prevent mechanical joint failure including peel, shear and separation.
      (4) Metal staples, zip ties, and two-piece connectors are not an acceptable panel connection method.

E. Stake Anchorage

1. The appropriate stake anchorage, if applicable, shall be selected based on the recommendations from the project evaluation require to be completed by Presto.
   (a) ATRA® Anchors
      (1) Anchors shall consist of standard (0.5 inch) or metric (10–12 mm) steel reinforcing rod with an ATRA® Stake Clip attached as an end cap.
      (2) Anchors shall be assembled by inserting the stake clip onto the reinforcing rod so that the end is flush with the top of the stake clip. Prior to attaching the stake clip, the reinforcing rod shall be beveled and free from all burrs.

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(3) The anchor length and placement shall be as shown in the Contract Documents.

(b) ATRA® Speed Stake

(1) Speed stake shall be one piece injected molded design with integral flanged arms and barbs.

(2) The stake shall be constructed of a specialty-based HDPE polymer alloy.

(3) The minimum tensile strength shall be 14.5 kips (100 mPa).

(4) The minimum bending strength shall be 575 lbs (2.55 kN).

(5) The stake shall be non-magnetic, non-conducting and corrosion resistant.

(6) The stake length and placement shall be as shown in the Contract Documents.

F. Tendon Anchorage

1. The appropriate tendon anchorage, if applicable, shall be selected based on the recommendations from the project evaluation require to be completed by Presto.

(a) Woven Polypropylene – TPP-55

(1) Material shall be bright yellow, high-tenacity, industrial-continuous-filament, polypropylene yarn woven into a braided strap.

(2) Minimum break strength shall be 1250 lbf (5.56 kN)

(b) Woven Polyester – [TP-67] [TP-93] [TP-225]

(1) Material shall be bright, high-tenacity, industrial-continuous-filament, polyester yarn woven into a braided strap.

(2) Elongation shall be 9 to 15 percent at break.

(3) Minimum break strength shall be [1506 lbf (6.70 kN) for TP-67] [2090 lbf (9.30 kN) for TP-93] [5100 lbf (22.5 kN) for TP-225].

(c) Woven Kevlar – TK-178

(1) Material shall be Kevlar® Aramid material woven into a strap.

(2) Minimum break strength shall be 4000 lbf (17.8 kN) for TK-178.

G. Infill Materials

1. Infill material shall be topsoil for vegetated surfaces and shall have an SCS texture of loam, sandy loam or silty loam. Topsoil shall be neither excessively acidic nor alkaline.

2. Surface protection shall consist of erosion control blanket and seed mixture, paid separately, as specified in the Contract Documents.

2.3 SOURCE QUALITY CONTROL

A. Non-conforming products will be subject to rejection.

B. Approved materials will be accepted based on the brand name labeled on the geogrid itself or its container.

2.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in Manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and Manufacturer.

B. The materials shall be stored in accordance with Manufacturer's instructions. The materials shall be protected from damage and away from direct sunlight.

C. The materials shall be delivered, unloaded and installed in a manner to prevent and minimize damage

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PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Contractor to follow manufacturer guidelines and recommendations when installing the GEOWEB system.

1. Follow installation guidelines found here: www.prestogeo.com/installation

2. Follow the recommendations from the project evaluation required to be completed by Presto.

3.2 INSTALLATION

A. Prepare sub grade and install slope protection system in accordance with Contract Documents and manufacturer's installation guidelines.

B. Subgrade Preparation

1. Excavate and shape subgrade per the Contract Documents.

C. Section Anchorage

1. Follow the installation requirements for the appropriate stake anchorage, if applicable, based on the recommendations from the project evaluation required to be completed by Presto.

(a) Anchorage with ATRA® Anchors

(1) Position collapsed sections at the crest of the slope.

(2) Excavate the anchor trench at the top of the slope to the depth as shown in the Contract Documents.

(3) Drive anchors at the crest of the slope to secure the sections and allow expansion of the sections into position.

(4) After the sections are expanded as desired, drive anchors so the arm of the stake clip engages with the top of the cell wall.

(5) Connect the sections with ATRA keys at each interleaf and end-to-end connection. Insert the key through the cell wall I-slot before inserting through the adjacent cell. Turn the key 90 degrees to lock the sections together.

(6) Fill the anchorage trench with the specified material and compact as required by the Contract Documents.

(7) Anchorage pattern and anchor length shall be in accordance with the Contract Documents.

(b) Anchorage with ATRA® Speed Stakes

(1) Position collapsed sections at the crest of the slope.

(2) Excavate the anchor trench at the top of the slope to the depth as shown in the Contract Documents.

(3) Drive speed stakes at the crest of the slope to secure the sections and allow expansion of the sections into position.

(4) After the sections are expanded as desired, drive speed stakes so the arm of the speed stake engages with the top of the cell wall.

(5) Connect the sections with ATRA keys at each interleaf and end-to-end connection. Insert the key through the cell wall I-slot before inserting through the adjacent cell. Turn the key 90 degrees to lock the sections together.

(6) Fill the anchor trench with the specified material and compact as required by the Contract Documents.

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(7) Anchorage pattern and stake length shall be in accordance with the Contract Documents.

(c) Anchorage with Tendons, ATRA® Tendon Clips and Pipe Deadman

(1) Excavate the anchor trench at the crest of the slope to the depth as shown in the Contract Documents.

(2) Install pipe Deadman in anchor trench. Pipe type, diameter and thickness shall be as shown on the Contract Documents.

(3) Position the collapsed sections at the crest of the slope.

(4) Measure, cut and mark each tendon run with a permanent marker per the tendon clip location chart.

(5) Starting from the first cell, count the number of cells to the next tendon clip location and repeat along that cell row.

(6) Repeat this procedure for each tendon run.

(7) With all the tendon clips in place, thread the tendons through the cell wall I-slots in the unexpanded section.

(8) Locate the corresponding mark on the tendon and position it in front of the cell wall. Hold the tendon and connect to the tendon clip. Refer to the Slope Installation Manual for tendon clip tie-off instructions.

(9) Repeat this process on each tendon run.

(10) Place the collapsed section in the anchor trench, tie the tendons to the pipe deadman and expand the sections down the slope.

(11) Connect the sections with ATRA keys at each interleaf and end-to-end connection. Insert the key through the cell wall I-slot before inserting through the adjacent cell. Turn the key 90 degrees to lock the sections together.

(12) Adjust the section (i.e., a shake or two of the expanded section works well for this) so that the section and tendons are uniformly taut.

(13) Terminate the bottom of the tendons with ATRA® Tendon Clips.

(14) Fill the anchorage trench with the specified material and compact as required by the Contract Documents.

(d) Anchorage with Tendons, ATRA® Tendon Clips and Earth Anchors

(1) Excavate the anchor trench at the crest of the slope to the depth as shown in the Contract Documents.

(2) Position the collapsed sections at the crest of the slope.

(3) Measure, cut and mark each tendon with a permanent marker per the tendon clip location chart.

(4) Starting from the first cell, count the number of cells to the next tendon clip location and repeat along that cell row.

(5) Repeat this procedure for each tendon run.

(6) With all the tendon clips in place, thread the tendons through the I-slots in the unexpanded section.

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(7) Locate the corresponding mark on the tendon and position it in front of the cell wall. Hold the tendon and connect to the tendon clip. Refer to the Slope Installation Manual for tendon clip tie-off instructions.

(8) Repeat this process on each tendon run.

(9) Install earth anchors in accordance with Manufacturer's recommendations and instructions. Earth anchor type and strength shall be as shown in the Contract Documents.

(10) Place the collapsed section in the anchor trench, secure tendons to earth anchors and expand the sections down the slope.

(11) Connect the sections with ATRA keys at each interleaf and end-to-end connection. Insert the key through the cell wall I-slot before inserting through the adjacent cell. Turn the key 90 degrees to lock the sections together.

(12) Adjust the section (i.e., a shake or two of the expanded section works well for this) so that the section and tendons are uniformly taut.

(13) Terminate the bottom of the tendons with ATRA® Tendon Clips.

(14) Fill the anchorage trench with the specified material and compact as required by the Contract Documents.

D. Topsoil Infill Placement

1. Place infill with suitable handling equipment.
2. Infill material shall be free-flowing and not frozen when placed in the sections.
3. Limit drop height to prevent panel distortion.
4. Fill sections from the crest of the slope to toe or in accordance with Contract Documents.
5. Evenly spread infill and tamp into place ensuring the infill is flush with top of cell walls per the Contract Documents.

E. Surface Treatment

1. Surface protection shall be installed in accordance with the Contract Documents.

3.3 QUALITY ASSURANCE AND QUALITY CONTROL

A. The geocell system material shall be provided from a single Manufacturer for the entire project.

B. The Manufacturer's Quality Management System shall be certified and in accordance with ISO 9001:2015 and CE certification. Any substitute materials submitted shall provide a certification that their geocell manufacturing process is part of an ISO program and a certification will be required specifically stating that their testing facility is certified and in accordance with ISO. An ISO certification for the substitute material will not be acceptable unless it is proven it pertains specifically to the geocell manufacturing operations.

C. The Manufacturer shall provide certification of compliance to all applicable testing procedures and related specifications upon the customer's written request. Request for certification shall be submitted no later than the date of order placement. The Manufacturer shall have a minimum of 20 years' experience producing geocells and accessories.

D. Certified Installer Training Course

1. At a minimum, the certified installer training course shall be taken by the contractor's project manager and on-site project manager.
2. The certified training course is free of charge and consists of reviewing the Construction Resource Package. The training course is 2 hours in length.

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3. The contractor shall take the certified training course addressing best practices for base preparation, geotextile installation, engineered base composition and installation, unit installation and orientation and unit fill.

E. Pre-Construction Meeting: Prior to construction, conduct a virtual or on-site meeting to review all the requirements and expectations to complete the work. The pre-construction meeting shall be attended by all parties involved in the installation of the geocell system.

1. Manufacturer shall provide a recommended list of all necessary tools and equipment required for installation. Installation videos and techniques shall be reviewed.

2. Discuss any special features and requirements for the installation of the geocell system to prevent any delays and conflicts in completing the work.

F. Pre-Installation Meeting: Prior to installation of any materials, conduct a pre-installation meeting to discuss the scope of work and review installation requirements. The pre-installation meeting shall be attended by all parties involved in the installation of the geocell system.

G. Manufacturer's Field Representative Qualifications:

1. Manufacturer shall provide a qualified field representative on site at the start of construction to ensure the system is installed in accordance with the Contract Documents.

2. Manufacturer's field representative shall have a minimum 10 years' installation experience with the specified products in the specified application.

3. Manufacturer of any substitute materials to be used shall certify that a representative can meet the above criteria and will be on site for initial construction start up. Manufacturers other than Presto will be required to provide proof the representative meets these qualifications.

3.4 WARRANTY

A. The Manufacturer shall warrant each section that it ships to be free from defects in materials and workmanship at the time of manufacture. The Manufacturer's exclusive liability under this warranty or otherwise will be to furnish without charge to the original f.o.b. point a replacement for any section which proves to be defective under normal use and service during the 10-year period which begins on the date of shipment. The Manufacturer reserves the right to inspect any allegedly defective section in order to verify the defect and ascertain its cause.

B. This warranty shall not cover defects attributable to causes or occurrences beyond the Manufacturer's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation, improper alteration or improper application.

C. In no event shall the Manufacturer be liable for any special, indirect, incidental or consequential damages for the breach of any express or implied warranty or for any other reason, including negligence, in connection with the cellular confinement system.

PART 4 - APPENDICES

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Appendix A
Short-Term Seam Strength Test Procedure

Frequency of Test

The short-term seam peel strength test (referred to as the 'test' in this section) shall be performed on a geocell section randomly taken directly from the production line each two hours.

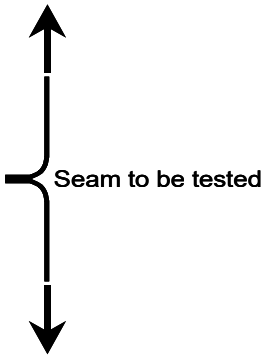


Figure A1

Test Sample Preparation

Randomly choose 10 welds within the selected section and cut those welds from the section such that 10 cm (4 in) of material exist on each side of the weld. The test sample shall have a general appearance as illustrated in Figure A1. Prior to testing, the test samples shall have air cool for a minimum of 30 minutes from the time the selected geocell section was manufactured.

Short-term Seam Peel Strength Test

The apparatus used for testing the short-term seam peel strength shall be of such configuration that the jaws of the clamp shall not over stress the sample during the test period. Load shall be applied at a rate of 12 in (300 mm) per minute and be applied for adequate time to determine the maximum load. The date, time and load shall be recorded.

Short-term seam peel strength shall be defined as the maximum load applied to the test sample. Minimum required short-term seam peel strength shall be:

- 640 lbf (2840 N) for the 8 in (200 mm) depth cell
- 480 lbf (2130 N) for the 6 in (150 mm) depth cell
- 320 lbf (1420 N) for the 4 in (100 mm) depth cell
- 240 lbf (1060 N) for the 3 in (75 mm) depth cell.

Definition of Pass / Failure

Two methods shall be used to determine acceptability of the manufactured geocell sections. The successful passing of the short-term seam peel test shall not be used to determine acceptable of the polyethylene for use in manufacturing of the geocell sections. Acceptability of the polyethylene shall be determined through tests conducted in Appendix B.

The Tested Value

If more than one of the tested seam samples fails to meet the minimum peel strength, all sections manufactured after the previously successful test shall be rejected.

If all tested seam samples meet the minimum peel strength, all geocell sections manufactured since the last successful test shall be considered to have passed the test.

When one of the tested seam samples fails to meet the minimum peel strength, another 10 samples shall be randomly selected and cut from the previously selected section. If more than one of these samples fails, all sections manufactured after the previously successful test shall be rejected. Otherwise, all geocell sections manufactured since the last successful test shall be considered to have passed the test.

Visual Failure Mode

After each sample is tested, the seam shall be examined to determine the failure mode. Two failure modes are possible.

- Material failure within and adjacent to the weld indicated by material strain and
- Weld failure resulting in complete separation of the seam and shows little or no material strain.

Upon examination, when the failure mode results in complete separation of the seam and indicates little or no material strain, product manufactured shall be rejected.

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Appendix B
Long-Term Seam-Strength Test Procedure

Frequency of Test

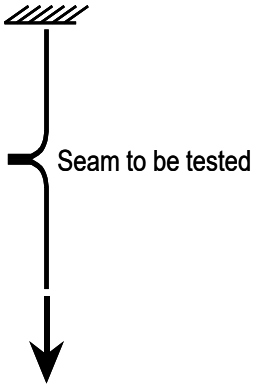


Figure B1

The long-term seam peel strength test (referred to as the 'test' in this section) shall be performed:

1. On each new resin lot number if the geocell manufacturer extrudes the sheet or strip used to produce the geocell material.
2. On each new order of sheet and/or strip if the geocell manufacturer does not extrude the sheet and/or strip used to produce the geocell material.

Test Sample Preparation

A test sample shall be made using two sets of two strips meeting all aspects of the material portion of this specification. Testing shall be done on non-perforated samples to obtain the true seam strength of the bond. One set of two strips are to be welded in welder position "A" and the other set of two strips are to be welded in welder position "B" producing two 1-cell long sections of geocell product. Welding should be done using a warm welder. The welded samples shall be labeled "A" and "B" and the weld seams of each sample shall be numbered consecutively from left to right starting with the number 1 (one) and corresponding to the welding head number.

The samples shall air cool for a minimum of 30 minutes. Randomly choose 10 welds from samples "A" and "B" and cut those welds from the geocell samples such that 4 in (10 cm) of material exist on each side of the weld. These samples shall be cut to a width of 4 in (10 cm). Properly identify each weld using the sample letter and weld seam number.

These samples are now ready to be tested.

Long-term Seam Peel Strength Test

The long-term seam peel strength test shall take place within an environmentally controlled chamber that undergoes temperature change on a 1-hour cycle from room temperature to 130°F (54°C). Room temperature shall be defined per ASTM E41.

Within the environmentally controlled chamber, one of the ends of the samples (10 samples in total) shall be secured to a stationary upper clamp. The jaws of the clamp shall be of such configuration that the grip does not over stress the sample during the test period. The sample shall be secured so that its axis is vertical and the welds being tested are horizontal as the sample hangs within the environmentally controlled chamber.

A weight of 160 lb (72.5 kg) shall be lifted via a hoist or lift platform and attached to the free lower end, of the sample. The weight shall be lowered in a way so that no impact load occurs on the sample being tested. The weight shall be sufficient distance from the floor of the chamber so that the weight will not touch the floor of the chamber as the sample undergoes creep during the test period. The date and hour the weight is applied shall be recorded.

The temperature cycle shall commence immediately within the environmentally controlled chamber. The test period for the applied load shall be 168 hours.

Definition of Pass / Failure

If any of the 10 seams fail prior to the end of the 168-hour (7-day) period, the date and hour of the failure shall be recorded and the polyethylene resin and strip material shall be considered unsuitable for geocell manufacturing.

******END OF SECTION******

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SECTION 31 23 23.33 - FLOWABLE FILL

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the installation of a cementitious flowable fill, as indicated on the drawings or as specified herein.

B. Flowable fill is a bedding and backfill material requiring no compaction using waste incinerator ash (WIA), Portland Cement, an approved aggregate, and sufficient water to permit the material to flow freely. Applications include but are not limited to:

1. Filling subsurface voids, including utility pipes and structures to be abandoned.
2. Bedding material and backfill for all piping.
3. Rock stabilization is used for backfilling to trench bottom grade for trenches over excavated to remove unsuitable materials.
4. Structural fill.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Abandon Watermain
   (a) Payment for Abandon Watermain shall be by the LINEAR FOOT. The amount bid shall be compensation in full for all labor, equipment, materials, and access needed to properly abandon the specified watermain and fill with sand or flowable fill.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for Flowable Fill. Such items of work include but are not limited to:

1. Interference with other above and underground structures and utilities.
   (a) The removal and restoration, or protection of existing structures and utilities which are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.
2. Bulk-heading, berming, damming, or other measures to restrict the path of flow, as detailed on the plans or directed by the Engineer.
3. Installing any appurtenances required to provide access for the flowable fill into pipes being abandoned.
4. Unless separately itemized in the Schedule of Unit Prices, any dewatering necessary for construction.
5. The replacement of all material displaced due to shrinkage or loss beyond the restricted flow pattern during the installation operation.
6. Delays due to other utility conflicts which result during construction.
7. Protecting existing improvements and previously accepted elements of this construction from damage.
8. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages, which threatens to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris, and soil, which accumulated during the construction.

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1.3 SPECIFICATION REFERENCES

A. American Concrete Institute (ACI):

1. 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. 301 Specifications for Structural Concrete for Buildings.

B. American Society for Testing and Materials (ASTM):

1. C31 Standard Practice for Making~ and Curing Concrete Test Specimens in the Field.
2. C33 Standard Specifications for Concrete Aggregates.
3. Cl09 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2.0-inch or 5Omm Cube Specimens).
4. C94 Standard Specification for Ready Mixed Concrete.
5. C150 Standard Specification for Portland cement.
6. C172 Standard Test Method of Sampling Freshly Mixed Concrete.
7. C403 Standard Test Method for Time of Setting of Concrete Mixtures by
8. Penetration Resistance.
9. C494 Standard Specification for Chemical Admixtures for Concrete.
10. D232 Standard Test Methods for Bleeding of Concrete.

1.4 SUBMITTALS

A. Mix Design giving dry weights of cement and WIA, saturated surface-dry weights of fine aggregate, types, names and percent of admixtures, air content, and water used per cubic yard. Include laboratory test data on 7- and 28-day strengths initial and final set times of design mix as determined by ASTM C-403

PART 2 - PRODUCTS

2.1 FLOWABLE FILL MATERIALS

A. Cement - Type I Portland meeting the requirements of ASTM C-l50.

B. Fine aggregate shall meet the provision S of ASTM C33.

C. Waste Incinerator Ash (WIA):

D. Admixtures certified to be compatible with each other. Admixtures shall not contain calcium chloride.

E. Water shall be potable, clear, and free from amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel.

2.2 FLOWABLE FILL MIX DESIGN

A. Consistency - the mixture of WIA, cement, sand, water, and admixture(s) shall be so proportioned to create a flowable slurry with a flow diameter from 8.0-10.0-inches. The mix must be a homogenous slurry that the materials do not readily segregate upon deposition into the trench. The ingredients will be so proportioned that the bleed water shall be no greater than 10 percent of the mixing water as measured by Method A of ASTM C232.

B. Proportioning and Design of Flowable Fill mixes. Field experience test data or laboratory test batches prepared in accordance with AC 21 1.1 and AC 301. A minimum of 100 lb. of Portland cement and 800 lb. of WIA shall be used per cubic yard of Flowable Fill. (Experience has shown that this amount of ash and cement will require approximately 1000 lb. of water and 840 lb. of fine aggregate to yield one cu. yd. of Flowable Fill.) Other mixes utilizing 100 percent WIA cement, and water will also be acceptable.

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C. Compressive Strength 28-day design strengths shall range from 30 - 300 psi The mix shall be so designed to provide a minimum of 20 psi at 7 days. Test cylinders shall be made in cardboard molds to release some of the excess water needed for flow ability.

D. Set time the mix will be so proportioned that it will have a minimum of 500 psi penetration resistance in four hours as measured by ASTM C403

2.3 MIXING

A. Flowable fill may be provided by the ready mix industry and shall comply with ASTM C94. If mixed on site by Contractor, details of mixing operation will be provided for approval. Sufficient mixing capacity shall be provided to permit the fill to be placed without interruption- The mixer drum shall be completely emptied prior to the initial batch of the fill to ensure that no additional cement fines are incorporated into the mix.

PART 3 - EXECUTION

3.1 FLOWABLE FILL PLACEMENT PROCEDURES

A. Deposit flowable fill by ready mix truck or other approved method by continuous discharging material in the space specified to be filled.

B. Where used to backfill the trench above the pipe to some specified elevation1 delay placement of base or other fill until flowable fill 7 in the opinion of the Engineer, has gained sufficient strength to support the next layer to be placed.

C. For all piping located under paved areas continue placing the fill from the bedding surface through the pipe zone to the subgrade elevation. Excess excavated materials taken from these paved sections shall be reused in other areas where applicable or shall be otherwise disposed of

D. Where flowable fill is specified for bedding piping material for lightweight piping and ducts, placement will be required in stages to prevent the uplift of the pipe. The first stage placement shall stop at one-fourth the diameter of the pipe. After setting of the first lift as determined by the Engineer the second stage-placement shall stop at mid-height of the pipe after consolidation (setting of the second lift the remainder of the trench shall be filled in one operation.

3.2 LIMITATION OF OPERATIONS

A. Flowable fill shall not be placed on frozen ground. Mixing and placing may begin only if the air temperature is at least 35 degrees and rising. At the time of placement, the fill shall have a temperature of at least 40 Degrees Fahrenheit. Mixing and placing shall stop when the air temperature is 40 degrees Fahrenheit and falling.

3.3 TESTING AND INSPECTION

A. The following tests will be conducted:

1. Standard 2.0-inch square mortar cubes; Made in the field and tested in a laboratory in accordance with ASTM C31 and Cl72

2. The strength level of the Flowable Fill will be considered satisfactory if the average 28-day strength test results are within the strength range specified.

3. The Contractor shall arrange for Independent Testing Laboratory to provide the above tests.

******END OF SECTION******

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SECTION 31 37 00 - RIPRAP

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to construct the riprap and geotextile fabric as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Payment for riprap will be by the Cubic Yard, as measured in the field. The amount bid will be compensation in full for all costs of excavating, removing, and disposing of, if necessary, all materials encountered in the course of riprap placement.

(a) 1.4 tons per cubic yard will be utilized as the unit conversion rate for riprap.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated rip-rap items. Such items of work include but are not limited to:

1. Granular filter material and/or geotextile fabric.

2. Excavation and disposal required to place rip-rap.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2511.

2. MnDOT 3601.

3. MnDOT 3733.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The material to be used will be the class riprap and fine filter aggregate shown on the plans as specified in MnDOT 3601.

B. The geotextile fabric shall meet the requirements of MnDOT 3733, Type 4, unless otherwise shown on the plans.

C. The Contractor may choose the type of filter material, except as restricted for geotextile filters, unless the type is specified on the plans.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. No exception to the referenced specification is made.

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******END OF SECTION******

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SECTION 32 01 16.11 - ASPHALT PAVEMENT RECLAMATION (INPLACE)

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to in place bituminous pavement reclamation as shown on the drawings or as specified herein.

B. This work will consist of in-place pulverizing and mixing of the existing bituminous pavement structure and a predetermined portion of the underlying aggregate base materials, where these materials exist, to the depths shown on the plans so as to produce a homogenous dense graded aggregate base.

C. This work will include spreading, shaping, compacting and maintaining the blended base course material to the proper grade, line and cross-sections as shown on the plans and as provided herein, unless otherwise directed by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. In-place bituminous pavement reclamation will be measured by the SQUARE YARD (SQ YD) – PLAN QUANTITY (P) and paid at the unit price bid.

1. Payment for in-place bituminous pavement reclamation at the contract bid price will be compensation in full for all labor, equipment, and material costs required to construct the aggregate base course as specified including the costs of scarifying, pulverizing, blending, watering, grading, shaping, rolling, compaction, and excess hauling of existing bituminous pavement and aggregate base courses.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the bituminous pavement reclamation, as indicated. Such items of work include but are not limited to:

1. Interference of underground structures and utilities will be included in the price bid for bituminous pavement reclamation.

(a) The removal and restoration, or protection of existing utilities for which there is no bid item for removing and restoring or working around the utility.

2. Protecting existing improvements and surfaces from damage will be included in the price bid for bituminous pavement reclamation.

3. Protecting the inverts of utility pipes from the accumulation of debris and soil, the removal of blockages which threatens to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil which accumulated during the construction will be included in the unit price bid for bituminous pavement reclamation.

4. Reclaiming around manhole and catch basin castings and valve boxes will be included in the price bid for bituminous pavement reclamation.

5. All work associated with the movement of the reclaim material to meet the profile and cross-section and to accomplish the maximum compaction layer thickness shall be included in the work under Subgrade Preparation.

6. Excess pulverized material from other locations on the project shall be utilized to attain the plan grade or cross-section as directed by the engineer. Where the excess pulverized material is on-site transporting such material will not be paid for separately but will be included in the pay item for bituminous pavement reclamation.

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7. No direct compensation will be made for water used in conjunction with the operations associated with pulverizing, blending, placing, shaping and compacting the reclaimed material nor for water used in maintaining the finished surface, or for water used for dust control purposes.
8. Reclaiming existing bituminous material, mixing with underlying granular material, loading and temporarily stockpiling the mixture (unless specifically identified as a separate bid item).
9. The reuse of the salvaged bituminous and aggregate mixture for haul road maintenance.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2106.
2. MnDOT 2211.
3. MnDOT 2215.
4. MnDOT 2232.
5. MnDOT 3138.
6. MnDOT 3149.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The pulverized material shall meet the following gradation:

Sieve Size (inch)	Percent Passing (by weight)
1.5	100%
1.0	90 – 100%
3/8	50-90%
No. 200*	10% Max

(a) * The No. 200 sieve requirement will be applied when there is no aggregate base material to meet the established grade-line and cross-section. The aggregate material shall consist of either 100 percent salvaged bituminous material (which meets the above gradation requirements and is approved by the Engineer) or MnDOT 3138 Aggregate Base, Class 5.

B. The Contractor may salvage and reinstall excess reclaim material as an acceptable equal to imported Aggregate Base, Class 5 under spot curb replacements, to supplement aggregate base needs for the bituminous trail rehabilitation areas, to construct new aggregate base for bituminous trails as required, or for backfill of subgrade correction areas, as directed by the Engineer. Reclaim material may NOT be used for the aggregate base under concrete driveways or concrete sidewalks.

C. Salvaged bituminous and granular mixture shall be temporarily stockpiled at a location determined by the Contractor.

D. All excess reclaimed materials will become the property of the Contractor and shall be removed from the site and disposed of at a location secured by the Contractor.

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PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Reclaiming Machine:

1. The road reclaimer shall be a self-propelled machine capable of effectively pulverizing the in-place bituminous pavement structure and blending a portion of the underlying aggregate base material to the depth shown on the plans. The machine shall have either an upward or downward rotational cutting head. The machine shall have controls to maintain a constant cutting depth to produce a uniformly blended aggregate mixture.

B. Pulverizing Operation:

1. The existing pavement and base material shall be pulverized and blended to the depth shown on the plans in one or more passes so that the entire mass of material is uniformly blended/mixed. The blended material shall meet the previously specified gradation requirements, based on the results of gradation tests run on aggregate samples obtained after mixing and prior to compaction.

2. The Contractor shall not pulverize any more pavement than that which can be spread, shaped and compacted by the end of the workday.

3. The Contractor shall take care to avoid disturbing or damaging curb and gutter and existing drainage or utility structures on the project. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at no expense to the Owner.

C. Grading & Spreading:

1. The reclaimed material shall be spread and compacted to the grade, width and slope shown on the plans and typical cross-sections or as directed by the Engineer.

2. If additional aggregate material is required to attain the plan grade and/or cross-section, the materials used shall meet the previously stated requirements and may be added, either:

(a) On the surface of the undisturbed road prior to reclaiming.

(b) Or after the roadway has been reclaimed; with this option, the add material shall be blended with an additional pass of the reclaiming machine so as to obtain a reasonable uniform mixture.

(c) If the bitumen content of the reclaimed mixture exceeds 3 percent by weight, then additional aggregate base shall be placed and blended with the original reclaimed mixture until less than 3 percent bitumen by weight is achieved.

D. Compaction:

1. Compaction of each layer of the reclaimed mixture shall be by the Quality Compaction Method (MnDOT 2211.3C2). The mixture shall be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The stability of the compacted material will be considered adequate when the surface shows less than one, ¾-inch of yielding or rutting after one pass, or as otherwise approved by the Engineer. The test rolling of the compacted aggregate base using a fully loaded aggregate truck (tandem) will be incidental.

2. Water shall be added prior to and during compaction as required and will be incidental to the reclamation bid prices.

3. The maximum reclaimed layer thickness for compaction will be 6.0-inches. If the layer thickness is greater than 6.0-inches, it shall be bladed to one side of the roadway and the remaining in place material shall be compacted. The material, which was bladed to the side, shall be spread back and compacted before the end of the work day.

4. Each 6.0-inch layer of reclaimed material shall be of uniform thickness and compacted until there is no evidence of further consolidation.

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E. Surface Requirements:

1. Upon completion of the final shaping and compaction, the finished surface of reclaimed aggregate base course shall be smooth and not vary more than 0.05-feet from the planed elevation. If any area is found to lack the required smoothness and/or out of tolerance, such areas shall be reshaped and recompacted until the required smoothness and tolerance is obtained.
2. The Contractor shall be responsible for maintaining the finished surface of the aggregate base course in a smooth, compacted condition; free of ruts and distortions, and to the grade and cross-section tolerances previously stated until the first bituminous course required by the contract is placed thereon. The application of water may be required to maintain the compacted surface. The necessary maintenance shall be performed at no additional cost to the Owner.
3. If a weak area or soft spot is encountered during the reclamation process, this area shall be corrected at the direction of the Engineer. Measurement and payment for the correction will be in accordance with MnDOT 2106 for subgrade excavation and MnDOT 3149 for stabilizing aggregate.

F. Dust Control:

1. If necessary, the Contractor shall utilize water for dust control of the reclaimed gravel base. Dust control will be incidental.

******END OF SECTION******

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SECTION 32 01 16.13 – ASPHALT PAVEMENT MILLING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the milling of concrete or bituminous pavement as shown on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Mill Bituminous Surface

(a) Payment for milling the surface shall be made at the SQUARE YARD unit price bid for the thickness specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the milling items, as indicated. Such items of work include but are not limited to:

1. The removal of milled materials from the project by the Contractor, include in the price bid for pavement milling.
2. Interference of underground structures and utilities include in the price bid for pavement milling.
3. The removal and restoration, or protection of existing utilities that are shown on the plans and for which there is no bid item for removing and restoring or working around the utility.
4. Protecting existing improvements and surfaces from damage include in the price bid for pavement milling.
5. Protecting the inverts of utility pipes from the accumulation of debris and soil, the removal of blockages which threatens to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil which accumulated during the construction, include in the unit price bid for pavement milling.
6. Milling headers when matching into existing perpendicular pavement roadways or surfaces, include in the price bid for pavement milling.
7. Milling around manhole and catch basin castings and valve boxes, include in the price bid for pavement milling.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2232.
2. MnDOT 2211.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

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A. All unsuitable excess milled materials shall become the property of the Contractor and shall be removed from the site and disposed of at a site secured by the Contractor.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. No exception to the referenced specifications is made.

******END OF SECTION******

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SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the aggregate base course as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Reclaimed bituminous and aggregate material will be utilized for a portion of the aggregate base on this project. The estimated quantity of Aggregate Base, Class 5 as shown in the Bidding Schedule is based on an assumed quantity of suitable reclaimed material being available.

2. Aggregate Base, Class 5 may be incidental to associated bid items, as indicated.

3. The quantities for aggregate base are strictly estimates and may be increased or decreased by any amount with no adjustment in unit price according to the extent of aggregate base used to backfill subgrade excavations and the extent of reclaimed material available.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated aggregate items. Such items of work include but are not limited to:

1. Protecting existing improvements and previously accepted in-process improvements from damage.

2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.

3. The cost of all labor, equipment and materials necessary for meeting the testing requirements of field quality control, if required, include in price bid for Aggregate Base.

4. Furnishing and installing blue tops for gravel surface.

5. Test rolling of the compacted aggregate base using a fully loaded aggregate truck (tandem).

1.3 SPECIFICATION REFERENCES

A. MnDOT 2211 shall apply to the construction of aggregate base, except as modified herein.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Provide the following test results for each source of aggregate:

1. Two gradation tests

PART 2 - PRODUCTS

2.1 MATERIALS

A. When no percent crushing is designated in the Schedule of Prices, the material to be used shall conform to the Specifications for Aggregate Base Class 5 modified so that the percent passing the No. 200 sieve shall be 5 to 10 percent.

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B. When the schedule of unit prices calls for 100 percent crushed aggregate base, the material to be used shall conform to the Specifications for Aggregate Base Class 5, modified so that the material consists of 100 percent crushed rock. The gradation shall also be modified so that the percent passing the No. 200 sieve shall be 5 to 10 percent.

C. Materials included here consist of new Class 5 aggregate base. If additional rock is added to meet the Class 5 gradation, the added materials must pass the Los Angeles Rattler (L.A.R.) test. The percent crushed shall also be tested on the aggregate base class 5 samples.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cleats, and roll the surface with a steel wheel or rubber-tired roller.

B. The depth and class of aggregate base to be constructed shall be as shown on the plans. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the Engineer.

C. Pneumatic rollers are required for compaction on all aggregate base courses with recycled bituminous unless otherwise approved by the Engineer.

D. All aggregate base courses shall be compacted using the Quality Compaction Method.

E. The compacted aggregate base shall be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The stability of the compacted base shall be considered adequate when the surface shows less than 1.0-inch of yielding or rutting after one pass, or as otherwise approved by the Engineer. The test rolling of the compacted aggregate base using a fully loaded aggregate truck (tandem) shall be incidental.

3.2 SOURCE QUALITY CONTROL

A. The Owner may arrange for the following tests:

1. One gradation test for each 500 tons or 275 cubic yards (VC) of each class of aggregate base.
2. One percent crushing test.
3. One aggregate quality test.

B. Samples for testing shall be taken from material stock at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

C. The Contractor shall cooperate fully with the individuals performing the tests.

D. Should any of the specified tests fail, the Contractor shall arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

3.3 FIELD QUALITY CONTROL

A. "Blue Top" stakes shall be provided by the Contractor at 50.0-foot intervals to confirm that the base is constructed to the required grades and elevations. Methods other than "Blue Top" staking may be allowed, if approved by the Engineer.

B. The Owner may arrange for the following tests:

1. One density test per 2000 square yards of each class of aggregate base, minimum of 3 tests per project.
2. One moisture test per project (not required for reclaimed aggregate base material).

C. Any required Contractor testing shall be performed by an independent testing laboratory approved by the Engineer.

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D. The Contractor shall cooperate fully with the individuals performing the tests.

E. Samples for testing shall be taken from materials in place, in the roadway at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

F. Should any of the specified test fail, the Contractor shall arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements may have been met.

******END OF SECTION******

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SECTION 32 12 00 - FLEXIBLE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of plant-mixed bituminous surfacing utilizing the MnDOT Gyratory Design Specification (2360) as indicated on the plans or as specified herein.

B. This is a Certified Plant Project. The supplier shall have sufficient testing facilities and qualified personnel including Certified Technicians. All required plant and field tests shall be performed in a timely manner and with a good quality control program.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment for the accepted quantity of asphalt emulsion and cutback shall be at the Contract price per gallon for undiluted asphalt emulsion and neat cutback. Should the Contract fail to include a Contract Item covering payment for the bituminous material used for tack coat, all costs of furnishing and applying bituminous tack coat material will be included in the compensation provided for the bituminous mixture, with no measurement made of the bituminous material used and with no direct compensation being made therefore.

2. Payment shall be at the unit price bid per TON of bituminous surfacing for the respective bituminous courses. The amount bid shall include all material and work required to mix and place the bituminous course specified.

3. Payment for bituminous driveways (TYPE SP 9.5 WEARING COURSE MIXTURE (2,B) 3.0" THICK) shall be at the unit price bid per square yard (SY) of bituminous driveway constructed. The amount bid shall include all material and work required to construct the bituminous driveways as specified on the plans, including:

   (a) Sawcutting for bituminous driveway removals

   (b) Subgrade preparations

   (c) Aggregate base course

   (d) Bituminous paving

   (e) Constructing clean vertical edges on adjacent asphalt surfaces.

B. No payment adjustment shall be made for density. No cores will be taken on the final wear course

C. This project is not subject to the provisions of MnDOT 2399.

D. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous paving items. Such items of work include but are not limited to:

1. Equipment and materials necessary for meeting the testing requirements of Source Quality Control for the bituminous tack coat, if required, include in price bid for bituminous tack coat.

2. The cost of all labor, equipment and materials necessary to comply with plant and field testing requirements of MnDOT 02360, include in price bid for Plant-Mixed Bituminous Surfacing.

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3. The cost of all labor, equipment and materials necessary for constructing clean, vertical, solid edge at the adjacent asphalt surface for both non-wear and wear courses, include in the price bid for Plant-Mixed Bituminous surfacing.

4. Sawcutting the bituminous edges and removing of damaged bituminous just prior to the construction of the next lift of bituminous course.

1.3 SPECIFICATION REFERENCE

A. MnDOT 2360 shall apply, except as modified herein.

B. MnDOT 2357 shall apply, except as modified herein.

C. MnDOT 3139 shall apply, except as modified herein.

D. Unless noted otherwise, the provisions in this Section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Bituminous Mix Designs (wear and non-wear).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bituminous Tack Coat:

1. The bituminous material for tack coat will be limited to one of the following kinds of emulsified asphalt. However, the Engineer may authorize the use of medium cure cutback asphalt (MC-250) during the early and late construction season when it is anticipated the air temperature may drop below 32 degrees Fahrenheit. Cutback asphalt shall be used only when approved by the Engineer.

(a) Emulsified Asphalt

(1) Anionic SS-1, SS-1h

(2) Cationic CSS-1, CSS-1h

(b) Cutback Asphalt:

(1) Medium Cure Liquid Asphalt MC-250

2. Only Certified Sources are allowed for use. MnDOT's Certified Source List is located at the following link: http://www.dot.state.mn.us/products/index.html .

B. Bituminous material and aggregate shall be as shown on the typical sections in the plans.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Bituminous Tack Coat

1. The tack coat shall not be applied when the road surface or weather conditions are unsuitable as determined by the Engineer.

2. At the time of applying bituminous tack coat material, the road surface shall be dry and clean and all necessary repairs or reconditioning work shall have been completed as provided for in the Contract and approved by the Engineer.

3. Unless otherwise indicated in the Plans or provisions, the bituminous tack coat material shall be applied within the application rates shown in the table below as based on pavement type or condition and type of bituminous material. The Engineer shall approve the time and rate of application. Only a MnDOT certified asphalt emulsion supplier is allowed to dilute the emulsion. When diluted, the

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supplier shall provide asphalt emulsion diluted 1-part emulsion to 1-part water. Dilution of asphalt emulsion in the field is not allowed. The Engineer may waive the tack coat requirement when multiple lifts are paved on the same day.

Pavement Type or Condition	**Application Rate - gallons/sy**		
	Undiluted Emulsion SS-1, SS-1H, CSS-1, CSS-1H	**Diluted Emulsion (1 part Emulsion to 1 part water) [1] SS-1, SS-1H, CSS-1, CSS-1H**	**MC Cutback[2] MC-250**
New HMA	0.03 – 0.05	0.06 – 0.10	0.03 – 0.05
Aged HMA[3] or Un-milled PCC	0.05 – 0.08	0.10 – 0.15	0.05 – 0.08
Milled HMA or Milled PCC	0.07 – 0.10	0.14 – 0.20	0.07 – 0.10

[1]As provided by the asphalt emulsion supplier
[2]When approved by the Engineer
[3]Older than 1 year

4. The temperature of the bituminous material at the time of application shall be approved by the Engineer, within the limits specified following:

   (a) SS-1, SS-1H, CSS-1, CSS-1H .....70 to 160 Degrees Fahrenheit

   (b) MC-250 .....165 to 220 Degrees Fahrenheit

B. The Contractor is required to use the self-propelled pneumatic tire roller as an intermediate roller on the wearing courses.

C. Cut the adjacent asphalt surface prior to construction of the bituminous surface course to obtain a clean, vertical, solid edge.

D. Compaction of all bituminous mixtures shall be by Ordinary Compaction Method

3.2 SOURCE QUALITY CONTROL

A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.

B. Testing of the material bituminous tack coat may be required, if determined by the Engineer, that the material appears suspect.

C. Samples for testing shall be taken from material in stock at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

D. The Contractor shall cooperate fully with the individuals performing the tests.

3.3 FIELD QUALITY CONTROL

A. If required by the Engineer, cores for mat density and for lift thickness verification shall be taken, except that for daily production less than 300 tons, the Engineer may require that two cores are taken (one for Contractor testing and one companion core). Sample locations shall be designated by the Engineer and made with a drilling device that produces clean sharp, vertical edges.

B. Lift Thickness Tolerances:

1. If any cores indicate lift thicknesses outside of the specified tolerances, the Contractor may, at its own cost and expense, take additional core samples to further define the extent of the deficiency.

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2. The Engineer shall calculate deficient pavement areas using the locations and thickness results of all core samples and prorating the thickness profile.

3. At the discretion of the Engineer as an alternative to removal and replacement, the Engineer may allow a $1.00 deduction per square yard will be made for each 1/8-inch deficiency of thickness beyond the specified tolerances.

4. Reduction in payment for bituminous courses constructed to more than the maximum permissible thickness, except that the thickness tolerances specified herein apply.

C. Testing:

1. For projects with 2000 tons or less of a particular mix type, delete Tables 2360.2-7 and 2360.2-8 of the referenced MnDOT 2360 and substitute the following:

Production Test	Sampling and Testing Rates (each mix type)	Test Reference (Laboratory Manual unless otherwise indicated)	Spec Section
Bulk Specific Gravity	Divide the planned production by 500. Round up to the next whole number	1806	2360.2.G.7.b
Maximum Specific Gravity		1807	2360.2.G.7.c
Air Voids (calculated)		1808	2360.2.G.7.d
Asphalt Content		1853	2360.2.G.7.a
Add AC/Total AC Ratio (calculated)		1853	2360.2.G.7.a
Adj. AFT (Calculated)		1854	2360.2.E.7.e
Gradation	1 gradation per 500 tons or portion thereof (at least one per day)	1203	2360.2.G.7.f
Coarse Aggregate Angularity	1 test per 500 tons or portion thereof. If CAA >8 percent of requirement, 1 sample per day but test 1 per week.	1214	2360.2.G.7.g
Fine Aggregate Angularity (FAA)	1 test per 500 tons or portion thereof. If FAA >5 percent of requirement, 1 sample per day but test 1 per week.	1213	2360.2.G.7.h
Fines to Effective Asphalt Ratio (calculated)	Divide the planned production by 500. Round up to the next whole number	1203 & 1853	2360.2.G.7.f & 2360.2.G.7.a
TSR	As directed by the Engineer	1213	2360.G.7.i
Aggregate Specific Gravity	As directed by the Engineer	1204, 1205, and 181	2360.G.7.j
Mixture Moisture Content	Daily unless otherwise required by the Engineer	1805	2360.G.7.k
Asphalt Binder	As directed by the Engineer]	MnDOT Bituminous Manual 5-693.920	2360.G.7.l

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2. Contractor shall send a copy of the testing results to the Engineer.
3. Should any of the specified tests fail, the Contractor shall notify the Engineer immediately and shall arrange and pay for additional test as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 32 12 01 - FLEXIBLE PAVEMENT PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of plant-mixed bituminous surfacing as indicated on the plans or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment for bituminous patch (REMOVE AND PATCH BITUMINOUS PAVEMENT) patch shall be at the unit price bid per square yard (SY) of bituminous patch. The amount bid shall include all material and work required to construct the bituminous patch as specified on the plans, including:

(a) Saw cutting for bituminous base pavement removals, if required

(b) Removal and disposal of bituminous base pavements

(c) Subgrade Preparation

(d) Aggregate Base Course, if required

(e) Bituminous Base Course

(f) Constructing clean vertical edges on adjacent asphalt surfaces.

2. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous patch. Such items of work include but are not limited to:

(a) No exception to the referenced specifications is made.

3. No payment will be made under this bid item for bituminous base patches surrounding casting and gate valve work and adjacent to new concrete curb and gutter. This work shall be considered incidental to the associated casting or adjustment bid item, however, the requirements of these specifications shall still apply to the work.

4. Payment will be made under this bid item for bituminous base patches at locations where the base pavement is identified by the Engineer to be damaged to the point of needing correction after milling operations have concluded.

1.3 SPECIFICATION REFERENCE

A. MnDOT 2104 shall apply, except as modified herein.

B. MnDOT 2106 shall apply, except as modified herein.

C. MnDOT 2112 shall apply, except as modified herein.

D. MnDOT 2211 shall apply, except as modified herein.

E. MnDOT 2357 shall apply, except as modified herein.

F. MnDOT 2360 shall apply, except as modified herein.

G. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

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A. Bituminous Mix Designs (wear and non-wear).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subgrade Preparation

1. No exception to the referenced specification is made.

B. Aggregate Base Course

1. The material to be used shall conform to the requirements for Aggregate Base, Class 5.

C. Bituminous Tack Coat

1. The bituminous material for tack coat shall be CSS-1H.

D. Bituminous Paving Materials

1. Bituminous material and aggregates shall conform to the typical sections shown in the plans.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The depth and class of aggregate base and bituminous surface to be constructed shall be as shown on the typical sections in the plans.

B. The subgrade, aggregate and bituminous base courses of patches whose smallest dimension is less than the width of the compaction equipment shall be hand tamped.

C. The subgrade shall be compacted using Quality Compaction Method.

D. When the Contractor believes subgrade preparation is complete, he shall notify the Engineer for a final examination. If the Engineer requests it, the subgrade shall be test rolled with a fully loaded tandem truck to verify subgrade stability.

E. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the Engineer.

F. Cut the adjacent asphalt surface prior to the Construction of the bituminous surface course to obtain a clean, vertical, solid edge.

G. Compaction of the aggregate base courses shall be by the Quality Compaction Method.

H. The bituminous tack coat shall be applied at the rate of 0.08 gallons per square yard.

I. The contact surfaces of all fixed structures, the edge of the in-place mixture in all courses at transverse joints, and the wearing course at longitudinal joints shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.

J. The bituminous surfacing shall be constructed with maximum deviation of plus or minus ¼-inch from the planned compacted thickness.

K. Compaction of all bituminous mixtures shall be by the Ordinary Compaction Method. A nuclear density meter and operator shall be provided by the Contractor, if requested by the Engineer.

3.2 FIELD QUALITY CONTROL

A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project, and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.

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B. Final line and grade of the wearing surface shall not exceed the following tolerances from the adjacent pavement surfaces:

	Distance Below Adjacent Bituminous Pavement (inch)
City Streets	1/8
County Highways	1/8
State Highways	1/8
Sidewalks	1/8
Parking Areas	1/4

******END OF SECTION******

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SECTION 32 14 16 - BRICK UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the installation of all brick pavers, as shown on the drawings, as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Salvaging and installing brick pavers shall be measured and paid per SQUARE FOOT (SQ FT) of pavers salvaged and reinstalled. The amount bid shall include all costs for salvaging, storing, layout, cutting of existing pavers, furnishing and installing a sand leveling base and paver edging, and reinstallation of the salvaged materials to their pre-project locations matching the existing pattern, if applicable, or other location as specified by the Engineer.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for brick pavers. Such items of work include but are not limited to:

1. Installation and maintenance of temporary walking surfaces, if the installation of the pavers is delayed will be included in the unit price bid for brick pavers.

2. Cutting and fitting necessary to install pavers around manholes, valves, planters, tree grates, and other utility items will be included in the unit price bid for brick pavers.

3. Furnishing and installing leveling sand, aggregate base, and edging material shall be considered incidental. 1” – 2” of leveling sand shall be used over an approved subgrade with 4” aggregate base for walks and 6” aggregate base for driveways.

4. Protecting existing pavers and cutting as necessary shall be considered incidental.

5. Furnishing and installation of mortar, expansion, and control joints, providing the base as required for the brick pavers, and furnish and install required sleeves and box-outs shall be considered incidental.

1.3 SPECIFICATION REFERENCES

A. All masonry work shall be done according to practices outlined in the Concrete Masonry Handbook.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No exceptions to the reference specification.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Grout and mortar materials shall match the existing as closely as possible, if applicable.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The paver installer shall examine areas and conditions under which brick pavers are to be installed. The Contractor shall notify the Engineer and Owner, in writing, of conditions detrimental to proper and timely

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completion of the work. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the paver installer unless otherwise directed by the Engineer.

******END OF SECTION******

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SECTION 32 15 00 - AGGREGATE SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the aggregate surfacing / shouldering as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. No exception to the referenced specification is made.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated aggregate surfacing items. Such items of work include but are not limited to:

1. Protecting existing improvements and previously accepted in-process improvements from damage.
2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.
3. The cost of all labor, equipment and materials necessary for meeting the testing requirements of field quality control, if required.
4. Furnishing and installing blue tops for aggregate surfacing.
5. Test rolling of the compacted aggregate surface using a fully loaded tandem axle truck.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2118 shall apply to the construction of aggregate surfacing, except as modified herein.

B. MnDOT 2221 shall apply to the construction of aggregate shouldering, except as modified herein.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Provide the following test results for each source of aggregate:

1. Two gradation tests One percent crushing test (only if requested by Engineer).
2. One aggregate quality test (only if requested by Engineer).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials included here consist of new aggregate surfacing, Class 2. If additional rock is used to provide a coarser Class 2 gradation, the added materials must pass the Los Angeles Rattler (L.A.R.) test.

B. Excess reclaim material may be used in lieu of aggregate surfacing, as approved by the Engineer.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

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A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers, tractor tires and tracked equipment, and roll the surface with a steel wheel or rubber tired roller.

B. The depth and class of aggregate surfacing to be constructed shall be as shown on the plans. Aggregate surfacing construction shall take place only after the subgrade or aggregate base condition and grade has been examined by the Engineer.

C. Existing aggregate surfacing shall be salvaged prior to commencing trenching activities and shall be restored after underground construction is completed.

D. Compaction of the aggregate surfacing courses shall be by the Quality Compaction Method.

E. The compacted aggregate shall be test rolled using a fully loaded tandem axel truck in a pattern approved by the Engineer. The stability of the compacted aggregate shall be considered adequate when the surface shows less than 1.0-inch of yielding or rutting after one pass, or as otherwise approved by the Engineer. Test rolling shall be incidental.

3.2 SOURCE QUALITY CONTROL

A. The Contractor shall perform and pay for Contractor Quality Control Testing in accordance with the MnDOT Schedule of Materials Control.

B. Samples for testing shall be taken from material in stock at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

C. The Contractor shall cooperate fully with the individuals performing the tests.

D. The OWNER will arrange for and pay for Quality Assurance (QA) testing. Should any of the specified (QA) tests fail, the Contractor shall pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met. If the material is determined to be out of compliance with the MnDOT 2211, price reductions or material rejections will be implemented per MnDOT 2211.

******END OF SECTION******

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SECTION 32 16 14 - CURBS, GUTTERS, AND DRIVEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This work consists of constructing cast-in-place concrete curbs, curb and gutter, medians, driveway pavement, pedestrian ramps, valley gutters, and other similar traffic delineation or service items as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. 6” Concrete Driveway Pavement

(a) This item shall be measured and paid per SQUARE YARD (SY). The amount bid shall include all costs for subgrade preparation, furnishing and installing aggregate base to depth as specified, and furnishing, placing, jointing, curing, protecting, and scoring concrete to depth as specified.

2. Concrete Curb & Gutter, Design B618/Surmountable (Spot)

(a) This item shall be measured and paid per LINEAR FOOT (LF) per the referenced specification. The amount bid shall include all costs for preparation of the existing aggregate base, supplementing with new aggregate base if the existing is not sufficiently salvaged during removal operations, and furnishing, placing, jointing, curing, protecting, and scoring concrete to depth as specified.

(1) Bituminous base patches shall be constructed adjacent to new spot concrete curb and gutter in mill & overlay areas. This work shall be considered incidental to the associated spot concrete curb and gutter bid item, for which no direct payment will be made. The requirements of Section 32 12 01 (Flexible Pavement Patching), included in these specifications, shall still apply to the patching work.

(2) Drill and grout reinforcement bars (epoxy coated) shall be furnished and installed to tie the new spot curb replacements to the existing concrete curb. This work shall be considered incidental to the associated spot concrete curb and gutter bid item, for which no direct payment will be made. The requirements for Drill and Grout Reinforcement Bar (Epoxy Coated) included in Section 32 16 23.13 (Concrete Walks), included in these specifications, shall still apply to the reinforcement bars installation.

(3) It is assumed that this bid item will be utilized for concrete curb and gutter spot replacements around all catch basin casting replacements, pedestrian ramp curb replacements, and for deficient curb, as marked in the field by the Engineer.

3. Concrete Curb, Design V

(a) This item shall be measured and paid per LINEAR FOOT (LF) per the referenced specification. The amount bid shall include all costs for preparation of the aggregate base, and furnishing, placing, jointing, curing, protecting, and scoring concrete to depth as specified.

(1) This work shall consist of constructing Concrete Curb Design V of varying heights up to 12 inches as detailed in the Plan and in accordance with the provisions of MnDOT 2531, and other Contract provisions.

(2) This bid item may or may not be needed, depending on actual grades encountered in the field when laying out new ADA pedestrian ramps. Owner reserves the right to adjust quantities of work for concrete curb with no adjustment in unit price, including other contract pay items not listed on this sheet based on actual needs determined in the field during construction.

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4. Valley Gutter

   (a) This item shall be measured and paid per SQUARE YARD (SY) per the referenced specification. The amount bid shall include all costs for preparation of the existing in-place reclaim material, and furnishing, placing, jointing, curing, protecting, and scoring concrete to depth as specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated concrete curb and gutter, and concrete driveway items. Such items of work include, but are not limited to:

1. Aggregate base placed under pavements, except curb & gutter and valley gutters.
2. Cold weather concrete protection methods and materials required.
3. High early strength concrete, as necessary to meet requirements.
4. Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.
5. Provide temporary walkways spanning fresh concrete where required to maintain access into building entrances.
6. Providing joints matching existing pavements, including tooled or saw cut joints as necessary to match adjacent pavements.
7. Casting and curing concrete compressive test cylinders and the performance of compressive strength tests as specified.
8. Slump and air entrainment testing.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2301.

B. MnDOT 2531.

C. MnDOT 3137.

D. MnDOT Standard Plates.

E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. A copy of the certified mix design shall be submitted to the Engineer for review at least seven days prior to the placement of any concrete.

1. Mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor.
2. A current mix design may be submitted and accepted, provided the aggregate source is the same as that being used for this project.
3. Two copies of the certified mix design shall be submitted to the Engineer for review prior to the construction of the project.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Adjust class and composition of coarse aggregate material in the mixture to comply with 3.2.B.

B. The coarse aggregate designation shall be ASTM #67* from MnDOT Table 3137.2-4.

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C. High early strength concrete shall be used for driveway pavement where the Contractor's operations have delayed opening of driveways per requirements.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The use of dimensional lumber as forms is permitted if the dimension of the lumber is within ½-inch of the specified dimension of the finished concrete.

B. The width of all driveways shall be established in the field by the project Engineer or Owner.

C. The joints in the driveway pavement shall match with the sidewalk and curb control joints. The Contractor shall be fully responsible for proper jointing patterns. Mismatched jointing will require removal and replacement of components in order to achieve the desired results. All removal and replacement of rejected construction shall be at the Contractor's expense.

D. The tooling tolerances as outlined in MnDOT 2531 for surface uniformity, alignment and jointing shall be reviewed by the Contractor prior to the construction. Defects found during examinations will require the Contractor to remove and replace those areas. No deduction in unit price will be acceptable to satisfy defective areas found.

E. Backfill along exposed edges of slabs and/or behind the curb with selected salvage material from the excavation to the elevation shown on the design detail plate.

F. The Contractor shall imprint the concrete curb at the locations of the utility service locations if indicated and in accordance with the plans.

G. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be spaced or be of a width to provide an approach over which a vehicle may be driven onto the pavement.

H. The Contractor shall schedule and implement construction of curb and concrete driveways to close driveways for no longer than 7 consecutive days. Multiple closures will not be accepted.

I. The Concrete Curb Design V shall be constructed as detailed in the Plan. Concrete Curb Design V may be constructed independent of or integral to the adjacent sidewalk. The bottom elevation of the Concrete Curb Design V shall match the bottom elevation of the adjacent sidewalk slab. When the Concrete Curb Design V is constructed independent of the sidewalk, the portion of the Concrete Curb Design V that will have new concrete walk placed against it shall be clean so as to maximize bonding between the walk and Concrete Curb Design V. The joint locations in the curb shall align with the joint locations in the adjacent concrete walk.

    1. The locations requiring the use of Concrete Curb Design V will solely be determined in the Plans or in the field by the Engineer. Any Concrete Curb Design V that is constructed without preapproval of the Engineer will be considered unauthorized work for which no compensation will be made and may be removed at the Engineer's discretion. The height and length of the Concrete Curb Design V to be constructed shall be recommended by the Contractor and approved by the Engineer before the Concrete Curb Design V is constructed.

3.2 FIELD QUALITY CONTROL

A. Testing

    1. The Owner may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:

        (a) Air and slump cone tests.

        (b) Beam and cylinder testing.

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2. The Contractor's shall cooperate with the individuals conducting the testing operations.

B. Surface Requirements

1. Immediately after placement and within the warranty period, no finished surface shall exceed the following defect rates. A surface defect is defined as any loss of aggregate or mortar from the surface that is larger than ¼-inch in diameter and greater than ¼-inch in depth. Any area not meeting the below thresholds shall be considered defective work and replaced at no expense to the Owner.

(a) Defect Thresholds:

(1) Five (5) per 10 LF section of curb and gutter.

(2) Twelve (12) per 10-foot by 10-foot panel of driveway.

2. The following shall also be considered as defective work at any rate and replaced at no expense to the Owner:

(a) Cracking outside of control joints.

(b) Surface flaking / mortar flaking.

(c) Surface spalling.

(d) Surface imprints not conforming to specified texture and finish.

(e) Chipping.

C. Defective sections or panels shall be replaced to the nearest construction joint.

D. Warranty Period

1. During the warranty period indicated in the Supplementary Conditions, necessary repairs shall include but not be limited to defects in concrete mentioned above.

******END OF SECTION******

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SECTION 32 16 23.13 – CONCRETE WALKS

PART 1 - GENERAL

1.1 SUMMARY

A. This work consists of constructing concrete or bituminous walks.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment for constructing pedestrian ramps shall be measured and paid as concrete walk at the unit price bid in the Schedule of Unit Prices, complete and in place.

2. Payment for constructing truncated domes shall be measured and paid at the unit price bid per Square Foot (SF) in the Schedule of Unit Prices, complete and in place.

3. Payment for installing epoxy coated reinforcement bars in concrete walks at pedestrian ramps shall be measured and paid as Drill and grout Reinforcement Bar (Epoxy Coats) at the unit price bid in the Schedule of Unti Prices per each, complete and in place.

(a) No additional payment will be made for spot repair work/materials under this bid item. Reinforcement bars required for spot concrete sidewalk and spot concrete curb and gutter replacements shall be considered incidental to the associated bid item.

4. Special walk sections shall be measured and paid for as a part of the design style of walk as shown on the plans.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated walks - concrete items. Such items of work include but are not limited to:

1. Aggregate base placed under concrete walk, as specified.

2. Cold weather concrete protection methods and materials required.

3. Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.

4. Provide temporary walk ways spanning fresh concrete where required to maintain access into building entrances.

5. Use of high early strength concrete, if necessary.

1.3 SPECIFICATIONS REFERENCES

A. MnDOT 2521 shall apply to the construction of concrete walks, except as modified herein.

B. MnDOT 3137 shall apply, except as modified herein.

C. MnDOT 3301 shall apply to the epoxy coated reinforcement bars, except as modified herein.

D. MnDOT Standard Plates.

E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. A copy of the certified mix design shall be submitted to the engineer for review at least seven days prior to the placement of any concrete.

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B. For projects not funded using federal, state and/or state-aid funds the mix design may be determined by an independent certified testing laboratory secured by the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

A. CONCRETE

1. Adjust class and composition of coarse aggregate material in the mixture to comply with 3.2.B.
2. The coarse aggregate designation shall be ASTM #67* from MnDOT Table 3137.2-4.
3. The foundation materials shall be in accordance with the plans.

B. TRUNCATED DOME SYSTEMS FOR PEDESTRIAN CURB RAMPS.

1. The approved products are those listed on the MnDOT web site – No Stainless Steel ramps are allowed. http://www.dot.state.mn.us/products/detectablewarningsurfaces/index.html.
2. Truncated domes shall be powder coated with color to be **natural rust color**.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The use of dimensional lumber as forms is permitted if the dimension of the lumber is within ½-inch of the specified dimension of the finished concrete.

B. When the pavement is placed directly on natural subgrade, earth check dams shall be constructed immediately after passage of the slip forms or removal of the forms to prevent water from flowing along the edge of the pavement and undermining the concrete. They shall not be constructed to provide an approach over which a vehicle may be driven onto the pavement.

C. Drill and Grout Reinforcement Bar (Epoxy Coated) (ADA)

1. This work consists of furnishing, drilling, grouting, and inserting No. 4 epoxy coated reinforcement bars as shown on the details in the Plan in accordance with provisions of MnDOT 2301.
2. Anchor the reinforcement bars to the in-place concrete by utilizing either a non-shrink grout or epoxy adhesive from the Approved Products List. The Contractor may use vibratory drilling tools 24 hours after placing the concrete to avoid subjecting the concrete to damaging stresses in cooler weather after the concrete has reached a compressive strength of at least 2,000 psi.
3. Reinforcement bars may be cast-in-place in accordance with the details shown on Standards Plan 5 297.250 (Sheet 6 of 6).
4. Cast-in-place of reinforcement bars will be allowed as an option to Drill and Grout. Cast-in-place bars shall be installed through holes or slots in the forms, with a form height at least equal to the walk thickness of the formed concrete shown in the Plans. These bars shall be deformed and installed with a 2” minimum concrete cover. Cast-in-place reinforcement bars will be required in accordance with the details shown on Standards Plan 5 297.250 (Sheet 6 of 6).

3.2 FIELD QUALITY CONTROL

A. Testing

1. The Owner may conduct various material tests throughout the construction to determine conformance with these specifications, including but not limited to:
   (a) Air and slump cone tests.
   (b) Beam and cylinder testing.

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2. The Contractor's shall cooperate with the individuals conducting the testing operations.

B. Surface Requirements

1. Immediately after placement and within the warranty period, no finished surface shall exceed the following defect rates. A surface defect is defined as any loss of aggregate or mortar from the surface that is larger than ¼-inch in diameter and greater than ¼-inch in depth. Any area not meeting the below thresholds shall be considered defective work and replaced at no expense to the Owner.

   (a) Defect Thresholds: Four (4) per 5-foot by 5-foot panel of walk.

2. The following shall also be considered as defective work at any rate and replaced at no expense to the Owner:

   (a) Cracking outside of control joints.

   (b) Surface flaking / mortar flaking.

   (c) Surface spalling.

   (d) Surface imprints not conforming to specified texture and finish.

   (e) Chipping.

C. Defective sections or panels shall be replaced to the nearest construction joint.

******END OF SECTION******

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SECTION 32 16 23.33 - ASPHALT WALKS AND TRAILS

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of bituminous walks and trails as indicated on the plans and/or as specified herein.

1.2 DEFINITIONS

A. Compacted Volume (CV) – The volume of material actually placed as determined by computing the difference between original and final cross-sections by the average end area method.

B. Excavated Volume (EV) – The volume of material actually excavated as determined by computing the difference between original and final cross-sections by the average end area method.

C. Excess Material - Material that is not needed to complete the earthwork balance.

D. Structural Improvements - For the purposes of this specification, structural improvements shall refer sidewalk, trail, or other improvements requiring suitable soil to support the anticipated loadings.

E. Subcut - Excavation performed below the proposed subgrade elevation shown on the plans for the purposes of removing unsuitable material.

F. Subgrade - The top surface of a trail bed upon which the pavement structure (including aggregate base and/or granular subbase) is to be constructed. This is also a general term denoting the soil foundation upon which a proposed improvement is to be placed.

G. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.

H. Topsoil - Any soil, generally black in color, 100 percent passing the ¾-inch sieve, 3 percent to 15 percent containing organic material, and a pH of 6.0-7.8.

I. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

1.3 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment shall be at the unit price bid for 3” Bituminous Walk per square foot (SF) of bituminous surfacing for the respective bituminous courses and compacted depth specified. The amount bid shall include all material and work required to mix and place the bituminous course specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous paving items. Such items of work include but are not limited to:

1. Equipment and materials necessary for meeting the testing requirements of Source Quality Control for the bituminous tack coat, if required, include in price bid for bituminous tack coat.

(a) The cost of all labor, equipment and materials necessary to comply with the testing requirements of the "Certified Plant" designation, if required, include in price bid for 3” Bituminous Walk.

(b) All costs of furnishing and applying bituminous tack coat material will be incidental with no direct compensation being made therefore.

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(c) The cost of all labor, equipment and materials necessary for constructing clean, vertical, solid edge at the adjacent asphalt surface, include in the price bid for Plant-Mixed Bituminous surfacing.

1.4 SPECIFICATION REFERENCE

A. Reference the following sections of this Project Manual as appropriate:

1. Section 31 20 00 “Earth Moving”.
2. Section 31 23 13 “Subgrade Preparation”.
3. Section 32 11 23 “Aggregate Base Courses”.
4. Section 32 12 00 “Flexible Paving”.

B. Reference MnDOT Specifications shall apply:

1. MnDOT 2360, Plant Mixed Asphalt Pavement. A copy of MnDOT Standard Specification 2360 is available from the Engineer upon request.
2. MnDOT 2360, Plant Mixed Asphalt Pavement: The maximum payment factor for density is 100 percent.
3. MnDOT 2360, Plant Mixed Asphalt Pavement (pavement smoothness) is hereby DELETED.
4. MnDOT 2106 shall apply, except as modified herein.

C. Unless noted otherwise, the provisions in this Section are in addition to the referenced specification.

1.5 SUBMITTALS

A. Bituminous Mix Design.

B. Gradation Test Results from 2 separate tests from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bituminous materials are shown in the plans.

B. Wearing course mixture for trail construction shall be as specified on the plans.

C. No recycled materials will be allowed in the bituminous wearing course.

D. The wear mix shall be produced with gradation 3 Aggregate for lifts of 1½-inch and more and shall be produced with gradation 4 aggregate for lifts of less than 1½-inch.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Common Excavation

1. The Contractor shall grade the trail in the locations and to the elevations shown on the plans and typical sections, in accordance with Sections 31 20 00 “Earth Moving” and 31 23 13 “Subgrade Preparation” of this Project Manual.
2. Excavated topsoil and suitable material for reuse in the project shall be segregated and stockpiled at a site selected by the Contractor.
3. All excavations shall be kept free of water during the placement of fill.
4. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheepsfoot rollers and tractor cleats, and roll the surface with a steel wheel or rubber-tired roller.

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5. Sufficient excavation shall be utilized by the Contractor to replace the soil shrinkage from excavation that occurs through the course of construction handling and compaction. The Contractor shall make his own estimate of the amount of shrinkage that will occur.

6. Topsoil

   (a) Topsoil shall be separated, stockpiled and respread.

   (b) The Contractor shall salvage and stockpile all topsoil removed during the course of the construction. This topsoil shall be used where required for turf establishment as directed by the Engineer.

7. Material suitable for trail backfill shall be segregated and stockpiled at a site selected by the Contractor. Following trail construction, the material shall be placed adjacent to the trail, allowing for a minimum of 6.0-inches of topsoil.

8. In areas where filling above the existing grade is necessary to establish the final designed elevation, the Contractor shall fully remove the topsoil and organic material to the level of stable underlying sand or clay prior to backfilling with suitable embankment material.

9. All vegetation, topsoil, organic, or other unsuitable materials shall be excavated from the area below the structural improvement. Due to the variability of soils, the depth of the excavation in these areas is expected to vary significantly throughout the site.

10. Subgrade excavation shall be performed for the removal of any unstable soils which may be encountered. Such excavation shall be backfilled with suitable excess common excavation material or granular borrow. If the Contractor proceeds without approval from the Engineer or Owner, all work and material to restore the trail bed to the proper grade shall be at the Contractor's expense.

B. Subgrade Preparation

1. Trail subgrade preparation shall be completed in accordance with Section 31 23 13 "Subgrade Preparation" of this Project Manual.

C. Aggregate Base

1. Aggregate base for trail construction shall be furnished and installed in accordance with Section 32 11 23 "Aggregate Base Courses" of this Project Manual. Note that existing in-place aggregate base will be utilized for the aggregate base on the trails. Import aggregate base, or use of excess reclaim material, will only be required as necessary to supplement the existing aggregate base to maintain existing trail grades, if not sufficiently maintained during removal operations, and for the placement of 6-inches of excess reclaim material as new aggregate base for the bituminous trail areas where existing aggregate base does not exist (including the Highway 96 trail segment and the re-aligned trail segment at the west end of Cummings Park Drive).

D. Bituminous Surfacing

1. The Contractor is required to use the self-propelled pneumatic tire roller as an intermediate roller on the wearing courses.

2. The bituminous surfacing shall be constructed with maximum deviation of plus or minus ¼-inch from the planned compacted thickness.

   The contact surfaces of all fixed structures, the edge of all in-place bituminous shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.

3. Cut the adjacent asphalt surface prior to construction of the bituminous surface course to obtain a clean, vertical, solid edge.

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4. MnDOT 2331 - Compaction of all bituminous mixtures shall be by the Ordinary Compaction Method.

3.2 SOURCE QUALITY CONTROL

A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.

B. Source quality control for aggregate base shall be in accordance with Section 32 11 23 “Aggregate Base Courses” of this Project Manual.

3.3 FIELD QUALITY CONTROL

A. Field quality control for subgrade preparation shall be in accordance with Section 31 23 13 “Subgrade Preparation” of this Project Manual.

B. Field quality control for aggregate base shall be in accordance with Section 32 11 23 “Aggregate Base Courses” of this Project Manual.

C. Field quality control for bituminous surfacing shall be in accordance with Section 32 12 00 “Flexible Paving” of this Project Manual.

D. The Owner reserves the right to perform cores on the new bituminous trails constructed, if desired. If any cores prove deficient, the Contractor may, at its own cost and expense, take additional core samples to further define the extent of the deficiency.

E. The Engineer shall calculate deficient pavement areas using the locations and thickness results of all core samples and prorating the thickness profile.

F. A $1.00 deduction per square yard will be made for each 1/8-inch deficiency of thickness beyond the specified tolerances.

G. Reduction in payment for bituminous courses constructed to more than the maximum permissible thickness shall be in accordance with MnDOT 2360, except that the thickness tolerances specified herein apply.

H. Testing:

Quantity Mixture Type	REQUIRED CONTRACTOR TESTING			OWNER ARRANGED INDEPENDENT ASSURANCE TESTING			
	VMA & Air Voids	Gradation	Spot Check	VMA & Air Voids	Gradation	Spot Check	Extraction
0-500 Ton	2	1	1	1	1		1
500-1000 Ton	3	1	1	1	1		1
1000+ Ton	4 First Day 1/1000 Ton Thereafter with Min. 2/day	2/Day	2/Day	1	1	1	1

1. Contractor shall send a copy of the testing results to the Engineer.

2. Should any of the specified tests fail, the Contractor shall notify the Engineer immediately and shall arrange and pay for additional test as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performance of all work and services necessary or incidental to the application of pavement markings as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Pavement markings of the specified width will be measured separately by LINEAL FOOT of each type constructed complete in place as specified. Broken line will be measured by the actual length of line marked and will not include the gap between the broken lines.

2. Pavement messages will be measured by the SQUARE FOOT for the actual area of paint constructed, as indicated in the MnDOT Pavement Marking Field Guide.

3. Crosswalk blocks will be measured by the SQUARE FOOT for the actual area of paint and will not include the space between the blocks.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated pavement markings items. Such items of work include but are not limited to:

1. All costs of preparing the surface, including sandblasting and removing of existing (old) pavement markings on existing pavement areas where a new marking layout is to occur.

2. Controlling and protecting traffic.

3. Maintaining the work, together with any other expenses incurred in completing the work that are not specifically included for payment under other Contract Items.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2581 shall apply to temporary, removable pavement markings, except as modified herein.

B. MnDOT 2582, 3354, 3590, 3591 and 3592 shall apply to permanent and painted pavement markings, except as modified herein.

C. MnDOT Pavement and Marking Specifications shall apply. These specifications may be found at http://www.dot.state.mn.us/products/pavementmarkings/information.html. Exceptions are as modified herein:

1. Specification - High Durability Preformed Pavement Markings - (including stop lines and crosswalks)

2. Specifications – No. 1 Patterned Preformed Polymer Pavement Marking Tape with improved retention of reflectivity for lines and selected symbols and legends

D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. The *Construction Striper Operations Report Form* shall be completed and submitted to the Engineer.

PART 2 - PRODUCTS

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2.1 MATERIALS

A. Interim Pavement Markings for application on bituminous base course prior to the construction of the bituminous wearing course shall be:

1. High Solids Water Based Traffic Paints, in accordance with the referenced specification.

2. Drop-On Glass Beads, in accordance with the referenced specification.

B. Permanent Pavement Markings for application on the final bituminous wearing course shall be:

1. Multi-Component Pavement Markings, in accordance with the referenced specification.

2. Drop-On Glass Beads, in accordance with the referenced specification.

2.2 EQUIPMENT

A. Application equipment for latex and epoxy resin systems shall consist of a machine of the spray type capable of applying the material under pressure at a controlled temperature through nozzles equipped with remotely controlled cutoff mechanisms and suitable line guides that will produce clean cut lines and prevent excessive material drift.

B. For highway and street applications, the marking material shall be applied with truck mounted traveling units properly equipped to apply the stripes as required. Where two or more lines are to be applied closely spaced, the machine shall be equipped to apply those stripes simultaneously. For application of broken lines, the applying unit shall include an automatic feed to control device capable of being set to produce the specified stripe gap ratio.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. At the time of applying the marking material, the application area shall be free of contamination. The contractor shall clean the surface prior to the line application in a manner and to the extent required by the Engineer.

B. The Contractor shall sandblast or otherwise remove existing (old) pavement markings on existing pavement areas where a new marking layout is to occur.

C. Pavement markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied.

D. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material.

E. No striping operations will be permitted between sundown and sunrise without written permission from the Engineer.

F. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line.

G. All pavement striping shall be 4.0-inches wide, unless noted otherwise on the plans.

H. Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be clean cut and square, with a minimum of material beyond the cutoff.

I. All pavement markings not conforming to the requirements of the Contract shall be removed and replaced or otherwise repaired to the satisfaction of the Engineer. Removal of unacceptable work shall be accomplished with suitable blasting or grinding equipment unless other means are approved by the Engineer.

3.2 ACCEPTANCE

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A. The *Construction Striper Operations Report Form* shall be completed and submitted to the Engineer. The form can be found at the link below:

http://www.dot.state.mn.us/products/pavementmarkings/information.html

******END OF SECTION******

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SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the salvaging and reinstallation of existing chain link fences and gates as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. The salvaging of existing fence (Salvage Fence) and installation of salvaged fencing (Install Fence) shall be paid at the unit price bid per linear foot, salvaged, protected, and installed complete including wire fabric, posts, bracing, fittings, gates, and any other materials or appurtenances required to complete the installation to match or improve the existing fence condition and in accordance with the plans and the requirements of this specification.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated fencing items. Such items of work include but are not limited to:

1. **Temporary fencing installed in place of existing permanent fence panels during the entirety of construction operations requiring the existing fence to be temporarily removed.**

2. Additional payment will not be made if the contractor's means and methods determine it beneficial for an additional length of fencing to be salvaged and reinstalled than that shown on the plan drawings.

3. No additional exceptions to the referenced specification is made.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2557 shall apply to fencing except as modified herein.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Two copies of the certified mix design shall be submitted to the engineer for review prior to the construction of the project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All fencing shall be salvaged and installed to match the existing conditions.

B. In the event that the existing fence is damaged or existing conditions are not available, it shall be replaced with an equal fence material or better. The following are minimum material requirements in the absence of a property specific replacement product:

C. CHAIN LINK FABRIC

1. Wire for chain link fabric shall be helically wound and woven to a height shown on the plans. Chain link fabric shall meet the requirements of ASTM A392 for the following:

(a) Residential:

(1) 2¼-inch mesh

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(2) 12-gauge wire

(3) Class 1 zinc coating (1.2 oz/sq. ft min.)

(b) Commercial/Industrial:

(1) 2.0-inch mesh

(2) 9-gauge wire

(3) Class 2 zinc coating (2.0 oz/sq. ft min.)

(c) Tennis Court:

(1) 1¾-inch mesh

(2) 11-gauge wire

(3) Class 2 zinc coating (2.0 oz/sq. ft min.)

2. All selvages shall be knuckled unless otherwise specified or shown on the plans.

D. POSTS FOR FENCING AND GATES:

1. Posts shall be Group IC round steel pipe (Schedule 40) as specified in ASTM F1043. Pipe shall have Type A coating inside and out (1.8 oz./sq. ft. minimum average zinc coating in accordance with ASTM Specification F1083).

2. Post diameters and lengths shall be as shown on the plans and details for the fence heights and gate widths to be provided.

E. TOP RAIL AND BRACING

1. Top rail shall be ASTM F1083, Type 1, (Schedule 40) round steel pipe. Pipe shall be hot-dipped galvanized inside and out with a minimum average zinc coating of 1.8 oz/sq.ft. surface area.

2. Top rail dimensions shall be as follows, unless otherwise shown on the plans:

(a) Outside diameter: 1.66 inches (1½ to 5/8-inch O.D in fencing terminology)

(b) Wall thickness: 0.140-inch

(c) Weight: 2.27 pounds/foot

3. Top rails shall pass through the bases of extension arms, which shall be provided on the top of each post, and shall form a continuous brace from end to end of each stretch of fence.

4. Top rails shall be provided with expansion rail couplings and shall be securely fastened to gate and terminal posts by means of suitable hot-dip galvanized connections.

5. End, gate and corner posts shall be suitably braced by means of 1-5/8-inch O.D. steel pipe weighing not less than 2.27 pounds per linear foot, set in horizontal position, with adjustable truss braces between terminal and first intermediate posts, complete with all fittings hot-dip galvanized.

6. Terminal posts shall be laterally braced.

7. Swing gates shall be provided with auxiliary side braces where necessary.

F. GATES

1. Gates shall be fabricated by the manufacturer of the fence in which they are installed.

2. The gate frames shall be fabricated using the following framing materials:

(a) Perimeter gate frame:

(1) Outside diameter: 1.900 inches (2.0-inch O.D in fencing terminology)

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(2) Wall thickness: 0.145-inches

(3) Weight: 2.72 pounds/foot

(b) Intermediate braces:

(1) Outside diameter: 1.66-inches (1-5/8-inch O.D in fencing terminology)

(2) Wall thickness: 0.140-inches

(3) Weight: 2.27 pounds/foot

3. The gates shall be filled with fabric to match the line fence fabric. Fabric shall be built into each gate frame by means of stretcher bars and adjustable bolt hooks.

4. Hinges shall be of heavy malleable iron, hot-dip galvanized. A hot-dip galvanized latch of the drop bar type, arranged for padlocking, shall be provided for each gate.

5. A heavy duty Schlage, Yale, Masterlock or equal padlock with not less than two keys shall be provided for each gate.

G. ACCESSORIES

1. Chain link fence accessories shall conform to ASTM F 626. Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.

2. Post caps:

(a) Formed steel or cast malleable iron weather tight closure cap for tubular posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary.

(b) Where top rail is used, provide tops to permit passage of top rail.

3. Top rail and rail ends shall be pressed steel per ASTM F626, for connection of rail and brace to terminal posts.

4. Top rail sleeves shall be 7.0-inch expansion sleeve with a minimum 0.137-inch wire diameter and 1.80-inch length spring, allowing for expansion and contraction of top rail.

5. Wire ties shall be 9 gauge, 0.148-inch galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 12-1/2 gauge for attachment.

6. Brace and tension (stretcher bar) bands shall be pressed steel, minimum 300 degrees profile curvature for secure fence post attachment.

7. Tension (stretcher) bars shall be one piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16-inch x ¾-inch. Provide tension (stretcher) bars where chain link fabric meets terminal posts.

8. Tension wire: Galvanized coated steel wire, 6-gauge wire with tensile strength of 75,000 psi. Zinc coating shall match that specified for the chain link fabric. Zinc coating shall match that specified for the chain link fabric.

9. Truss rods & tightener shall be steel rods with minimum diameter of 5/16-inch capable of withstanding a tension of minimum 2,000 lbs.

10. Barbed wire shall meet the requirements of ASTM A 121, Class 3, zinc coated steel wire double-strand, 12-1/2 gauge [0.099-inch twisted line wire with galvanized steel, 4 point barbs spaced approximately 5-inch on center.

11. Barbed wire supporting arms shall be pressed steel arms with provisions for attaching 3 rows or barbed wire. Arms shall withstand 250 lb. downward pull at the outermost end of arm without failure.

(a) Provide [3 strands, single arm] [6 strands double “V’ arms].

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(b) Provide intermediate arms with hole for passage of top rail.

12. Nuts and bolts shall be galvanized.

13. Privacy Slats shall be fabricated from a quality high density virgin polyethylene and contain ultraviolet inhibitors. Color shall be selected by the Owner from the manufacturers standard color palate.

H. CONCRETE

1. Concrete for post foundations shall be MnDOT Mix Designation 3B32 or approved equal. Two copies of the certified mix design shall be submitted to the engineer for review prior to the construction of the project. The mix proportions shall be determined by an independent certified testing laboratory secured by the Contractor. A current MnDOT Design Mix may be accepted provided the aggregate sources are the same as that being used for this project.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall take photos of the existing fence conditions prior to salvaging/removing any fence panels. The photos will be used to help match the existing conditions during reinstallation and for proof of existing conditions to ensure the property owner receives an equal or improved fence system.

B. The Contractor shall provide a minimum 24-hour notice to the property owner(s) before salvaging/removing any fence panels.

C. The existing fence panels and gates shall be salvaged and reinstalled in a manner to match the existing fence construction. The following are minimum installation requirements if the existing construction methodology is unable to be matched:

1. All earth, brush or other obstructions that interfere with the proper alignment of construction of fences shall be removed and disposed of.

2. Corner, brace and gate posts shall be set vertically plumb in circular concrete foundations as indicated on the plans. Corner posts shall be installed where the fence deflects 30 degrees or more. Place concrete around posts in a continuous pour. The top of the foundation shall extend above the ground surface and shall be crowned not less than one inch to provide adequate drainage away from the post. Trowel finish around post.

3. All line posts shall be installed vertically plumb and spaced uniformly and intervals not exceeding 10.0-feet. Intermediate line posts shall be air driven to a depth of four feet unless otherwise indicated on the plans.

4. The fence shall be so erected that the bottom of the fencing will follow the contour of the grade surface with 1.0-inch maximum clearance. The gate shall align with the top of the fence and shall have a 3.0-inch maximum clearance at the bottom.

5. Bracing shall be provided at all end, gate and corner posts, the latter in both directions. Horizontal brace rails shall be set midway between top rail and ground running from the corner, end or gate post to first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.

6. The chain-link fabric shall be fastened on the side of the posts as shown or as designated by the Engineer. The fabric shall be stretched and securely fastened to the posts, and, between the posts, the top and bottom edges of the fabric shall be fastened to the top rail and tension wire, respectively. The tension wires shall be stretched tight with turnbuckles at the end and corner posts. The bottom tension wire shall be installed on a straight grade between posts.

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7. The fabric shall be fastened to the end, corner and gateposts with stretcher bars and stretcher bar bands spaced approximately 14.0-inches on line posts and at approximately 18.0-inches on tension wires.
8. Any galvanized coating damaged during construction of the fencing shall be repaired by application of molten Galvo-Weld, Galvinox or equal.

******END OF SECTION******

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SECTION 32 90 04 - LANDSCAPE PLANTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This section of specifications will include all equipment, materials, and labor necessary for the furnishing and installation of plant materials, and protection, maintenance, guarantee, and replacement of plants for completed planting work as specified in the contract documents.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation will be at the unit price bid for landscape plantings and will include all materials, labor, and equipment necessary to complete the installation.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated landscape item.

C. No landscape bonus will be paid as part of this contract.

1.3 PROTECTION OF PROPERTY

A. Contractor will protect existing conditions at the site against damage.

1. Take precautions to insure that equipment, vehicles, and planting operations do not disturb or damage existing grades, walls, drives, pavement, utilities, plants, lawns, lawn irrigation systems, and other facilities. Keep all pavement and work areas clean and orderly during construction, removing all excess materials and trash from site during and following project completion.

2. Verify locations and depths of all underground utilities prior to excavation and report conflicts with new plantings. Contractor will hand excavate, as required, to avoid conflicts with utilities.

3. Maintain grade and utility stakes set by others until all involved parties are in acceptance of their removal.

4. Any damage to existing trees or shrubs including branches and root systems will be repaired and/or pruned by an approved, experienced tree surgeon or arborist.

5. Repair, replace, and/or return to original condition any damaged item, without additional compensation.

1.4 SUBMITTALS

A. Contractor will submit the following items in a format and on a schedule that complies with the Contract.

1. Prior to starting work, Contractor will submit copy of current certification that the landscape contractor is a Minnesota Certified Nursery Dealer, Grower or approved equivalent specializing in landscape installation.

2. Submit manufacturer’s certification of the inoculants, root stimulator, and/or soil amendment analysis.

3. All plant materials will comply with State and Federal laws with respect to inspection for plant disease infestation. Inspection certificates and permits required by law to this effect will accompany each shipment, invoice, or order of stock. File each certificate or permit, upon arrival with Owner’s Representative. All permits and fees will be provided by the Contractor at no cost to the Owner.

4. Contractor will submit plant labels or tags for all plant materials, verifying the materials meet the requirements of the contract documents.

5. Provide certification to Owner’s Representative stating that container grown material has been grown in the container for not less than one year.

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6. Upon Owner's request, the Contractor will provide Material Certifications for all materials.
7. Contractor will submit a sample of the mulch proposed for this project for approval prior to installation.
8. Contractor will submit a sample of the staking straps and the staking design proposed for this project.
9. Prior to beginning work, the Contractor will submit a proposed planting schedule in compliance with the specified planting dates. Any revisions to this schedule must be approved by the Owner's Representative.
10. Contractor to submit content, analysis, and sample of compost and material test reports for imported topsoil used in planting soil mix.

1.5 QUALITY ASSURANCE

A. Contractor will not make substitutions. Contractor will verify availability of specified plant material prior to submitting their bid. If materials are unavailable, Contractor must submit proof of inability to locate materials and a proposed equivalent for review prior to bidding the project. Failure to locate material prior to bidding without notifying the Owner will not result in any additional cost to the Owner in order to locate and furnish the material.

B. All plant material will meet the minimum requirements of size and grade in the latest edition of American Standard for Nursery Stock, ANSI Z60.1.

C. In addition, all plant materials will meet the requirements of size, quantity, and variety as required in the contract documents and Master Plant Schedule. When a variance occurs between these two requirements, the most restrictive will apply.

D. Plant names indicated comply with the latest edition of "Standardized Plant Names" as adopted by the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. All plants will be true to name and tagged legibly as to name in accordance with nursery standards of practice as recommended by the American Association of Nurserymen. All plants previously approved which begin showing characteristics not true to name during warranty period will be replaced at no cost to the Owner.

E. All plants will be nursery grown under similar climatic conditions as this project for a minimum of 2 years, and will have been transplanted or root pruned in accordance with size and type of plant, ANSI 260.1-1996.

F. One-sided branching plants from tightly planted nursery rows will be rejected.

G. All plants will be normal specimens without objectionable deformities, voids, and open spaces, with well-developed branch and root systems; true to height, shape, and character of growth of the species or varieties. Plants will show appearance of good health and vigor.

H. All plants will be free of injurious insects, insect eggs, bores, and all forms of infestation, plant diseases, moldy or dried roots, or damage to trunk, bark, branches, leaders or root systems, or cut leaders. All plants will be free of defects, disfiguring knots, sunscald injuries, and frost cracks. All plants to be free of rodent damage to bark and buds.

I. Plants will be inspected and approved at the place of growth by the Owner's Representative for compliance with specification requirements for quality, size, and variety. Travel, time, accommodations, and expenses will be at the expense of the Contractor. Such approval does not waive the right to reject any plant material after it has been delivered to the site and/or installed.

J. All plants will be inspected by the Owner's Representative prior to planting. All rejected plant materials will be removed from the site immediately.

K. A planting list of all plants including a schedule with sizes, quantities, and other requirements is shown on the plans. In the event that quantity requirements or material omissions occur in the planting material list, the planting plan will govern.

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L. All plant materials will bear waterproof tags indicating both common and botanical names.

M. All plant materials designated in the planting schedule as matched will be of uniform size, color, branching height, form, etc. Plants which do not match will be rejected.

N. Landscape work for this project will be subcontracted to, or completed by a single landscape firm.

1.6 DELIVERY, HANDLING, AND STORAGE

A. Deliver inoculants, soil amendments, and all other packaged materials to site in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent damage and deterioration.

B. Take all precautions customary in good trade practice in preparing plants for delivery to the site to insure arrival of the plants at their destination in good condition for successful growth. Plants with trunk damage, multiple broken branches, damaged central leaders, or excessive, recent pruning will not be accepted.

C. Dig, pack, transport, and handle plants with care to insure protection against injury.

D. Plants will be handled in such a manner as to ensure adequate protection from any damage such as climatic, seasonal, wind damage, or other damage during transportation or temporary storage. Balled and burlapped plant material will be handled to insure it is not dropped during transport or planting.

E. Plant root systems of balled and burlapped plant material will be protected with wet straw, moss, or other suitable material which will assure arrival at destination, and during temporary storage with root systems in a moist, healthy condition. Bare root plant material is not acceptable for this project.

F. All trees and shrubs will be fresh and in excellent condition. Plant material should be delivered to the site only after all preparations for planting are completed. All containerized plants will remain in containers until they are ready to be planted.

G. If planting is delayed more than 6 hours following the arrival of plant material at the site, contractor will heel-in plants and maintain during temporary storage by providing moist straw, moss, or other suitable material to protect root systems, watering, and protection from excessive sun, wind, and inclement weather conditions; providing a healthy vigorous plant when planted.

H. Temporary Storage: When approved by Owner's representative, temporary storage of plants on the project site will be permitted. When temporary on-site storage is not approved, the Contractor will provide such facilities and location without additional compensation.

1.7 PLANT MATERIAL WARRANTY

A. Warrant each plant to remain alive and be in healthy, vigorous condition for a period of one year after completion and initial acceptance of the plant material and installation.

B. Warranty will not include damage or loss of plant material caused by fires, acts of God, acts of vandalism, or negligence on the part of the Owner.

1.8 WARRANTY INSPECTION

A. Inspection of plants will be made by the Owner’s Representative at the expiration of the one-year warranty period, and following a written request by the Contractor. Contractor will request inspection a minimum of 7 days prior to proposed inspection date.

B. All plants that are missing or not in a live, healthy growing condition will be removed from the site by the Contractor. Missing and rejected plant material will be replaced by the contractor once after the warranty period at no expense to the Owner and as soon as possible during the specified planting season.

C. Upon notice from the Owner’s Representative, the removal from site of rejected plants and the replacement of plant material of the same species and size and installed as originally specified will be completed by the Contractor with no additional compensation.

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D. All replacement plants will be inspected by the Owner's Representative prior to planting.

E. Maintain replacement plants as specified for original plants until accepted by the Owner's Representative. Contractor will notify the Owner's Representative when all replacements and repair are complete, and schedule the inspection 7 days prior to the proposed inspection date.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

A. Provide plants typical of their species and variety in a good healthy condition.

B. Plants will meet the requirements for spread, height, and caliper indicated on the plans. Plants will have the branching habit and number of canes corresponding with the recommendations of the current American Standards for Nursery Stock for the specified type, species, and size.

C. Plants larger than those specified in the plant list, with corresponding root system, will be used upon approval of the Owner's Representative.

D. Plants with broken or cut back terminal leaders will be rejected.

E. Plants planted in rows or specified as matched will be uniform in form, size, branching, height, and color unless specified or indicated otherwise on the plans.

F. Tree caliper for trees 4.0-inch caliper or less will be measured 6.0-inches above ground. Trees larger than 4.0-inch caliper will be measured 1.0-foot above ground. Shrub height and spread will be measured prior to pruning, with branches in a normal position. Measurement of height and spread apply to the main body of the plants.

G. All plants which fail to comply with these specifications in any way will be rejected by the Owner's Representative and will be removed immediately from the project site by the Contractor.

H. Bare Root and Park Grade materials are not acceptable.

I. Root balls of balled and burlapped plants will be firm and unbroken, moist, and of the specified size. Broken or loose root balls will be rejected. No manufactured or artificially produced or mudded-in-root balls will be accepted.

J. A container grown plant, in lieu of "B&B" root ball, will be accepted provided it meets specified sizes, complies with current "American Standard for Nursery Stock" (ANSI Z60.1-1996), and meets criteria for container grown plants.

K. Container grown plants will have been grown in sufficiently sized containers for a minimum of 1 year with a root system to have developed to hold its soil together, firm, whole, and moist when taken from the container. No loose root systems in the container nor root bound nor circling of the root system will be accepted.

2.2 ORGANIC SOIL AMENDMENTS

A. Peat Moss will be partially decomposed fibrous vegetation matter of natural occurrence, finely shredded or granular, brown to black in color, and free of woody particles, seeds and weeds.

B. Mycorrhizal Fungus Inoculants will comply with the rules of the Minnesota Department of Agriculture.

1. The contents of the mycorrhizal fungus inoculant will be identified as to percentage and type of endo- and ectomycorrhizal fungus, hydrogel, soil conditioners, etc.

2. All inoculants will be furnished from an established manufacturer and guaranteed percentage analysis will be provided by the inoculant supplier on each container with the proper scale weight records.

3. Inoculant will be a granular or pellet form, uniform in composition, dry and free flowing without caking or other damage not suitable for use.

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4. Upon request of the Contracting Authority, the Contractor will provide a test of the inoculant for conformance with the required analysis; at no additional compensation.

C. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through ½-inch sieve; soluble salt content of 5 to 10 Deci siemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter content: 50 to 60 percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.3 PLANTING SOIL

A. Refer to Section 32 91 19.13 "Topsoil Placement and Grading" of this Project Manual for detailed information on planting soil.

B. Do not use frozen or muddy mixtures for backfilling.

2.4 MULCH

A. Mulch will consist of premium finely shredded or processed hardwood bark graded to ¼-inch to ½-inch diameter and maximum of 3.0-inches in length. Green or freshly chipped or shredded mulch will be rejected. Mulch to be free of weeds, weed seed, chaff, diseases, or other foreign material.

2.5 STAKING MATERIALS

A. Stakes required for staking plants will be steel posts, “T” or “U” shaped of minimum 7.0-foot length. All stakes will be uniform in shape, size, and color. Color will be black, dark green, or grey.

B. Staking straps will be ¾-inch or larger mesh or woven material designed specifically for tree staking. Gromets, where applicable to receive wire, will be metal.

2.6 TREE TRUNK WRAPPING MATERIAL

A. Tree Trunk Wrapping Material will be 4.0-inch rolls of bituminous impregnated tape, corrugated or crepe paper, specifically manufactured for tree trunk wrapping, having qualities to resist insect infestation and sun scald damage, or similar material approved by the Owner’s Representative.

2.7 WATER

A. Water will be free of substances harmful to plant growth. Contractor to provide water, equipment, methods of transportation, water tanker, hoses, sprinklers, and the application of water.

2.8 VERTICAL SPADE CUT EDGE

A. Vertical spade cut shrub bed and tree pit edges as shown in the construction documents.

PART 3 - EXECUTION

3.1 PLANTING SEASONS

A. Evergreen Plants (B&B and Container): Planting period will be from August 15 to October 15 and from April 1 to June 1.

B. Deciduous plants (B&B and Container): Planting period will be from August 15 to November 15 and from April 1 to June 1.

C. At the option and on the full responsibility of the Contractor, planting will be conducted under unseasonable conditions, except in weather below 32 degrees Fahrenheit or above 90 degrees Fahrenheit; without additional compensation nor variance from plant survival guarantee. However, plants will not be initially inspected outside the defined planting seasons.

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3.2 PREPARATION

A. Provide notice and obtain approval from Owner's Representative 3 days prior to planting operations.

B. Provide barriers or fencing as approved by Owner's Representative to protect the general public from injury when planting installation is within street right-of-way.

3.3 LOCATION OF PLANTS

A. Contractor will mark with flags or lathe the location of all plants in accordance with the plans. Trees are to be marked individually. Stake the outline of bedded plants or shrub groups and the individual plant locations for the quantity on the plans.

B. The Owner's Representative will be notified to approve plant location markings by the Contractor, prior to excavation of planting wells. Contractor will notify Owner's Representative 7 days prior to proposed planting date.

C. Make field adjustments in plant locations where underground or overhead obstruction is encountered, or where changes have been made in construction, as approved by the Owner's Representative.

3.4 EXCAVATION OF PLANTING PIT

A. Excavate the plant pit, centered at the location marks, with 45-degree angled side slopes and a diameter 2 times larger than ball or root condition, with a minimum of 6.0-inch on each side of base of root ball. Pit will have a flat or saucer-shaped bottom, with high point in the center of the pit. Excavate plant pit to a depth to match the nursery grade of the root crown for all balled and container root systems. Scarify sides of excavated pit.

B. Following excavation of planting pits for trees and shrubs, randomly select planting pits and fill selected pits full of water; allow to stand (without adding water) for an 18-hour period to determine porosity of the soil. Report drainage time to the Owner's Representative prior to proceeding with planting.

3.5 PLANTING

A. Bare root plants will not be accepted for use on this project.

B. Remove any plants, rocks, sod clumps, etc. or other hazardous items from the planting soil. Remove any unacceptable soil and debris from the project site.

C. All container and balled root systems to be moist at time of planting. Remove plant root system carefully from container prior to planting without disturbance to root systems. Place plants centered, erect, and with desired orientation in planting pit with the root crown matching existing grade. After plant placement, cut twine, wire, wire mesh, and burlap and fold from sides of ball and remove from pit. Remove all ties and wrap from branch system, except plant identification.

D. Carefully compact planting soil backfill in layers, filling all voids until two-thirds of plant pit is complete; apply water to fill pit and allow soil to settle. Compact lightly the settled topsoil. Incorporate mycorrhizal fungal inoculant as directed by manufacturer. Continue backfilling and form a 3.0-inch depth saucer around plant, as detailed on plans. Water plant and surrounding area until backfill is thoroughly moist.

E. When planting on slopes place the top of the root crown at or slightly above the finish grade at the center of the planting pit. For all plants planted on significant slope, form a saucer as a dam or shoulder on the downhill side to catch and hold water and to avoid erosion.

3.6 MULCHING

A. Prior to mulching, grade all shrub beds to drain to edge of bed, and construct saucers around all trees and shrubs as shown on plans.

B. Mulch all trees and shrubs with 3.0-inch depth mulch as shown on details. Provide a minimum of 18.0-inch radius mulch area from tree trunks and shrub centers. Provide a continuous mulch area around plant groupings.

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C. Clear mulch away from direct contact with tree and shrub trunks.

D. Thoroughly water mulched areas. Rake to a smooth finish surface.

3.7 WRAPPING

A. Contractor will provide trunk wrapping to the Owner for all deciduous trees. Contractor will only wrap trees in the fall season.

B. Wrap trunks spirally from ground line by overlapping one-half of the tree wrap strip and completely cover trunk to the height of the first branch. Secure wrap at top and bottom.

C. Contractor will provide written instructions to the Owner on maintenance, installation, and dates for removal of wrap.

3.8 STAKING

A. The Contractor is required to maintain all plants in an upright, plumb condition. Staking will be completed by end of the planting day for all single stem plants over 1.0-inch caliper. Clump form plants will not be staked.

B. Locate stakes uniformly from trunk. Set posts vertically into unexcavated soil at a minimum 2.0-foot depth or until firm providing a required post height above grade. Stake trees with the number of stakes and in the locations shown on the plans.

C. Secure staking straps a minimum of 4.0-feet above grade or between one-half to two-thirds distance from grade to treetop below the first set of branches. Straps will go around the trunk from each stake. Secure the straps to the stakes with a slight tension, allowing the trunk to move 2.0-inch in each direction.

D. Contractor will remove all staking and strap assembly material from all plants at the end of the warranty period and remove from site.

3.9 PRUNING

A. Trees and shrubs should be pruned prior to final inspection, only to remove any dead or injured branches.

B. Make all cuts flush, leave no stubs or prune to closest outward growing bud. All cuts over ¾-inch diameter should be treated with an approved antiseptic tree paint.

C. Plant materials incorrectly pruned will be rejected.

3.10 MAINTENANCE

A. The plant maintenance period will be the period of time from the beginning of the Contract to initial acceptance of the plant material. Maintenance will consist of caring for the project as specified herein until the initial acceptance of the plant material. The Contractor will care for all plants until initial acceptance as will be necessary to keep plants in a live, healthy growing condition.

1. Prune, cultivate, and remove weeds from planting beds and mulch areas. Remove all weeds prior to review for initial acceptance.

2. Water at the minimum rate of 1.0-inch per week or as needed to maintain plant health.

3. Adjust stakes and ties to maintain plant in upright and plumb condition.

4. Re-set settled plants to proper grades and position. Restore planting saucer and mulch; adding planting soil and mulch as required.

5. Apply appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

B. All plants will be in a live, healthy, and growing condition at the date of initial acceptance of the project by the Owner’s Representative.

C. Following initial acceptance of the planting, maintenance will become the responsibility of the Owner.

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D. Contractor will submit written maintenance instructions to the Owner recommending procedures for plant maintenance.

E. If the Contractor observes maintenance practices detrimental to plant health during the warranty period, the Owner should be notified immediately.

F. The contractor will replace any unacceptable plant materials, at the end of the warranty period, at no cost to the Owner if the Owner has followed the recommended maintenance program.

3.11 CLEANUP

A. Contractor will keep the work site clean during installation of work and will leave the worksite clean upon completion of work.

B. Remove from site all excess materials, trimmings, branches, soils, debris, and equipment. Remove all tags and labels from plants following acceptance.

C. Repair any damage resulting from planting operations. Broom clean all paved areas.

3.12 REVIEW AND INITIAL ACCEPTANCE

A. Review and initial acceptance of the plants and installation to determine completion of contract work will be made by Owner's Representative only after the completion of all work items.

B. Contractor will provide written notification at least 7 days before requested review date by the Owner's Representative.

C. All plants will be in a live and healthy condition, of the specified variety and size, and all requirements and maintenance have been complied with. Any plant that is dead or not in a vigorous, thriving condition will be removed and replaced. Plants that are missing are to be installed during the specified planting season. Mulched areas are to be free of weeds and grasses.

D. After the plant and installation review, a listing of acceptance, deficiencies, incomplete work, and requirements for completion of work will be provided to the Contractor.

E. Plantings will not be initially accepted until deficiencies are corrected and inspected.

F. Contractor will maintain plants, mulch areas, staking, and guying as specified until corrections or completion of work is approved for initial acceptance.

G. Replacement of rejected or missing plants before acceptance will not be considered fulfillment of the warranty.

H. Contact Owner's Representative prior to planting replacement plants for inspection and approval of plants and to verify location.

I. The warranty period for all plants will begin upon date of initial acceptance for completed installations.

******END OF SECTION******

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SECTION 32 91 19.13 - TOPSOIL PLACEMENT AND GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All labor, materials, equipment, and supervision required to furnish and install amended soil and topsoil to finished grade, as shown on the Plan Sheets.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment for amended soil and topsoil shall be by the CUBIC YARD based on plan quantity for each type of topsoil specified. The amount bid shall be compensation in full for all costs of area preparation, transportation, placement, and final grading as shown on the plan sheets.

1.3 SPECIFICATION REFERENCE

A. MnDOT 3877 Topsoil Materials

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise specified on the plans, topsoil types shall be provided as follows:

1. Common Topsoil Borrow shall be used for areas to be seeded or sodded.

PART 3 - EXECUTION

3.1 SHRUB, TREE, AND PERENNIAL PLANT BED PREPARATION

A. Loosen surface of subgrade to minimum 2.0-inch depth to insure a positive bond between subgrade and topsoil.

B. Do not place finish topsoil until after clean-up and removal of construction debris, trash, surplus materials, and equipment from project site.

C. In perennial and shrub planting beds, place and spread topsoil to a uniform settled depth that is approximately 66.67 percent of the overall settled depth.

D. Where topsoil is spread, use a cultipacker, pulverizer, or similar tool to pulverize the soil and eliminate all lumps. Do not compact topsoil.

E. Provide settled depth of amended soil in all shrub and perennial plant beds as shown in the drawings. Provide backfill for tree root balls as shown on the plans.

F. Finish grade plant bed areas as shown on the Drawings.

3.2 TOPSOIL PLACEMENT AND FINISH GRADING FOR SOD

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A. Topsoil should be placed to a 6.0-inch finished depth in all areas to be sodded or seeded. Existing topsoil shall remain in place, where possible, and common topsoil borrow shall be supplemented directly over the existing in-place topsoil to meet the proposed grades as shown on the plans.

B. Prepare soil for planting so that only light raking, or scarifying will be required.

C. Round finished surfaces at abrupt changes in slope.

D. Should spot elevations for finished grades conflict with finished contours, the spot elevations shall govern.

E. Finished grades shall be to top of sod.

F. Finished grades to uniform levels or slopes between points where levels are given or between such points and existing grades.

G. Positively drain all sod and planting areas to designated surface water collection points, streets, and/or waterways.

H. Protect paving, sidewalks, utilities, and plants during finish grading; repair or replace any items damaged by construction operations at no cost to Owner. Equipment that may leave black tire marks should not be driven on sidewalk or paver areas, or marks must be removed, without damage to walks or pavers, prior to project acceptance.

I. After placement, maintain surfaces to indicated finished grades; deposit additional topsoil or amended soil to repair settlement or erosion up to the date of final acceptance. Scarify surfaces upon which additional topsoil is to be deposited.

3.3 BORROW TOPSOIL IN ABOVE-GRADE PLANTERS

A. Place according to manufacturer's recommendations.

3.4 MAINTENANCE

A. Protection of graded areas:

1. Protect newly graded areas from traffic and erosion.

2. Keep free of trash and debris.

3. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

4. Keep public streets clean from soil, soil tracking, and debris at all times.

B. Reconditioning Compacted Areas: Where completed graded areas are disturbed by subsequent construction operations, erosion or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction at no cost to the Owner.

C. Settling: Where settling is measurable or observable during general project warranty period, add topsoil or amended soil, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work and eliminate evidence of restoration at no cost to the Owner.

3.5 FIELD QUALITY CONTROL

A. The Owner may arrange at its expense for the following testing to be performed:

1. One (1) gradation test.

2. One (1) PH test.

B. All testing will be performed by an independent testing laboratory approved by the Engineer.

C. The Contractor will cooperate fully with the individuals performing the tests.

D. Samples for testing will be taken from material in place at locations approved by the Engineer. All sampling methods will be approved by the Engineer.

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E. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the specified density requirements have been met.

F. Copies of all test results with maps of testing locations will be submitted as determined at the pre-construction meeting.

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove waste materials, including unacceptable excavated material, trash, and debris from the job site.

3.7 PROTECTION OF SIDEWALK

A. Equipment that may leave black tire marks shall not be driven on sidewalk or special paver areas, or marks must be removed without damage to walks prior to acceptance.

******END OF SECTION******

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SECTION 32 92 00 – TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to turf restoration as indicated on the drawings or as specified herein.

B. A variety of different seeding mixtures may be utilized on this project. The Contractor shall refer to the plan for the locations of the different turf establishment areas.

C. Temporary seeding may be necessary during construction in erosion sensitive areas. The Contractor shall do temporary seeding work as specified herein or as directed by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. All measurements for payments for turf establishment items shall be based on the Unit Price bid per item.

2. For sod and turf/vegetation establishment bid items, 75% of payment shall be made upon installation. The remaining 25% shall be made upon turf/vegetation establishment meeting the final acceptance requirements for the entirety of an installation area.

3. Payment for Rolled Erosion Prevention Category 20 w/ Seed Mixture (XX-XXX) shall be by the SQUARE YARD (SY) and shall be compensation in full for the installation of seed, fertilizer, and blanket, as specified.

4. Payment for Rolled Erosion Prevention Category 30 w/ Seed Mixture (XX-XXX) shall be by the SQUARE YARD (SY) and shall be compensation in full for the installation of seed, fertilizer, and blanket, as specified.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated seeding and sodding items. Such items of work include but are not limited to:

1. Application of starter fertilizer on all areas to be sodded shall be included in the price bid for sodding.

2. Subgrade preparation and topsoil placement as required on all areas shown on the plans.

3. Maintenance of newly sodded and seeded areas, as specified, include in the unit price for the associated items.

4. Stapling of sod on sloped areas, include in the unit price bid for sodding.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2574.

2. MnDOT 2575.

3. MnDOT 3876.

4. MnDOT 3877.

5. MnDOT 3878.

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6. MnDOT 3881.
7. MnDOT 3882.
8. MnDOT 3884.
9. MnDOT 3885.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Seeding - Certificates of Compliance for seed mixture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seeding

1. The seed mixtures to be used are shown on the plans.
2. Unless otherwise specified on the plans, all application rates for MnDOT mixes, except temporary seed, are 150 percent the specified rate.
3. Type 1 mulch shall consist of clean straw with no pasture hay.
4. All seed shall be supplied as pure-live seed (PLS).
5. All seed and seed mixes shall conform to State seed requirements for noxious weed content.
6. All seed and seed mixes shall conform to State labeling requirements. For all species in the mix, the label and or invoice shall include the county of origin, and if from Canada, the province.

B. Sodding Items

1. Unless otherwise indicated on the plans, sod shall be Lawn Sod as defined in the referenced specification except when located within MnDOT right-of-way where Salt Tolerant Sod shall be utilized.

C. Imported Topsoil

1. Unless otherwise indicated on the plans, imported topsoil borrow for general use as a turf growing medium shall comply with MnDOT 3877.2.A.
2. Unless otherwise indicated on the plans, imported topsoil borrow for use as a plant growing medium in designated areas such as landscape beds shall meet the requirements of MnDOT 3877.2.B.
3. Salvaged topsoil generated on-site shall be used in areas of turf establishment. No direct payment shall be made for the use of salvaged topsoil.

D. Fertilizer

1. Fertilizer shall be per MnDOT specification.
2. Fertilizer shall be applied at a rate of per MnDOT specification.

E. Hydraulic Matrix

1. Hydraulic Matrix shall be MnDOT Type Bonded Fiber Matrix
2. Hydraulic Matrix shall be applied at a rate of 3500 lbs/acre (dry weight)

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. GENERAL

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1. The subgrade shall be shaped to the approximate contour of the finished surface. All construction debris shall be removed from the area prior to the placement of the topsoil. The subgrade shall be loosened with a disc or harrow to a depth of 6.0-inches prior to application of the topsoil.
2. The topsoil shall be shaped to the approximate contour of the finished surface, with a minimum depth of 6.0-inches, unless otherwise shown on the plan. All construction debris, rocks and trash shall be removed from the area prior to seeding or sodding. The topsoil shall be loosened with a disc or harrow to its full depth prior to seeding or sodding.
3. The Contractor shall be responsible for providing water and maintenance for a period of 30 calendar days, or until final acceptance by the Owner, to firmly establish the seed or sod. The term maintenance includes mowing, weed control and watering, as necessary. Failure to perform this work within 24-hours of notification of non-compliance may result in the Owner or Engineer arranging for completion of the work by others. A contract deduction will be made equal to the total of all costs to perform such work so arranged, including but not limited to, labor, materials, equipment and administrative costs.
4. Where dormant seeding or sodding is authorized, the maintenance period will be extended to include the first 30 calendar days after the beginning of the growing season. The beginning of growing season will be defined as bud burst.

B. SEEDING REQUIREMENTS

1. Turf establishment by seeding shall be done utilizing the various combinations of seed mixtures (including aquatic plants), fertilizing and mulching at disturbed areas as shown on the plans.
2. Areas prepared for seeding shall be free of rocks, debris and clumps of soil. The areas shall be graded uniformly, and vegetated areas shall be raked free of chunks exceeding ½-inch diameter.
3. Seed shall be applied with a drill seeder, unless otherwise approved by the Owner.
4. The Contractor shall furnish weight tickets documenting pounds of hydraulic soil stabilizer placed, pounds of fertilizer placed, and pounds of seed placed. The seed tickets shall show individual plant species along with the percent purity and percent germination. The fertilizer tickets shall show mix proportions. The Contractor shall also furnish its QA/QC data to the Engineer.
5. Dormant seeding and snow seeding may be utilized in accordance with the referenced specification and technical memorandum, provided the final acceptance standards are met.
6. Final acceptance of seeding will be based on an established growth of 6.0-inches with a uniform density to cover 70 percent of the designated area, free of weeds and bare spots. Any re-seeding necessary shall be performed at the Contractor's expense.

C. SODDING REQUIREMENTS

1. Sod shall be placed by the Contractor in the locations shown on the plans as directed by the Engineer.
2. When placing sod in irregularly shaped locations, the Contractor shall produce sharp, straight joints between sod rolls.
3. Sod shall be placed to create a firm, smooth, uniform surface without ruts, knobs or wrinkles.
4. Sod placed on slopes greater than 1:4 (v:h), in ditch bottoms, and around storm sewer inlets or outlets shall be anchored with staples. Staples shall be U shaped 0.12-inch diameter or heavier steel wire having a span width of 1.0-inch and a length of 8.0-inches from top to bottom, after bending.
5. All re-work necessary to repair imperfections in sod placement shall be made at the Contractor’s expense.

******END OF SECTION******

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SECTION 33 01 30.12 - CLEANING AND TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sanitary sewer cleaning, televising and inspection of pipe, fittings, and miscellaneous appurtenances.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Payment for all labor, equipment, materials, and supplies necessary to complete the work specified in this section will be included with the unit price bid for Lining Sewer Pipe by the linear foot (LF). No direct payment will be made for the cleaning and televising of sewers to be CIPP lined.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. All costs will be included in the lump sum bid. Such items of work include but are not limited to:

1. Bypass pumping.
2. Notices to the impacted property owners.
3. Traffic control.
4. Disposal fees.

1.3 SPECIFICATION REFERENCES

A. No references for this section.

1.4 SUBMITTALS

A. A minimum 5 working days prior to mobilization:

1. A sanitary sewer bypass pumping plan
   (a) Shall be submitted to the Engineer for review a minimum 5 working days prior to beginning of work.
   (b) The bypass pump system will be of sufficient capacity to handle existing flow at peak flow times.
2. Traffic Control and Work Zone Signage Plan
   (a) Shall be submitted to the Engineer for review a minimum 5 working days prior to beginning of work.

B. File Naming

1. The Contractor will be provided with a map showing manhole and pipe identification numbers.
2. All files shall be named using the upstream and downstream structure numbers.

C. Televising Video.

D. A summary report which includes a table showing the following information:

1. Owner’s upstream and downstream structure numbers.
2. Date of televising.
3. Starting manhole number.
4. Ending manhole number.
5. File names for video, report, and images associated with each section of pipe.

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PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOTIFICATIONS TO PROPERTY OWNERS

A. The Contractor shall coordinate and distribute any required public notices, in coordination with the Owner.

3.2 SANITARY SEWER CLEANING

A. Cleaning Equipment

1. Hydraulically propelled equipment.

(a) Equipment will be of a movable dam type and be constructed in such a way that a portion of the dam may be collapse at any time during the cleaning operations to protect against flooding of the sewer.

(b) The movable dam will be equal in diameter to the pipe being cleaned and will provide a flexible scraper around the outer periphery to insure removal of grease.

(c) If sewer cleaning balls or other equipment which cannot be collapsed is used, special precautions to prevent flooding of the sewers and public or private property will be taken.

2. High-Velocity Jet (Hydro cleaning) Equipment.

(a) All high-velocity sewer cleaning equipment will be constructed for ease and safety of operation.

(b) The equipment will have a selection of 2 or more high-velocity nozzles.

(c) The nozzles will be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.

(d) Equipment will include a high-velocity gun for washing and scouring manhole walls and floor.

(e) The gun will be capable of producing flows from a fin spray to a solid stream.

(f) The equipment will carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.

3. Mechanically Powered Equipment.

(a) Bucket machines will be in pairs with sufficient power to perform the work in an efficient manner.

(b) Machines will be belt operated or have an overload device.

(c) Machines with direct drive that could cause damage to the pipe are not permitted.

(d) A power rodding machine will be either a sectional or continuous rod type capable of holding a minimum of 750.0-feet of rod.

(e) The rod will be specifically heat-treated steel.

(f) The machine will be fully enclosed and have an automatic safety clutch or relief valve.

B. Cleaning Precautions

1. During sewer cleaning operations, satisfactory precautions will be taken in the use of cleaning equipment.

2. When hydraulically propelled cleaning tools or tools which retard the flow in the sewer lines are used, precautions will be taken to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. Contractor will be fully responsible for any property damage caused by the cleaning operations.

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3. When possible, the flow of sewage will be utilized to provide the necessary pressure for hydraulic cleaning devised.

4. When additional water from fire hydrants is necessary to avoid a delay in normal work procedures, the water will be conserved and not used unnecessarily.

   (a) Water is available for the Contractor's use at on-site fire hydrants with the use of a meter and backflow preventor. Meters will be provided by the City's Public Works Department with a deposit from the Contractor. The Contractor must use the meter when filling water from a City fire hydrant and will pay the City for the water used at the rate established by the City. The Contractor is responsible for providing the backflow preventor.

   (b) The Contractor must obtain approval from the Owner for using a hydrant source of water and must only use it for application on this project.

5. No fire hydrant will be obstructed in case of a fire in the area served by the hydrant.

C. Sewer Cleaning

1. The cleaning of the sewer lines will begin upstream and work downstream.

2. The sewer manhole sections will be cleaned using hydraulically propelled, high-velocity jet or mechanically powered equipment. Selection of the equipment will be based on the conditions of lines at the time the work commences.

3. The equipment will be capable of removing dirt, grease, rocks, sand and other materials and obstructions from the sewer lines and manholes.

4. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment will be set up on the other manhole and cleaning will be attempted again.

5. If successful cleaning from both manholes cannot be completed, Contractor will contact the Engineer.

D. Root Removal

1. Roots will be removed completely where root intrusion is a problem.

2. Any roots which could inhibit the proposed construction will be removed.

E. Chemical Root Treatment

1. Chemical root treatment may be used at the option of the Contractor to aid in the removal of roots.

2. The application of the herbicide to the roots will be done in accordance with the manufacturer's recommendation and specifications in a manor to preclude damage to the surrounding vegetation.

3. Any damage to the vegetation will be repaired at Contractors expense.

4. All safety precautions as recommended by the manufacturer will be adhered to concerning handling and application of herbicide.

F. Material Removal

1. All sludge, dirt, sand, rocks, grease and other solids or semisolid material resulting from cleaning operations will be removed at the downstream manhole of the section being cleaned.

2. Passing material from manhole section to manhole section, which could cause line stoppages, accumulation of sand in wet wells, or damage to pumping equipment, will not be permitted.

G. Disposal of Material

1. All solids or semisolids resulting from the cleaning operations will be removed from the site and disposed of at a site secured by Contractor.

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2. All materials will be removed from the site no less often than at the end of each workday. Under no circumstances will Contractor be allowed to accumulate debris on the site of work.

H. Final Acceptance

1. Acceptance of sewer line cleaning will be made up on successful completion of the television inspection and will be to the satisfaction of the Owner.

2. If television inspection shows the cleaning to be unsatisfactory, Contractor will be required to re-clean and re-televise the sewer line until cleaning is shown to be satisfactory.

3.3 EXAMINATION

A. Commence televising only when pipe and structures are clean and free of dirt or other foreign matter.

3.4 SEWER FLOW CONTROL

A. When sewer line depth of flow at the upstream manhole of the manhole section being worked in is above the maximum allowable for television inspection, the flow will be reduced to the level shown below by operation of pump stations, plugging or blocking of the flow or by pumping and bypassing of the flow as specified.

B. Plugging or Blocking

1. Perform bypass pumping as need to complete the work.

2. A sewer line plug will be inserted into the line upstream of the section being worked.

3. The plug will be designed so that all or any portion of the sewage can be released in accordance with the Engineer.

4. During television inspection, flow will be reduced within the limits specified above.

5. After the work has been completed, flow will be restored to normal.

C. Pumping and Bypassing

1. When Pumping and bypassing is required, Contractor will supply the pumps, conduits and other equipment to divert the flow of sewage around the manhole section in which work is being performed.

2. Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypass pumping system. If pumping is required on a 24-hour basis, engines will be equipped in a manor to keep noise to a minimum.

D. Flow Control Precautions

1. When flow in a sewer line is plugged, blocked or bypasses, sufficient precautions must be taken to protect the sewer lines from damage that might result from surcharging.

2. Precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property be served by the sewers involved.

3.5 SANITARY SEWER TELEVISING

A. General

1. Televising will be performed on all gravity/pressure utility lines that are shown in the plans and specifications.

2. Camera – The camera will be a self-propelled unit providing color video with the ability to tilt up and down and pan left to right. The camera lens will be capable of turning and looking up each wye or service tap to a minimum distance of the first fitting of the service pipe. The camera is to provide color video and still photographs of any defect.

3. Rate – The televising will be conducted at a rate not to exceed 30.0-feet per minute.

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B. Line Requirements

1. All lines will be jetted and vacuumed so that all debris has been removed prior to televising.
2. A small quantity of water is to be introduced into the line prior to televising. Amount will be determined by the Engineer and coordinated with the Owner's Water and Sewer Department. The amount of water will be sufficient enough to distinguish any sags or alignment problems with the pipe.
3. Each run will consist of a starting and ending MH-#, pipe material and diameter, direction of flow, and a zero reading on the counter at center of the starting manhole.
4. Each service wye will be examined using the pan and tilt feature.
5. The video camera operator will type into the video the station (distance), wye location on either the top, left, or right side of the pipe and any problems they notice while televising the sewer lines. Examples of defects include offset joints, leaking joints, sages, cracked pipe, etc.

C. Manhole Requirements

1. Examine upstream and down doghouses for water tightness.
2. Examine all joints to confirm watertight quality of gaskets and seals.
3. While at the bottom of the manhole, the camera will examine for infiltration as high as it can see around the entire manhole circumference.
4. Examine vertical drops.

D. Report Requirements

1. A technician will observe the monitor at all times during the televising and record the data per NASSCO standards.
2. Date, time, city, street, name of operator, inspector, and weather conditions.
3. Note locations, length, and depth of any sag in the pipe (indicate any depths greater than ½-inch).
4. Note locations, length, and depth of any areas of dirt or debris in the pipe (indicate any depths greater than ½-inch).
5. Note all defective or substandard areas identified during the inspection.
6. Record distance from center of manhole to center of manhole.
7. Note each change in pipe material, including station.
8. Note each wye or service tap location with station and orientation (Example: wye right, 3 o'clock).
9. Note direction of flow using cardinal/ordinal directions.
10. Include color photos/images of defects in the written report.

E. Review

1. All television reports and videos will be reviewed after the submittal is received.

F. Video and Reporting Format

1. All televising videos and reports shall be uploaded to a USB flash drive.
2. Video files shall be viewable without the use of specialty software.
3. Report files shall be in .pdf format, viewable using standard Adobe or Bluebeam software.
4. File Naming

   (a) The Contractor will be provided with a map or plan showing manhole identification numbers.

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(b) All files shall be named using the upstream and downstream structure numbers.

******END OF SECTION******

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SECTION 33 01 30.61 - PACKER INJECTION GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sewer pipe joint sealing with packer method
2. Sewer lateral connection sealing with packer method.
3. Manhole joint and penetration sealing.

B. Related Sections:

1. Section 33 01 30.12 - Cleaning and Television Inspection of Sewers.
2. Section 33 01 30.72 - Cured-in-Place Pipe Lining.
3. Section 33 01 30.81 - Manhole Rehabilitation.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below.

1. A Bid Item has been provided for Sewer Pipe Joint Grouting. This Bid Item is for sealing the existing main line sanitary sewer joints where there are found to be locations of infiltration, prior to installation of the CIPP liner. Measurement will be paid per EACH (EA) joint grouted to stop infiltration into the sewer pipe being lined. Payment will constitute full compensation for all work (including testing) and costs to provide adequate infiltration prevention to allow for the installation of the CIPP liner as recommended by the manufacturer.
2. A Bid Item has been provided for Sewer Pipe Lateral Grouting. This Bid Item is for sealing the sanitary sewer lateral connections to eliminate infiltration occurring at a service connection. The lateral shall be plugged prior to the installation of the CIPP liner and grouted at the connection after the service has been reinstated. The grout required to seal the annular space between the liner and the host pipe at lateral connections shall be considered incidental to the Service Connection Bid Item. Measurement will be paid per EACH (EA). Payment will constitute full compensation for all work (including testing) and costs to provide adequate infiltration prevention at the service connection. The sanitary sewer service lateral should be grouted at least 24.0-inches up the service lateral.
3. A Bid Item has been provided for MH Rehab Joint Grouting. This Bid Item is for sealing the existing manhole joints which are found to be locations of infiltration (typically prior to the installation of the spray on liner). Measurement will be per EACH to stop infiltration into the identified manhole. Payment will constitute full compensation for all work and costs to provide adequate infiltration prevention, as recommended by the manufacturer.
4. The Owner reserves the right to increase or decrease quantities at their sole discretion. No adjustments to unit prices bid will be allowed for increased or decreased quantities in this section of the specifications.
5. All other Work and costs of this Section shall be incidental to the Project and included in the Total Base Bid.

1.3 REFERENCES

A. American Society of Testing and Materials (ASTM)

1. C230 – Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.

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2. C1107 – Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
3. C1116 – Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
4. F2304-03 – Standard Practice for Rehabilitation of Sewers Using Chemical Grouting.
5. F2414-04 – Standard Practice for Sealing Sewer Manholes Using Chemical Grouting.
6. F2454-05 – Standard Practice for Sealing Lateral Connections and lines from the Mainline Sewer System by Lateral Packer Method, Using Chemical Grouting.

B. Infiltration Control Grouting Association (ICGA)

1. Suggested Standard Specifications for Pressure Testing and Grouting Sewer Pipe Joints, Laterals and Lateral Connections Using the Packer Method with Solution Grouts.

1.4 SUBMITTALS

A. Submit the following items prior to the start of construction unless otherwise noted:

1. Product data for grout materials.
   (a) Description of chemical grout materials.
   (b) Description of proposed additives.
   (c) Manufacturer's recommendations for materials (storage, mixing, etc.)
   (d) MSDS sheets for all materials to be used.
2. Placement methods for grout.
3. Proposed grouting equipment.
4. Work sequencing schedule.
5. Manufacturer's Certificate of Compliance.
6. Manufacturer's Certificate of Proper Installation.
7. Post Grouting Report for each segment shall include:
   (a) Sewer pipe segment description (MH to MH).
   (b) Distance from referenced manhole.
   (c) Volume of grout material used at each joint or connection.
   (d) Test pressure used and duration of each test.

1.5 QUALITY ASSURANCE

A. Sewer Joint Testing – Post Sealing.

1. After the joint has been sealed, the packer shall be deflated so that the void pressure meter reads zero.
2. The packer is to be moved a minimum of one packer length in either direction, repositioned over the joint, inflated, and retested at a pressure equal to the initial test pressure. Test pressure shall be equal to 0.5 psi per vertical foot of pipe depth, plus 2 psi; however, test pressure shall not exceed 10 psi.
3. Any joint that fails to meet the specified test criteria shall be resealed and retested until the requirements are satisfied. A failed test shows a joint or lateral connection that shows more than 1.0 psi pressure drop over a 30 second pressure test.
   (a) No additional compensation will be made for additional testing.

PART 2 - PRODUCTS

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2.1 EQUIPMENT

A. Closed Circuit Television System (CCTV).

B. Chemical sealant container.

C. Pumps, sealant, regulators, valves, hoses.

1. System shall be sized to deliver a mixed volume of grout at a minimum of 3 gpm and 30 gallons of uninterrupted flow within 10 minutes.

D. Joint Sealing Packers.

1. Packer shall be cylindrical with a hollow, tubular, flow through design.

2.2 GROUT

A. While being injected, the grout must be able to react/perform in the presence of water (groundwater).

B. The ability to increase grout mix viscosity, density and gel strength by increased concentration of constituents or the use of approved additives.

C. Grout shall have a controllable cure time from 55 seconds at 50 degrees Fahrenheit to 30 seconds at 85 degrees Fahrenheit when reacted with water only.

D. Cure time shall range from 25 seconds at 50 degrees Fahrenheit to 15 seconds at 100 degrees Fahrenheit when an accelerator is used.

E. Liquid pre-polymer shall contain solid material constituting 49 to 55 percent of its weight.

F. The cured grout must withstand submergence in water without degradation.

G. The resultant grout formation must be homogeneous and prevent the passage of water (infiltration) through the pipe joint.

H. The cured grout must be chemically stable and resistant to organics found in sewage.

I. Handle, mix, and store grout in accordance with the manufacturer's recommendations.

1. Material shall be delivered to the site in unopened containers supplied by the manufacturer.

J. Manufacturers and Products:

1. Avanti AV-100, Avanti AV-118 or approved equal.

2. DeNeef AC-400, DeNeef Gelacryl SR, Avanti AV-160 or approved equal.

2.3 ADDITIVES

A. Additives may be used at the Contractor's discretion within the manufacturer's recommended quantities.

B. Strength

1. For joint grouting, a latex or "diatomaceous earth" additive may be added to increase compressive and tensile strength. The quantity of strengthening agent additive shall be as recommended by the manufacturer.

2. Product Manufacturer

(a) Avanti AV-257 Icoset, DeNeef Reinforcing Agent or approved equal.

C. Root Inhibitor

1. When roots are present, a root deterrent chemical shall be added to control root re-growth. The quantity shall be recommended by the manufacturer and approved by the Engineer.

2. Product Manufacturer

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(a) Avanti AC-50W or approved equal.

D. Dye

1. A water-soluble dye without trace metals may be added to the grout tank for visual confirmation.

E. Gel Time Modifier

1. A gel time extending agent may be used in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GROUTING

A. Mix, place and cure grout in accordance with the grout manufacturer's recommendations and as specified herein.

B. Pipe Joints showing visible leakage during the initial CCTV shall be sealed.

1. Sealing shall be accomplished by forcing chemical sealing material into or through the joints by a system of pumps, hoses, and sealing packers.

2. The grout must be injected beyond the joint interface into the soil surrounding the joint.

3. If a mainline or lateral joint requires more than 0.5 gallon of grout per inch-diameter of pipe, modify grouting procedure to perform stage grouting.

(a) Pump additional grout in up to 4-gallon increments.

(b) Wait the greater of 1 gel set cycle time or 1 full minute between stages.

(c) Maximum number of stages shall not exceed 2 stages of 4 gallons each unless approved by the Engineer.

4. Remove excess grout from pipe and laterals.

(a) Excess grout shall be defined as a thickness of grout that given its location, size and geometry, could cause a blockage.

(b) Flush or push forward to the next downstream manhole, remove from the sewer system, and properly dispose of excess grout.

(c) Penetrations and/or joints within manholes showing visible leakage shall be sealed.

(1) Sealing shall be accomplished by forcing chemical sealing materials Into or through the manhole wall by a system of pumps and hoses surrounding the penetration and/or joint location.

(2) The grout must be injected into the soil surrounding the joint.

3.2 FIELD QUALITY CONTROL

A. Flow Control

1. The Contractor is responsible for wastewater diversion in accordance with applicable sections of this project manual.

B. Grout Application

1. Jetting or driving pipes from the surface is prohibited.

2. Uncovering the pipe by excavation is prohibited.

3. Sewer lines shall be cleaned immediately prior to testing/sealing as required to remove solids and allow for proper seating of the packer.

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C. Residual Sealing Material

1. Residual material shall be removed from the joint and disposed of by the Contractor in an approved manner.

   (a) The sealed joints shall be left flush with the existing pipe surface.

2. If excess residual sealing material accumulates in the line, the pipe shall be cleaned to remove the residual material at the Contractor's expense.

******END OF SECTION******

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SECTION 33 01 30.72 - CURED-IN-PLACE PIPE LINING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the installation of a resin-impregnated flexible liner that is inserted into the original conduit by use of a hydrostatic head. Methods that are pulled in and inflated rather than inverted will be considered, providing they meet the other provisions of this specification. When cured, the finished pipe (CIPP) will be continuous and tight-fitting.

B. Televising of the majority of the project site has been performed by the Owner, and is available at:

1. Contact bradley.fisher@bolton-menk.com to obtain a link to download the videos.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below.

1. The contract unit price bid per linear foot for LINING SEWER PIPE will be compensation in full for all equipment, materials, and labor required to complete the CIPP installation for the identified pipe diameter and sewer type. Payment will be based on the actual measurement of the liner installed.

2. The contract unit price bid per each for CIPP SHORT LINER will be compensation in full for all equipment, materials, and labor required to complete the short liner installation for the identified pipe diameter and sewer type. The per each unit will assume a short liner length of 5-feet for each size.

3. The contract unit price bid per each for lateral reinstatement (any size) will be compensation in full for all labor, materials, and equipment required to determine which are active, and complete the lateral reinstatements of all lateral lines conveying sewage in accordance with these specifications

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the CIPP, as indicated. Such items of work include, but are not limited to:

1. Coordination with City for access to the sanitary sewer and/or storm sewer systems.

2. Securing and withdrawing from a water source.

3. Furnishing, installing, and maintaining traffic control devices where necessary not already provided for by bid items.

4. Pre-installation and post-installation cleaning and televising.

5. Removal and disposal of internal debris from the sewer mainline and services before installation.

6. Bypass pumping unless otherwise specified and included in the bid form.

7. Providing all required notifications of restricted sewer service periods to the Owner and residents affected by the work as well as coordination of resident relocations and reimbursements, if applicable.

8. Installation of pipe pre-liners or grouting if required to install CIPP in areas of excess infiltration.

9. Dye testing as required to determine active laterals (where needed).

10. Installation of hydrophilic end seals at the ends of the liner in each manhole.

11. Removal of liner in manholes if pulling/inverting through manholes (unless manhole is being abandoned).

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12. Excavation and restoration are required to reinstate sewer services if the Contractor is unable to reinstate services via trenchless methods.

13. General project-related restoration where not already provided by bid items.

1.3 SPECIFICATION REFERENCES

A. This specification references below are made a part hereof by such reference and will be the latest edition and revision thereof. In case of conflicting requirements between this specification and the ASTM referenced sections, this specification will govern.

B. The following referenced Specifications will apply to this Section:

1. ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastics (GRP) Cured-In-Place Pipe (CIPP) will apply, except as modified herein.

2. ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube will apply, except as modified herein.

3. ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull in and inflate and Curing of a Resin-Impregnated Tube.

4. ASTM F2561 – Standard Practice for Rehabilitation of a Sewer Service Lateral and its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner.

5. ASTM D543 Test Method for Resistance of Plastics to Chemical Reagents

6. ASTM D578 Standard Specification Glass Fiber Strands

7. ASTM D638 Standard Test Method for Tensile Properties of Plastics.

8. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials will apply, except as modified herein.

9. ASTM D2122 Standard 1 Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

10. ASTM D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics will apply, except as modified herein.

11. ASTM D3567 Standard Practice for Determining Dimensions of ‘‘Fiberglass’’ (Glass-Fiber Reinforced Thermosetting Resin) Pipe and Fittings

12. ASTM D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Pipe will apply, except as modified herein.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Prior to installation or use of any material or equipment:

1. Certified test results from the manufacturers indicate that all materials conform to the applicable requirements.

2. Copy of the license or certificate verifying the manufacturer's or licensor's approval of the Installer.

3. Evidence of the Installer’s experience including a list of similar projects completed within the previous 2 years.

4. Proposed construction schedule.

5. A sanitary sewer and/or storm sewer bypass pumping plan.

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(a) Will be submitted to the Engineer for review a minimum of 5 working days prior to the beginning of work.

(b) The bypass pump system will be of sufficient capacity to handle existing flow at peak flow times.

6. Traffic Control and Work Zone Signage Plan:

(a) Will be submitted to the Engineer for review a minimum of 5 working days prior to the beginning of work.

7. Details of how existing tees, wyes, air relief valves, blow-off valves, threaded taps, etc., will be reinstated. Reinstatements should provide a sufficient seal to prevent water tracking between the pipe lining and the host pipe.

8. Test results of the resin proposed that meet the chemical resistance requirements of ASTM F2019, Section 5.2.6. Tests will be completed in accordance with Test Method D543.

9. The field sampling procedure will be in accordance with ASTM 2019 and accordance with ASTM D5813.

10. Material Safety Data Sheets for all resins, and other additives such as accelerants, colorants, and lubricants utilized in the pipe liner/lining process.

11. Manufacturer information that describes the materials, curing speeds/schedule, curing installation processes, installation pressures, temperature limitations, and recommended post-curing documentation.

12. Residential Informational Handout that describes the materials, processes, installation, pressures, temperature limitations, and odors associated with the lining process that will be provided at the request of concerned residents.

13. Liner pipe thickness design for each pipe segment.

(a) No liner will be approved for installation until liner thickness calculations have been submitted and reviewed for conformance with the specification.

14. Description of cure method(s) proposed by the Contractor.

B. Prior to final payment:

(a) Televising and construction logs.

(1) These will become the property of the Owner. This includes the videos made at the beginning of the project just prior to the installation of the liner.

PART 2 - PRODUCTS

2.1 PREQUALIFICATION

A. Only bids for pre-qualified products will be accepted. Bids submitted for products or from Contractors that have not been pre-qualified may be rejected, pending review by the Owner. The Contractor and the proposed method of reconstruction and the product manufacturer's name will be identified on the bid.

B. Pre-qualified Installers

1. Insituform Technologies USA, LLC.

1140 Bunker Lake Boulevard NW, Anoka, MN 55303, Telephone: 651-762-1238

2. (National Liner) Visu-Sewer

19587 Tamarack St. NW Oak Grove, MN 55011, Telephone: 763-252-0004

3. Veit Companies

14000 Veit Place Rogers MN 55374, Telephone 763-428-2242

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4. Granite Construction

   2950 Metro Drive # 200, Bloomington, MN 55425, Telephone 952-853-1252

5. Michels Pipe Service – A Division of Michaels Corporation

   817 West Main Street, P.O. Box 128, Brownsville, WI 53006, Telephone: 920-583-3132

6. Sak Construction

   864 Hoff Road, O'Fallon, MO 63366, Telephone 626-385-1000

7. Hydro-Klean

   333 NM 49th Place, Des Moines, IA 50313, Telephone 855-845-5326

C. Qualification Process

1. Contractors wishing to qualify for this project must submit a copy of the license or certificate verifying the manufacturer's or licensor's approval, and evidence of the INSTALLER's experience including the number, total length, and locations of inversions installed to date using the proposed materials and methods together with the names and phone numbers of facility owners to the Engineer 5 days prior to the opening of bids to allow time for evaluation. The Contractor must have at least five (5) years of active experience installing the CIPP product.

2. The final decision to accept or reject the applicant lies solely with the Engineer and Owner. All decisions will be based upon the long-term best interest of the City.

2.2 MATERIALS

A. Liner - The liner material will meet the requirements of ASTM F1216 and/or ASTMF2019.

B. Resin - The resin system will meet the requirements of ASTM F1216 and/or ASTMF2019. Neat resin will be used for all lining of PVC pipes.

C. Hydrophilic End Seals will be LMK Insignia End Seal or Engineer approved Equal.

2.3 STRUCTURAL REQUIREMENTS

A. The CIPP will be designed as per ASTM F1216, Appendix X1. The CIPP design will assume no bonding to the original pipe wall but a tight, intimate contact is required.

B. The CIPP will be designed using a Long-Term Creep Retention Factor of fifty percent of the initial design flexural modulus as determined by the ASTM D790 test method. This value will be used unless the Contractor submits long-term test data (ASTM D2990) to substantiate a higher retention factor.

C. The layers of the cured CIPP will be uniformly bonded. It will not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers.

D. If separation of the layers occurs during the testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

E. The CIPP will conform to the following properties:

	Standard	**Min Value**	**UV Value**
Flexural Strength	ASTM - D790	4,500 psi	6,500 psi
Modulus of Elasticity	ASTM - D790	400,000 psi	725,000 psi

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F. The design parameters for 8” installations are:

Pipe diameter	8	Inches
Maximum depth from finished ground to invert	13	Feet
Minimum depth from finished ground to invert	5	Feet
Groundwater Depth	Equal to Soil Depth	Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	5%	Percent
Enhancement Factor (K)	7.0	Value
Poisson’s Ratio	0.3	Value
Level of Deterioration	Fully Det	Value
Creep Retention Factor	50%	Value
Soil Modulus	Depth 0-10’ = 700 Depth 10-15’= 1000 Depth >15’ = 1500	Value
Host Pipe Loading	H20 Highway	Value

G. The required structural CIPP wall thickness will be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F1216. The finished/cured liner thickness will exceed the minimum thickness requirements set forth by the equations in the appendix of ASTM F1216.

H. **For all 8” CIPP installations on this project, the contractor shall install a 6.0 mm Nominal/ 5.1 mm Cured/Finished thickness liner minimum on all installations. The contractor should design each segment and submit thicker installation exceeding the minimum as required by ASTM F1216.**

I. The design parameters for 12” installations are:

Pipe diameter	12	Inches
Maximum depth from finished ground to invert	10	Feet
Minimum depth from finished ground to invert	6	Feet
Groundwater Depth	Equal to Soil Depth	Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	2.0%	Percent
Enhancement Factor (K)	7.0	Value
Poisson’s Ratio	0.3	Value
Level of Deterioration	Fully Det	Value
Creep Retention Factor	50%	Value
Soil Modulus	Depth 0-10’ = 700 Depth 10-15’= 1000 Depth >15’ = 1500	Value
Host Pipe Loading	H20 Highway	Value

J. The required structural CIPP wall thickness will be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F1216. The finished/cured liner thickness will exceed the minimum thickness requirements set forth by the equations in the appendix of ASTM F1216.

K. **For all 12” CIPP installations on this project, the contractor shall install a 6.0 mm Nominal/ 5.1 mm Cured/Finished thickness liner minimum on all installations. The contractor should design each segment and submit thicker installation exceeding the minimum as required by ASTM F1216.**

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L. The design parameters for 15” installations are:

Pipe diameter	15	Inches
Maximum depth from finished ground to invert	9	Feet
Minimum depth from finished ground to invert	6	Feet
Groundwater Depth	Equal to Soil Depth	Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	2.0%-5%	Percent
Enhancement Factor (K)	7.0	Value
Poisson’s Ratio	0.3	Value
Level of Deterioration	Fully Det	Value
Creep Retention Factor	50%	Value
Soil Modulus	Depth 0-10’ = 700 Depth 10-15’= 1000 Depth >15’ = 1500	Value
Host Pipe Loading	H20 Highway	Value

M. The required structural CIPP wall thickness will be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F1216. The finished/cured liner thickness will exceed the minimum thickness requirements set forth by the equations in the appendix of ASTM F1216.

N. **For all 15” CIPP installations on this project, the contractor shall install a 7.5 mm Nominal/ 6.375 mm Cured/Finished thickness liner minimum on all installations. The contractor should design each segment and submit thicker installation exceeding the minimum as required by ASTM F1216.**

O. The design parameters for 24” installations are:

Pipe diameter	24	Inches
Maximum depth from finished ground to invert	8	Feet
Minimum depth from finished ground to invert	3	Feet
Groundwater Depth	Equal to Soil Depth	Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	2.0%	Percent
Enhancement Factor (K)	7.0	Value
Poisson’s Ratio	0.3	Value
Level of Deterioration	Fully Det	Value
Creep Retention Factor	50%	Value
Soil Modulus	Depth 0-10’ = 700 Depth 10-15’= 1000 Depth >15’ = 1500	Value
Host Pipe Loading	H20 Highway	Value

A. The required structural CIPP wall thickness will be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F1216. The finished/cured liner thickness will exceed the minimum thickness requirements set forth by the equations in the appendix of ASTM F1216.

B. **For all 24” CIPP installations on this project, the contractor shall install a 12.0 mm Nominal/ 10.2 mm Cured/Finished thickness liner minimum on all installations. The contractor should design each segment and submit thicker installation exceeding the minimum as required by ASTM F1216.**

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C. The design parameters for 27” installations are:

Pipe diameter	27	Inches
Maximum depth from finished ground to invert	8	Feet
Minimum depth from finished ground to invert	3	Feet
Groundwater Depth	Equal to Soil Depth	Feet
Cover density (assumed)	120	Lbs/cf
Design Safety Factor (1.5 for pipes 36 inches and larger)	2.0	Value
Ovality	2.0%	Percent
Enhancement Factor (K)	7.0	Value
Poisson’s Ratio	0.3	Value
Level of Deterioration	Fully Det	Value
Creep Retention Factor	50%	Value
Soil Modulus	Depth 0-10’ = 700 Depth 10-15’= 1000 Depth >15’ = 1500	Value
Host Pipe Loading	H20 Highway	Value

D. The required structural CIPP wall thickness will be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F1216. The finished/cured liner thickness will exceed the minimum thickness requirements set forth by the equations in the appendix of ASTM F1216.

E. **For all 27” CIPP installations on this project, the contractor shall install a 13.5 mm Nominal/ 11.475 mm Cured/Finished thickness liner minimum on all installations. The contractor should design each segment and submit thicker installation exceeding the minimum as required by ASTM F1216.**

2.4 TESTING REQUIREMENT

A. Chemical Resistance - The Contractor shall certify that CIPP will meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing will be of liner and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.

B. Hydraulic Capacity - The Contractor shall certify that the CIPP will have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition. The roughness coefficient of the CIPP will be verified by third-party test data.

C. CIPP Field Samples - When requested by the Owner, the Contractor shall submit test results from previous field installations in the USA of the same resin system and liner materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Section 2.3.D. have been achieved in previous field applications. Testing samples for this project will be made and tested as described in Section 3.4.A.

PART 3 - EXECUTION

3.1 GENERAL

A. Water is available for the Contractor’s use at on-site fire hydrants with the use of a meter and backflow preventor. Meters will be provided by the City’s Public Works Department with a deposit from the Contractor. The Contractor must use the meter when filling water from a City fire hydrant and will pay the City for the water used at the rate established by the City. The Contractor is responsible for providing the backflow preventor.

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B. The Contractor must obtain approval from the Owner for using a hydrant source of water and must only use it for application on this project.

C. It will be the responsibility of the owner to locate and designate all manhole access points open and accessible for the work and provide rights of access to these points. If a street must be closed to traffic because of the orientation of the sewer, the Contractor shall furnish and install all necessary traffic control devices until the street is opened to traffic.

D. Cleaning of Sewer Lines - The Contractor shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP. The Contractor shall secure their disposal site for all debris removed from the sewers.

E. Bypassing Sewage - The Contractor shall provide for the flow of sewage around the section or sections of pipe designated for the lining. The bypass will be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines will be of adequate capacity and size to handle the flow.

F. Inspection of Pipelines - Inspection of pipelines will be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television. The interior of the pipeline will be carefully inspected to determine the location of any conditions that may prevent proper installation of CIPP into the pipelines, and it will be noted so that these conditions can be corrected.

G. Line Obstructions - It will be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the proper insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, offset joint, or a collapse that will prevent the inversion process, and it cannot be removed by conventional sewer cleaning equipment, the Contractor shall immediately notify the Owner. The Owner may choose to have the Contractor make a point repair excavation to uncover and remove or repair the obstruction. Such excavation will be considered as a separate pay item.

H. The Contractor shall notify the Owner prior to initiating cleaning and flushing and will coordinate his operations with the Owner.

I. The Contractor shall determine the length and diameter of the pipe to be lined prior to fabrication of the liner. No additional compensation will be paid for measured diameters, which vary from the measurements indicated on the plans or bid form.

J. The Contractor shall provide all necessary equipment, jigs, pipe pieces, sandbags, labor, etc. to install the CIPP tube through the available access locations provided and shown on the plans. The Contractor shall also cut open, reinstate, and prepare the edges of cut surfaces in a clean and orderly fashion to reopen the pipe within manholes that have been lined through. No additional compensation will be made for lined through manholes, and such items of work will be considered incidental to the contract.

3.2 NOTIFICATION

A. Notice required. At least six days before the start of lining, the Contractor shall provide notice, including the approximate schedule of lining, as described below.

1. Written notice must be given to the adult residents of buildings, and to the owner or administrator of any property directly served by the sewer to be lined.

2. The notice must be mailed or hand-delivered to the owner or administrator of a childcare building, school building, commercial business, and/or industry.

3. The notice may be put on or under the door of each residence, one notice for each single-family building and one notice for each unit of a multi-unit building.

B. Contents of Notice to Residents, Administrator, and Owner. The notice will specify the days and the hours during which sewer service will be restricted.

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C. Reminder Notice: A written, or verbal reminder notice will be delivered at least 24 hours prior to the actual work.

3.3 CONSTRUCTION REQUIREMENTS

A. CIPP installation will be in accordance with ASTM F1216, Section 7, or ASTM F2019, Section 6.4 with the following additional requirements:

1. Resin Impregnation - The quantity of resin used for liner impregnation will be sufficient to fill the volume of air voids in the liner with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process will be used. A roller system will be used to uniformly distribute the resin throughout the liner.

2. Liner insertion will be performed in accordance with the manufacturer's recommendations and in such a way to fully extend the liner to its termination point, hold the liner tight against the pipe wall, and produce dimples at service connections and flared ends at maintenance holes. Lubricants may be used, as necessary. Care will be taken so as not to overstress the felt fiber.

3. Unless otherwise indicated in the plans or authorized in writing by the Engineer, steam curing, water curing, and UV curing will all be considered as an acceptable cure method for this project.

(a) Steam Cure

(1) After inversion is completed, suitable steam-generating equipment is required to distribute steam throughout the pipe.

(2) The equipment should be capable of delivering steam throughout the section to uniformly raise the temperature within the pipe above the temperature required to effect a cure of the resin.

(3) The temperature and pressure maintained in the pipe and the duration of the cure period will be as recommended by the manufacturer.

(4) The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

(5) Cooling:

1. The new pipe should be cooled to a temperature below 113 degrees Fahrenheit before relieving the internal pressure within the section.

2. Cool-down may be accomplished by the introduction of cool water into the section to replace the mixture of air and steam being drained from a small hole made in the downstream end.

3. Care will be taken in the release of the head so that a vacuum will not be developed that could damage the newly installed pipe.

(b) Circulated Heated Water Cure

(1) After inversion is completed, a suitable heat source and water recirculation equipment are required to circulate heated water throughout the pipe.

(2) The equipment should be capable of delivering hot water throughout the section to uniformly raise the water temperature above the temperature required to effect a cure of the resin.

(3) The heat source should be fitted with suitable monitors to gauge the temperature of the incoming and outgoing water supply. Another such gauge should be placed between the impregnated tube and the pipe invert at the termination to determine the temperatures during the cure.

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(4) The temperature and pressure maintained in the pipe and the duration of the cure period will be as recommended by the manufacturer.

(5) The curing of the CIPP must take into account the existing pipe material, the resin system, and ground conditions (temperature, moisture level, and thermal conductivity of soil).

(6) Cooling:

1. The new pipe should be cooled to a temperature below 100 degrees Fahrenheit before relieving the static head in the inversion stand pipe.
2. Cool-down may be accomplished by the introduction of cool water into the inversion stand pipe water to replace hot water being drained from a small hole made in the downstream end.
3. Care will be taken in the release of the head so that a vacuum will not be developed that could damage the newly installed pipe.

(c) UV Cure – Follow ASTM F2019, Section 6.6 & 6.7

(1) The approved system must utilize an outer and inner film to ensure that the liner remains intact during the insertion process and to protect the resin at all times during the installation and curing process from water and debris contamination and resin migration.

(2) A winch should be used to pull the glass fiber liner into position in the pipe. The pulling speed will not exceed 15.0-feet per minute. The liner will have a lateral fiberglass reinforcement band that runs the entire length of the liner ensuring that the pulling force is transferred to the band and not the fiberglass liner. Once inserted, end plugs will be used to cap each end of the glass fiber liner to prepare for pressurizing the liner. As with all CIPP products liner restraints should be used in manholes.

(3) A slip sheet will be installed on the bottom one-third to one-half of the pipe prior to liner insertion, to protect the liner during insertion and reduce the drag, or as recommended by the liner manufacture.

(4) The glass fiber liner will be cured with UV light sources at a constant inner pressure. When inserting the curing equipment in the liner, care should be taken to not damage the inner film material.

(5) The UV light sources should be assembled according to the manufacture's specification for the liner dimeter. For the liner to achieve the required water tightness and specified mechanical properties, the following parameters must be controlled during the entire curing process, giving the Engineer a record of the curing parameters over every segment of the entire length of the liner. This demonstrates that the liner is cured properly. The recording will include:

1. Curing Speed
2. Light Source and Wattage
3. Inner Air Pressure
4. Curing Temperatures
5. Date and Time
6. Length of Liner

(6) This will be accomplished using a computer and database that are tamper-proof. During the curing process, infrared sensors will be used to record curing data that will be submitted to the Engineer with a post-CCTV inspection on the portable hard drive.

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(7) The optimal curing speed, or travel speed of the energized UV light sources, is determined for each length of liner based on internal diameter, liner thickness, and exothermic reaction temperatures.

(8) The inner film material should be removed and discarded after curing to provide optimal quality of the final product.

B. The liner pipe will be continuous, without joints over the entire length of the pipe. The liner will be free of all visual and material defects, including but not limited to foreign inclusions, dry spots, pinholes, and delaminations. The surface will be smooth and free of waviness throughout the pipe.

C. Any defects that will affect the structural integrity or hydraulic capacity of the reconstructed pipe will be repaired or the liner will be replaced at the Contractor's expense, including large radial or longitudinal wrinkles that occur in such a size as to reduce the thickness or nominal diameter of the finished CIPP product.

D. Hydrophilic end seals are required to seal the ends of each CIPP liner as it connects to the manhole. These seals will be installed prior to CIPP to prevent water tracking between the CIPP product and the existing host pipe. End Seals will be LMK Insignia Seals or Engineer approved equal.

E. Any water used during the cure of storm sewer systems **must not** be released into the storm sewer system. The Contractor shall capture this water and coordinate with the Engineer to deposit it into the sanitary sewer system.

3.4 REINSTATEMENT OF SEWER SERVICE LATERALS

A. The Contractor shall certify he has a minimum of two complete working cutter units plus spare key components on the site before each inversion.

B. Prior to installing the sewer liner (during the television process), the Contractor shall locate, dye-test, and record the location of all sewer lateral connections that are in question. The Contractor shall immediately submit this information to the Owner. The Owner will then determine which, if any, sewer services are to be abandoned. Those services designated to be abandoned will not be reinstated.

C. After the sewer lining is complete, the Contractor shall re-establish all service connections except those designated by the Owner to be abandoned. This will be done without excavation from the interior of the pipe using a television camera and a remotely controlled cutting device.

1. If the Contractor is unable to re-establish the service connection from inside the pipe and excavation is necessary, no additional payment will be made for excavations to reopen connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

2. Reestablished service connections will be clean and smooth, free of jagged edges, and conform as closely as possible to the dimension of the existing service.

3. Brush-style cutters or similar devices will be required to ensure that the laterals are smooth for potential CIPP lateral lining.

D. The sewer main will be lined prior to lining service laterals, unless approved otherwise by the Engineer.

3.5 INSPECTION

A. CIPP samples will be prepared and tested in accordance with ASTM F1216, Section 8.1 using either method proposed.

B. Leakage testing of the CIPP will be accomplished during cure while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by the Owner.

C. Visual observation of the CIPP will be in accordance with ASTM F1216, Section 8.4.

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3.6 TELEVISING

A. Televising is required both prior to liner installation and after the CIPP process has been completed.

B. Televising will be performed by experienced personnel trained in locating breaks, obstacles, and service connections.

C. All televising videos will be in color. Each individual reach of pipe between manholes will be identified as a chapter on the video.

D. Immediately prior to televising, the televisor will discharge sufficient clear water into the pipe to clean the pipe and assist in identifying sags and misalignment.

E. Post-lining televising will carefully inspect the interior of the pipeline to identify any conditions which may indicate improper installation.

F. A DVD and suitable log will be kept of all televising and submitted to the Owner.

3.7 CLEAN-UP

A. Upon acceptance of the installation work and testing, the Contractor shall clean up the project area affected by the operations.

3.8 WARRANTY

A. All lining work will be fully guaranteed by the Contractor for 2 years from the date of Final Acceptance. During this period, all serious defects discovered by the Owner or Engineer will be removed and satisfactorily replaced by the Contractor at no cost to the Owner. In addition, the Owner may conduct independent televised inspections, at its own expense, of the lining work at any time prior to the completion of the guarantee period.

******END OF SECTION******

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SECTION 33 01 30.81 - MANHOLE REHABILITATION

PART 2 -- GENERAL

2.1 SUMMARY

A. This section covers additional requirements for Cementitious & Epoxy Manhole Rehabilitation which includes the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to rehabilitate a manhole or catch basin as indicated on the drawings or as specified herein.

2.2 METHOD AND MEASUREMENT OF PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment for CEMENTITOUS MANHOLE REHABILITATION shall be paid per Vertical Foot (VF) measured from the manhole invert through the adjustment rings and shall include the cost for fully rehabilitating the sanitary sewer manhole, rings, invert, and bench with an approved product. This also includes any manhole preparation work that is required to satisfactory rehabilitate the structure.

2. No direct payment will be made for internal chimney seals. The cost to furnish and install an internal chimney seal to effectively eliminate infiltration to the chimney portion of the manhole structure shall be included in the price bid for the associated casting adjustment or new casting bid item. The material used to line the structure shall stop at the base of the frame. Lining material shall not be coated over the cast-iron frame itself.

3. Payment for Joint Sealing Sanitary Manhole shall be paid for per EACH and shall include the cost to seal infiltration from joints between different wall sections of the structure with an approved grout product. The amount bid shall include all costs for labor, materials, and equipment needed prepare the structure for and to complete the installation.

2.3 SPECIFICATION REFERENCE

A. CEAM Specifications No. 2015.5.a, 2015.5.b, 2015.5.c, 2015.5.d, 2621.3A5, and 2621.3B2 shall apply to manhole and catch basin rehabilitation, except as modified herein.

B. MnDOT Specifications No. 2211, 2331, 2341, 2451.3D, and 2531 shall apply to manhole and catch basin rehabilitation, except as modified herein.

C. ASTM C-94 shall apply to manhole and catch basin rehabilitation, except as modified herein.

D. MnDOT Standard Plates

E. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

F. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 3 -- PRODUCT

3.1 APPROVED PRODUCTS:

A. Patching Mix:

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1. A quick setting cementitious material will be used as a patching mix and is to be mixed and applied according to the manufacturer's recommendations and will have the following minimum requirements:

   (a) Compressive Strength: 1400 psi @ 6 hours

   (b) Shrinkage: 0% at 90% R.H.

   (c) Bond: 28 days, 150 psi

   (d) Cement Sulfate Resistant

   (e) Density, when applied: 105-110 pcf

B. Infiltration Control Mix and Grouts:

1. The rapid setting cementitious product specifically formulated for leak control will be used to stop minor infiltration and will be mixed and applied according to the manufacturer's recommendations and will have the following minimum requirements:

   (a) Compressive Strength: 600 psi @ 1 hr., 1000 psi @ 24 hrs.

   (b) Bond: 30 psi @ 1hr., 80 psi @ 24 hrs.

2. A cementitious grout will be used for stopping very active infiltration and filling voids and will be mixed and applied according to the manufacturer's recommendations. The cementitious grout will be volume stable and have a minimum 28-day compressive strength of 250 psi and a 1-day strength of 50 psi.

3. Chemical grouts may be used for stopping very active infiltration and will be mixed and applied per the manufacturer's recommendations.

C. The required CEMENTITOUS MANHOLE REHABILITATION Product shall be DuraSeal PM or DuraSeal CA, Mainstay ML-72 or ML-CA, Raven 755 or 705CA, Sherwin Williams Calcium Aluminate or Microsilica Mortar, Tnemic Calcium Aluminate or Microsilica Mortar, Quadex GeoKrete, Strong High Performance Mix or Strong MS-2C, or Engineer approved equal meeting or exceeding the strength specs below.

1. The cementitious repair mortar product must meet or exceed the following properties:

   (a) Minimum Compressive Strength @ 28 Days: 8,000 psi

   (b) Minimum Split Tensile Strength @ 28 Days: 800 psi

   (c) Minimum Flexural Strength @ 28 Days: 1,500 psi

   (d) Shrinkage @ 28 Days: 0.02% max

   (e) Minimum Bond @ 28 Days: 2,000 psi

   (f) Freeze/Thaw: No visible damage after 300 cycles

D. The required internal chimney seal Product shall be Flex-Seal manufactured by Sealing Systems Inc, DuraFlex, or Engineer approved equal.

1. The Internal Chimney Seal must have or exceed the following properties:

   (a) Minimum applied thickness 150 mils thick.

   (b) Minimum elongation of 800%.

   (c) Minimum hardness (durometer) of 75.

   (d) Minimum Tensile-Strength of 1,150 psi.

   (e) Minimum Adhesion Strength of 175 lb. l/in.

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PART 4 -- EXECUTION

4.1 CONSTRUCTION REQUIREMENTS

A. General

1. The Contractor, approved and trained by the manufacturer shall furnish all labor, equipment and materials for supplying a manhole rehabilitation mix with machinery specially designed for the application.

   The following work requirements shall be considered incidental to the project. There will be no additional compensation for manhole cleaning and preparation tasks required prior to the application of the rehabilitation products.

   All aspects of the installation shall be in accordance with the manufacturer's recommendations and with the following specifications which include:

   (a) The elimination of active infiltration prior to making the application.

   (b) The removal of any loose and unsound material and cleaning of the interior of the manhole with high pressure water. Wire brushing and/or sand blasting may be required to remove build up on the structure wall prior to application of the new rehabilitation products**.**

   (c) Patching of manhole walls or sewer structures if needed, shall be required in areas where large voids exist, such as mortar missing between bricks, around step frames, pipes and spalled concrete. All loose or cracked and corroded material shall be removed from the area to be patched, exposing a sound substrate. Patching material shall be allowed to cure before applying waterproof coating.

   (d) The repair and sealing of the pipe invert, channel, and benches.

   (e) The application of a cementitious and epoxy mix to restore a structural/structurally enhanced manhole.

2. **The minimum applied thickness of the cementitious rehab product shall be no less than 1-inch in all areas.**

3. Internal Chimney Seal product shall be applied AFTER any cementitious rehab product is applied to the manhole structure.

B. Temporary Service Measures

1. It will be necessary to maintain service during the construction period. Before proceeding with the project, the Contractor shall establish a work plan and submit the plan to the City Staff and Engineer for review and comment. The plan shall outline the method to be used to maintain service to the affected consumers. Failure to maintain sewer service could result in direct damage claims as well as consequential damage claims against the Contractor. The Contractor is the sole party responsible to notify the City and consumers who may be affected by the interruption of service.

2. If needed, the Contractor shall furnish, install and maintain equipment to bypass and control the sewage flow around the construction zone. Failure to operate and maintain the bypass equipment could result indirect damage claims as well as consequential damage claims to the Contractor. Flow through bypass plugs may be utilized to help remove sewage from the invert portion of that manhole to be coated if flows allow. Any damages caused by the temporary conveyance process are the responsibility of the contractor.

3. Any temporary service measures needed shall be considered incidental to the project.

C. Preparation work

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1. If flow is maintained through the manhole during the cleaning work, place covers over the invert to prevent extraneous material from entering the sewer. If excessive quantities of debris enter the sewer, it shall be the responsibility of the Contractor to clean the sewer at its own expense.
2. All foreign material shall be removed from the manhole wall and bench using a high-pressure water spray or sand blasting. Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer and chisel and/or scraper. Fill any large voids with quick setting patching mix. The surface to be repaired must be clean and free of any loose materials with walls totally saturated with water.
3. PH testing of the structure must be provided in the presence of the Engineer and approved to meet the manufactures product installation requirements prior to the installation of any repair material.

D. Construction Work

1. Infiltration Repair and Grouting

(a) Infiltration sealing shall be performed during high ground water conditions to ensure that all leakage is identified, if possible. Some leaks may require weep holes to localize the infiltration during the application after which the weep holes shall be plugged with the quick setting infiltration control mix prior to the final surface application

(b) Minor leaks shall be stopped using quick setting specially formulated infiltration control mixes and shall be mixed and applied per manufacturer's recommendations.

(c) If chemical grouting is to be used, holes shall be carefully drilled from within the structure and shall extend completely through the wall. The grout shall be pumped through the manhole wall until no more movement of grout is evident in either the drilled holes or the locations of leaks. The process shall be repeated until the structure is completely sealed. All manufacturer's recommendations shall be followed including pot life of the grout and insertion pressure.

2. Quality Control Testing

(a) Prior to the acceptance of the epoxy coating, the Engineer may require the Contractor to perform a spark/holiday test to ensure that the coating is free of pinholes and that the structure is properly coated to prevent it from pre-mature degradation.

(b) Failure of any test may require the contractor to make the repairs needed to bring the rehabilitation into compliance with this specification. Any corrective work will be the responsibility of the contractor and there will be no additional payment for such work.

4.2 WARRANTY

A. All manhole rehabilitation work shall be fully guaranteed by the Contractor for a period of 2 years from the date of Final Acceptance unless otherwise stipulated in writing by the Owner prior to the date of Conditional Acceptance. During this period, all serious defects discovered by the Owner or Engineer shall be removed and replaced by the Contractor in a satisfactory manner at no cost to the Owner. In addition, the Owner may conduct independent televised inspections, at its own expense, of the lining work at any time prior to the completion of the guarantee period.

******END OF SECTION******

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SECTION 33 01 30.86 - MANHOLE RIM ADJUSTMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to adjusting a casting assembly frame and ring or valve box as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Measurement and payment for adjusting existing manhole frame and rings, catch basin frame and rings, and valve boxes shall be paid per EACH scheduled adjustment, not caused by the Contractor's activities or delays.

2. The initial installation and adjustment of the casting assembly for new manholes and valve boxes, whether to match the bituminous wear course shall be incidental to the installation of the item.

3. Raise/Lower Existing Manhole

(a) Payment for raising or lowering an existing manhole shall be measured and paid based on the lineal foot vertical difference of actual precast concrete structure height reconstructed (either removed or added to the existing structure), as indicated in the plan drawings. The payment shall include all cost of labor, materials and equipment required to complete the work under the RECONSTRUCT DRAINAGE STRUCTURE (SANITARY) bid item.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated adjustment items. Such items of work include but are not limited to:

1. Saw cutting the wall of the existing structure, if necessary.

2. Bituminous base patches shall be constructed adjacent to casting adjustments and casting replacements in mill & overlay areas. This work shall be considered incidental to the associated casting work bid item, for which no direct payment will be made. The requirements of Section 32 12 01 (Flexible Pavement Patching), included in these specifications, shall still apply to the patching work.

3. The furnishing and installation of new internal chimney seals with all adjusted sanitary and storm casting assemblies, as detailed in section 33 01 30.81 - MANHOLE REHABILITATION of these specifications.

4. The furnishing and installation of new external chimney seals with all adjusted sanitary casting assemblies.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2506 shall apply to adjusting frame and ring, except as modified herein.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 ADJUSTING RINGS

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A. Concrete adjusting rings must be used for all sanitary and storm structures.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The Contractor shall bring manhole castings and valve boxes to grade. The manhole casting shall be placed on a full mortar bed or bituminous mastic upon final setting. The inside and outside of the adjusted area shall be plastered with a minimum thickness of 1/2-mortar.

B. All inverts of manholes and valves boxes shall be cleaned of debris and gravel which may have fallen into the structures as a result of construction.

C. Finished grade of the casting or valve box in paved areas shall be according to the following, unless otherwise specified on the plans:

	Distance Below Adjacent Concrete Pavement (in)	Distance Below Adjacent Bituminous Pavement (in)	Distance Below Adjacent Gravel Surface/Green Area (in)
City Streets	1/8 to ¼	¼ to 3/8	1
County Highways	1/8 to ¼	¼ to 3/8	1
State Highways	1/8 to ¼	¼ to 3/8	1
Sidewalks	1/8 to ¼	1/8 to ¼	1
Parking Areas	1/8 to ¼	¼ to 3/8	1

D. In no case shall the casting or valve box extend above the finished surface.

E. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require the:

1. Removal of the manhole cone section or concrete slab top
2. Addition, removal or exchange of barrel sections
3. Replacement of the cone section or the flat slab top
4. Installation of the proper number of adjusting rings.
5. Replacement of the manhole frame and casting.
6. In some cases, the existing structure may require saw cutting.

******END OF SECTION******

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SECTION 33 05 06 - TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the maintenance of utility service, trench excavation, bedding, and backfill necessary for the construction of underground utilities and structures, as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

A. Excess Material - Material that is not needed to complete the earthwork balance.

B. Suitable Material - Sand, silty sand, or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.

C. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

D. Flexible Pipe Materials – For this specification section, flexible pipe materials will include the following:

1. Polyvinyl chloride (PVC) pipe – solid wall and profile wall pipe.
2. Polypropylene profile wall pipe.
3. High-density polyethylene pipe – solid wall and profile wall pipe.
4. Corrugated steel or aluminum pipe.
5. Centrifugally cast glass-fiber-reinforced, polymer mortar (CCFRPM) pipe.

E. Rigid Pipe Materials – For this specification section, rigid pipe materials will include the following:

1. Reinforced concrete pipe.
2. Reinforced concrete box culverts.
3. Ductile iron pipe.

1.3 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Items specifically identified in the Schedule of Unit Prices will be compensated following the description of measurement and payment contained in the section applicable to the individual item. No direct compensation will be granted for compliance with the provisions contained herein.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the individual pipeline items associated with the stated specific item or work effort. Such items of work include but are not limited to:

1. Interference with other above and underground structures and utilities.
2. The removal and restoration, or protection of existing structures and utilities that are shown on the plans and for which there is no bid item for removing and restoring or working around the utility.
3. Unless separately itemized in the Schedule of Unit Prices, any dewatering is necessary for construction.
4. Foundation materials placed instead of performing necessary dewatering.

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5. Bulkheading of existing pipes to be abandoned in place.
6. Granular foundation, granular bedding, and granular encasement materials.
7. Granular foundation materials used instead of bedding materials in the specified bedding zone, where specified.
8. Granular foundation materials used in unstable trench conditions.
9. The removal and disposal of native materials that are unsuitable for bedding and/or backfill.
10. Providing and maintaining utility service.
11. The replacement of all material displaced due to shrinkage or loss during the excavation and backfilling operations.
12. The removal of excess materials above the original topography resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures.
13. Delays due to other utility conflicts that result during construction.
14. Protecting existing improvements and previously accepted elements of this construction from damage.
15. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages that threaten to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil that accumulated during the construction.
16. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping/control of stormwater flows around the construction zone, will be included in the price bid for the associated items being installed.
17. The use of special construction techniques such as trench boxes, sheeting, shoring, etc., will be included in the price bid for the associated items being installed.
18. Compaction testing and compaction, if required, will be included in the price bid for the associated items being installed.
19. The removal of bituminous pavement prior to reclamation or milling operations to facilitate utility work shall be considered incidental to the associated utility bid item.

1.4 SPECIFICATION REFERENCES

A. CEAM 2600 will apply, except as modified herein.

B. MnDOT 2451 will apply, except as modified herein.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

A. Gradation Test Results for any granular borrow materials.

B. Two separate tests, as required in Source Quality Control provisions of individual sections contained herein, from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.

PART 2 - PRODUCTS

2.1 GRANULAR MATERIALS

A. Granular Bedding and Granular Encasement – No exception to the referenced specification is made.

B. Granular Backfill - No exception to the referenced specification is made.

PART 3 - EXECUTION

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3.1 EXCAVATION AND PREPARATION OF TRENCH

A. Interference and Protection of Underground Structures

1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.

2. The inverts of existing sewers (storm & sanitary), culverts, subdrains, etc. will be protected during construction. The Contractor is responsible to inspect and clean, if necessary, all lines which have become compromised by the construction operations.

B. Excavation Limits and Requirements

1. The trench for all flexible pipe will be undercut 6.0-inches below the pipe barrel to permit the installation of granular bedding or foundation material.

2. The trench for all rigid pipe will be undercut 3.0-inches below the pipe barrel, or as shown in the bedding detail, to permit the installation of granular bedding or foundation material.

3. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall make their subsurface investigations and determine what dewatering methods to utilize to prevent such damage.

4. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations.

5. Use of granular foundation material in place of performing dewatering is permitted.

6. All excess excavated material will become the property of the Contractor and will be removed from the site and disposed of at a location secured by the Contractor.

3.2 INSTALLATION OF PIPE AND FITTINGS

A. The Contractor shall keep accurate records as to the location of the service connections, field tile, utility crossings, etc. either constructed or encountered during the construction Measurements to service lines will be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings). Final payment for the project will not be made until the information is in the possession of the Owner.

B. When connection to an existing conduit is required at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing conduit before laying any pipe toward, or away from, the connection point. If the elevation of the existing conduit does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.

C. Sewer Pipe at Structures

1. The pipe end(s) will be extended inside the structure a maximum of 3.0-inches unless approved otherwise by the Engineer or shown on the plans.

D. Connection and Assembly of Joints

1. For sanitary sewer, watermain, forcemains, and culverts, all joints will be water-tight.

2. For storm sewers and subdrains, all joints will not permit the intrusion of soil or backfill materials.

(a) If a reinforced concrete pipe is used, the Contractor may at its discretion choose to wrap each joint with a geotextile filter fabric, as specified, rather than place mastic in the joint.

E. Bulkheading Open Pipe Ends

1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream sewer system. The plug will be placed at the beginning of the project or the end of each working day at the end of the day's operation.

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2. When flows are diverted from an existing sewer or tile to be abandoned in place, the Contractor will construct a water-tight plug on the open end of the abandoned pipe.

3. Permanent watertight plugs will be constructed with concrete grout with a thickness of not less than 1 pipe diameter.

3.3 BEDDING AND BACKFILLING OPERATIONS

A. Backfill material around all manholes, catch basins, valve boxes, curb boxes, and hydrants will be compacted with hand machines. The maximum lift thickness will be 6.0-inches.

B. Flexible Pipe Materials

1. Unless otherwise shown on the plans, the pipe will be bedded and backfilled with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser, from 6.0-inches below the bottom of the pipe to 12.0-inches above the top of the pipe the full width of the trench. The Contractor shall bed and backfill the pipe as shown on the plan details.

2. Where the trench foundation is unstable and not suitable for bedding, the trench will be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.

3. Unless otherwise shown on the plans, select native material will be used as a trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12.0-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard Proctor Density will be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.

C. Rigid Pipe Materials

1. Unless otherwise shown on the plans, in ordinary or stable trench conditions, the bottom of the trench will be first excavated to a depth of approximately 15 percent of the outside pipe diameter below the established grade for the bottom of the pipe. Then the bottom of the trench will be further excavated to allow for the placement of 6.0-inches of granular bedding for a width of at least 60 percent of the outside diameter of the pipe. A pipe will be placed on the bottom of the pre-shaped excavated trench. The bottom of the excavated trench will be shaped to fit the circumference of the pipe up to 0.15 of the outside diameter of the pipe. The Contractor shall encase the pipe from the 0.15 outside diameter to the 0.60 diameter height of the pipe with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.

2. Where the trench foundation is unstable and not suitable for bedding, the trench will be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.

3. Unless otherwise shown on the plans, select native material may be used as trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12.0-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard proctor Density will be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.

D. Structures

1. All manholes, catch basins, valve boxes, water vaults, headwalls, and miscellaneous structures will be backfilled with granular backfill material and will be compacted with a hand-operated motorized compactor.

E. All trench backfill will be compacted in accordance with the Specified Density Method:

1. Under areas with proposed paved or structural improvements:

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(a) 100 percent Standard Proctor from the proposed pavement subgrade elevation down 3.0-feet.

(b) 95 percent Standard Proctor from the bottom of excavation up to 3.0-feet below the subgrade elevation

2. Under areas with no proposed paved or structural improvements:

(a) 95 percent Standard Proctor

3.4 SOURCE QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

(a) One gradation test per every 500 tons or 275 cu yd (CV) of granular material.

3.5 FIELD QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

1. One compaction test (including Standard Proctor) on backfill per 300 lineal feet of trench per 3.0-feet of depth

B. The Contractor shall cooperate fully with the individuals performing the tests.

C. Samples for testing will be taken from material in place, in the trench at locations approved by the Engineer. All sampling methods will be approved by the Engineer.

D. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

*****END OF SECTION*****

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SECTION 33 05 60 - LIFT STATION STRUCTURE & FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to lift station construction as indicated in the drawings or as specified herein. These specifications specifically apply to Alternates 1-4, as applicable.

B. At the time of the startup of the lift station, the Contractor shall supply clean water if required to test pumps, controls, and all other equipment.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Wet Well

(a) Measurement and payment for all materials, equipment, supplies, and labor required to construct a fully operational lift station, complete, shall be at the lump sum bid price of the lift station. The amount bid includes all labor and material required to complete the structure and operating equipment, as shown in the project plan sheets and specified, including all piping, internal fixtures, electrical equipment, and wiring.

(b) Other specification sections apply to the storm lift station but the price for those items shall also be included in the price bid for the identified Lump Sum Alternate(s).

B. The furnishing and installation of specific items and/or the performance of work under certain circumstances shall not be individually paid. The costs shall be included in the price bid for the lift station, as indicated. Such items of work include but are not limited to:

1. Interference with other underground structures and utilities: Include in the price bid for the lift station.

(a) The removal and restoration, or protection of existing utilities which are shown on the plans and for which there is no bid item for removing and restoring or working around the utility.

2. Lift Station Site Preparation

(a) The unit price bid shall include all labor and materials to prepare the lift station site, including but not limited to topsoil stripping, driveway and embankment construction, grading, and compaction.

3. Unless separately itemized in the Schedule of Unit Prices, any dewatering necessary for lift station construction is to be included in the price bid for the lift station, including Temporary Steel Sheet Piling.

4. Foundation materials placed in lieu of performing necessary dewatering, include in the price bid for the lift station.

5. Locating and connecting to an existing sanitary sewer is to be included in the price bid for the lift station.

6. Maintenance of service: Include in the price bid for the lift station.

7. Establishing the foundation for the structure or placing rock to stabilize the subgrade, include in the price bid for the lift station.

8. The replacement of all material displaced due to shrinkage or loss during the excavation and backfilling operations: Include in the price bid for the lift station.

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9. Delays due to other utility conflicts which result during construction are to be included in the price bid for the lift station.

10. Protecting existing improvements from damage: Include in the price bid for the lift station.

11. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages that threatens to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil which accumulated during the construction, is to be included in the price bid for the lift station.

12. As specified elsewhere in these Specifications, all equipment, labor, materials, supplies, fees, and permits to construct a full and operable system are to be included in the price bid for the lift station.

1.3 SPECIFICATION REFERENCES

A. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Shop drawings of the wet well construction shall be submitted prior to their fabrication. The submittal shall indicate the pipe penetration locations in the wet well, and the access hatch location on the top slab. At least one separate submittal shall include all fixtures internal to the lift station as specified in this specification and as shown on the project drawings. This includes equipment associated with the pump, the piping associated with the station, the hatch to be cast into the lid, the vent pipe, and any other appurtenances.

1. The Contractor shall field verify the elevation of the existing forcemain prior to ordering the wet well structure to ensure proper fabrication for connection.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall conform to the requirements of ANSI A21.51 (AWWA C151) standard specification for centrifugally cast ductile iron pipe for water or other liquids.

2. Ductile iron pipe in exterior locations shall be provided with flanged or mechanical joint type ends as shown on the plans, and all interior ductile iron piping shall be ANSI/AWWA thickness Class 53 (minimum).

3. Ductile iron flanges shall conform to ANSI/AWWA C115 standard 125# template and shall be rated for 250 psi. Mechanical joints and push-on joints shall conform to the ANSI/AWWA C111 standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.

4. Unless otherwise shown on the plans, ANSI/AWWA short-body ductile iron fittings shall be furnished. Short body fittings shall conform to ANSI/AWWA C110. Flanged long radius elbows, reducing on-the-run tees, side outlet fittings eccentric reducers, and laterals shall conform to ANSI B16.1 standard specification for flanged fittings and flanges. All fittings shall be ductile iron. Compact fittings conforming to ANSI/AWWA C153/A21.53 may be supplied for mechanical and push-on joints.

5. Ductile iron pipe and fittings shall be furnished with standard bituminous interior coating. Pipe used for interior and exposed locations shall not have a bituminous exterior coating, but shall be furnished with a shop primed coating of Tnemec Primer, or equal, to facilitate painting as specified.

2.2 BOLTS AND ANCHOR BOLTS

A. All nuts and bolts on the piping inside the wet well shall be 304 stainless steel. All below-grade fittings and valves shall be secured with Cor-Blue T-Bolts as manufactured by NSS Industries or equal.

2.3 RESTRAINED COUPLING ADAPTERS

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A. A restrained coupling adapter shall be used where indicated to connect ductile iron lift station piping with the plastic forcemain pipe. Restrained coupling adapter shall be Romac Alpha Coupling. Contractor to follow all manufacturer instructions for installation.

2.4 INTERNAL WET WELL COMPONENTS

A. The existing Flygt BS2840-MT submersible pump on the site is to be salvaged and reused in the new lift station wet well structure. The Contractor shall follow all manufacturer recommendations for installation of the pump in its new configuration. For the interior of the new wet well and connection of the pump to the discharge piping as shown in the plans, the Contractor shall procure the following lift of equipment from Electric Pump (New Prague, MN):

1. 304 stainless steel cable holder with six (6) hooks (for hanging of control cables)
2. 3/8” 304 stainless steel J-hook (for hanging of pump)
3. 20’ 316 stainless steel lifting chain with bow shackle
4. Aluminum straight connector, 4” NPT
5. Aluminum pipe nipple, 4” NPT
6. Aluminum reducing flange: 6” ANSI flange x 4” NPT
7. Aluminum cam-and-groove straight plug, 6” flanged
8. Aluminum cam-and-groove socket with levers, 6” flanged
9. 6” spiral hose with socket and plug, cam-and-groove ends, of appropriate length to connect pump discharge to effluent pipe with appropriate slack and pump hung at elevation shown in the plans
10. 6” nut, bolt, and gasket kit
11. 6” MEGAFLANGE

2.5 WET WELL

A. Precast Concrete Structure

1. The pump station structure shall be constructed of Class I precast reinforced concrete with R4 joints and inside diameter, as shown on the plans. The structure base shall be integrally cast with the bottom barrel section. The base, as shown on the plans, shall be fabricated to accommodate the loading condition. The pump station structure shall be constructed as shown in the detailed drawings and in accordance with the approved shop drawings. The concrete mix shall be entrained with air content of not less than 4 percent and not more than 7 percent, Grade A concrete with a cement-water ratio of 0.50, and a minimum compressive strength of 4,000 psi at 28 days. Cement shall meet ASTM C595 Type 1L-MS requirements. Testing for compliance shall be by ASTM Method C452The precast structure shall have attained the specified design strength when delivered to the project site.
2. The top slab of the structures shall be Type 1L-MS cement precast reinforced concrete having the dimensions shown on the detailed drawings. Frames for access hatches and vent pipes shall be cast in the slab when fabricated. Cut-outs to accommodate all piping entering the wet well shall be pre-formed or pre-cut and provided with a seal or water stop to ensure a watertight connection between the pipe and the wet well. The type of seal proposed shall be submitted to the Project Engineer for approval before the installation of the wet well is undertaken.
3. Joints between barrel riser sections and the top slab shall be sealed with two strips of flexible bitumastic preformed joint compound.
4. The interior of the wet well shall be painted as specified below.
5. Aluminum or steel-reinforced plastic manhole steps similar to Neenah R-1981-J shall be provided in the lift station.

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2.6 ACCESS HATCHES

A. Pump manufacturer to verify hatch size and location in top slab for clearance of pumps positioned as shown in the drawings. Minimum clearance of 3-inches required. Access hatch in the wet well shall be provided with safety gratings.

B. Door leaves a minimum 1/4-inch aluminum, diamond pattern, to withstand a live load of 300 pounds per square foot.

C. Channel frame of minimum 3-inch welded aluminum with anchor flange around the perimeter. The channel frame shall be embedded in the concrete with a minimum 6-inch cover. The overall dimension of the access hatch frame shall not exceed 3 ¾ inches beyond the clear opening on all four sides. Access hatches using angle frames will not be accepted.

D. Each door leaf is equipped with heavy-duty recessed hinges, totally enclosed spring or torsion bar operators as necessary for easy operation, a drop handle, and an automatic hold-open arm with a release handle. Locate the hold-open arm release handle such that it can be easily operated without endangering personnel.

E. Maximum hatch opening force is not to exceed 15 pounds when applied perpendicularly to the hatch edge through any part of the hatch-operating arc.

F. Each door leaf is secured with a snap-lock with a removable handle, and a padlock hasp welded to each leaf and frame.

G. Aluminum surfaces mill finished. Apply bituminous paint to the exterior of the frame in contact with concrete.

H. Mechanical Fasteners and Hardware: Series 304 stainless steel.

I. Approved Manufacturers: Halliday, Bilco, EJ, or equal.

2.7 SAFETY GRATING

A. The protective safety grating panel shall be supplied as part of each hatch and shall be 1-1/2 in. “I” bar aluminum grating with Safety Orange powder-coated finish. Grating shall be hinged and shall be supplied with a positive latch to maintain the unit in an upright position. Grating shall have a 6-in. viewing area on each lateral unhinged side for visual observation and limited maintenance. Grating support ledges on 300 lbs. psf loaded access covers only shall incorporate nut rail with a minimum of four (4) stainless steel spring nuts. A padlock hasp for an owner-supplied padlock shall be provided.

B. Approved Manufacturers: Halliday, Bilco EJ, or equal.

2.8 SAND BACKFILL AND ENGINEERED FILL

A. Water from areas to receive sand backfill shall be removed before commencing work, and areas shall be kept free of water during filling and compaction. All topsoil and organic materials in any area to receive Engineered Fill shall be removed to a minimum depth of 12 inches.

B. Where concrete floor slabs are to be supported on Engineered Fill, the entire surface of the fill area shall be smoothed, leveled, and compacted using heavy vibratory equipment until there is no loss of elevation. The sand fill material shall be placed in 6” deep lifts and compacted to at least 100% of the maximum density given by ASTM D698 (Standard Proctor Density). The fill shall extend beyond the edges of the footings, one foot for each foot of fill placed below the footings. The compacted lift shall be relatively smooth and level.

C. Frozen material or material containing ice or snow shall not be used for fill. Sand fill shall not be placed on soil that is frozen or covered with ice or snow. Necessary precautions shall be taken during freezing weather to prevent freezing of the sand fill during placing and compaction.

D. All debris shall be removed from the excavated areas before backfilling.

E. Excavations shall be promptly backfilled as work permits.

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F. The excavated area outside of the lift station structure shall be filled with sand fill. Unless otherwise noted, the fill area shall be defined by a line 30°vertical plane, starting at a point at the base of the foundation. Sand fill shall be placed in 6-inch deep lifts, and each lift shall be compacted by approved methods to not less than 95% of the maximum density given by ASTM D698 (Standard Proctor Density). Compacted lifts shall be relatively smooth and level.

G. The sand fill to be used for backfilling shall be an SW clean well-graded sand (Unified Soil Classification System), free of organic impurities. The well-graded sand shall have less than 40% passing the No. 40 sieve and less than 10% passing the #200 sieve with the maximum aggregate size of 1 1/2".

H. The Contractor shall furnish tests for all fill material prior to use from an independent testing laboratory. The testing laboratory reports shall be reviewed and approved before the material is placed. The tests are to include optimum density ASTM D698-70 and gradation.

2.9 PAINTING

1. All ductile or welded iron pipe associated with the lift station shall come with a factory prime coating. The vent pipe cast into the lid of the station shall be finished with an epoxy coating system, with final color to be selected by the OWNER.

2.10 SIGNAGE

A. Provide a caution sign at the top of the entrance to wetwell.

B. Sign shall be red and black on a white background and shall have a minimum size of 10" x 14", and shall read:

1. "Danger"
2. "Confined Space"
3. "Enter BY Permit Only"

C. Letter shall be a minimum of one inch.

D. Caution sign shall be Lab Safety reference #179829, or equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Temporary Service

1. If needed, the Contractor shall furnish, install and maintain equipment to bypass and control the storm and/or sanitary sewer flow around the construction zone. Failure to operate and maintain the bypass equipment could result in direct damage claims as well as consequential damage claims to the Contractor.

B. Internal and External Pipe Restraint

1. Piping shall be secured against movement with fixed supports or approved joint restraints.
2. If the structures are located on disturbed soils or where differential subsidence is a potential, provision to allow for differential settlement shall be made at the time of construction. The Contractor shall notify the Engineer of the methods to be employed before construction.

3.2 EXCAVATION

A. Interference of Underground Structures

1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor is required to remove and restore, or protect the utility.

B. Excavation Limits and Requirements

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1. The Contractor shall dewater the excavations as necessary to construct the station. Excavation may require shoring and sheeting to maintain stable slopes or facilitate dewatering.
2. The Contractor shall excavate to the limits required by safety, and adequately install the lift station structures. Oversize excavation one foot horizontally beyond the footing slab for each foot vertically that the excavation is below the footing. The area shall be protected from surface runoff. Pumps and related appurtenances shall be readily available to remove excess water.
3. Existing inverts shall be protected during construction. If debris enters the sewer, it shall be the responsibility of the Contractor to clean the sewer.

C. Preparation and Maintenance of Foundation.

1. The Contractor shall undercut the foundation one foot, smooth and compact the existing subgrade. Any areas below the base of the structure shall be backfilled with ¾-inch crushed rock.
2. If the subgrade material becomes soft or unstable during the Contractor's operations, undesirable material shall be excavated and refilled with 3/4-inch crushed rock.

3.3 BACKFILL

A. Placement of backfill adjacent to the structure shall be delayed until any field-constructed concrete has attained its design compressive strength. Any backfill placement prior to attaining this strength shall be considered the responsibility of the Contractor, who shall be liable for any resultant damage to the structure.

B. Water from areas to receive granular backfill shall be removed before commencing work, and areas shall be kept free of water during filling and compaction.

C. Where concrete floor slabs or structures are to be supported on Engineered Fill or granular fill, the entire surface of the fill area shall be smoothed, leveled, and compacted using heavy vibratory equipment until there is no loss of elevation. The sand fill material shall be placed in 6” deep lifts and compacted to at least 100% of the maximum density given by ASTM D698 (Standard Proctor Density). The fill shall extend beyond the edges of the structure, one foot for each foot of fill placed below the structure. The compacted lift shall be relatively smooth and level.

D. Frozen material or material containing ice or snow shall not be used for fill. Sand fill shall not be placed on soil that is frozen or covered with ice or snow. Necessary precautions shall be taken during freezing weather to prevent freezing of the sand fill during placing and compaction.

E. All debris shall be removed from the excavated areas before backfilling.

F. Excavations shall be promptly backfilled as work permits.

G. The excavated area outside of the lift station structure shall be filled with granular fill. Unless otherwise noted, the fill area shall be defined by a line 30° from the vertical plane, starting at a point at the base of the foundation. Granular fill shall be placed in 6-inch deep lifts, and each lift shall be compacted by approved methods to not less than 100 percent of Standard Proctor Density beneath structures; 98% of Standard Proctor Density beneath roadways, walks, or paved areas; and 95 percent of Standard Proctor Density around the sides of structures. Compacted lifts shall be relatively smooth and level.

H. The granular fill to be used for backfilling shall be an SW clean well-graded sand (Unified Soil Classification System), free of organic impurities. The well-graded sand shall have less than 40% passing the No. 40 sieve and less than 10% passing the #200 sieve with the maximum aggregate size of 1-1/2”.

I. The Contractor shall furnish gradation tests at their expense for all fill material prior to use from an independent testing laboratory. The testing laboratory reports shall be reviewed and approved before the material is placed. Should the material being placed be different than previously tested, the Contractor shall furnish additional gradation tests.

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J. Sand backfill around lift station structure shall be capped with a one-foot minimum layer of clay and sloped away from the structure to provide good drainage.

K. If the Contractor is in doubt as to the bearing capacity of the soil at the bottom of the lift station structure or other work, he shall notify the Engineer before proceeding with his work. By failing to do this, he shall be responsible for any damage to the structure due to settlement.

3.4 PLUMBNESS AND ALIGNMENT OF WET WELL

A. Wet well shall be plumb with a deviation not exceeding 0.5% from vertical. Alignment shall be measured and recorded before backfilling is completed.

3.5 PUMP STATION COMPONENTS

A. General: Install pump station components in accordance with the manufacturer's recommendations and these specifications.

B. Electrical Cords: Cords shall be continuous with no splices made in wiring and are to run from the pump and level controls to the control panel.

C. Float Cords: Attach weight to the cord above the float to hold the switch in place in the sump and efficiently prevent sharp bends in the cord when the float operates.

D. Electrical Service Entrance:

1. See electrical specification sections for details associated with the lift station electrical service. Proposed replacement of the existing service is included as a bid alternate.

2. Electrical work shall be completed in accordance with NEC and any applicable local ordinances.

3. Grounding of electrical and telephone service for lift station shall be in accordance with Article 250 of NEC.

****** END OF SECTION ******

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SECTION 33 05 97.36 - UNDERGROUND UTILITY LOCATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to providing a system for the location of underground utilities as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Payment for all work associated with the construction of the underground utility location system will be incidental to the unit price bid for the utility associated with the system and no separate compensation will be granted, unless bid items are specifically identified in the bid form.

1.3 SPECIFICATION REFERENCES

A. MRWA Tracer Wire Specification Guide & Details for Underground Utility Location System located in Appendix A of this Project Manual.

1. Minnesota Trace Wire Specification https://www.mrwa.com

B. Arden Hills Sewer/Water Utility – Tracer Wire Specification included in Appendix C.

1. In the event of conflicting information, this referenced specification shall govern.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Submit the following items consistent with Section 01 33 00 “Submittal Procedures” of this Project Manual.

1. Complete catalog information, descriptive literature, specification, and identification of materials of construction.

2. Submit Operations and Maintenance Manual for Locate Equipment provided to the City under their Contract.

PART 2 - PRODUCTS

2.1 **MATERIALS**

A. Materials used to construct the underground utility location system shall be in accordance with the City or Arden Hills and MRWA Tracer Wire Specification Guide & Details for Underground Utility Location System located in Appendix C of this Project Manual.

PART 3 - EXECUTION

3.1 TRACE WIRE SYSTEM INSTALLATION

A. General:

1. Trace wire will be installed with all watermains, water leads, hydrant leads, and water services in accordance with the details shown on the plans, and as specified in the applicable specification section.

2. Trace wire installation will be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances over 1,000 linear feet, and without distortion of signal caused by multiple wires being installed close to one another.

3. Trace wire will be installed at the bottom half of the pipe and secured (taped/tied) at 5.0-foot intervals. Trace wire will not be wrapped around the corresponding utility piping.

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4. The trace wire along the main will be installed continuously, without cutting or splicing the main wire at services and intersecting mains. The wire will not be looped or coiled or near one another. The completed trace wire system will be fully sealed, with no exposed wire or connections.

5. Wire damaged during installation must be repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating is not an acceptable repair method.

6. All service lateral or intersecting main trace wires will be a single wire, connected to the mainline wire using a main to lateral lug connector, installed without cutting or splicing the mainline wire.

B. Water System

1. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.

2. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.

3. Trace wire on all water service laterals must terminate at an approved trace wire access box color-coded blue and located directly above the service lateral at the edge of the road right of way.

4. Above-ground trace wire access boxes will be installed on all fire hydrants.

5. All conductive and non-conductive service lines will include trace wire.

3.2 TERMINATION/ACCESS

A. General:

1. All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.

2. A minimum of 2.0-feet of excess/slack wire is required in all trace wire access boxes after meeting final elevation.

3. The grounding anode wire will be connected to the identified (or bottom) terminal on all access boxes.

B. Trace Wire at Hydrants

1. At hydrants, a single strand of trace wire will be connected to the main wire and installed along the hydrant lead to the hydrant. The trace wire will be extended up the hydrant barrel to the ground surface and attached to one of the terminals on the trace wire access box.

2. A one-pound grounding anode rod will be installed at the base of each hydrant. Trace wire will be extended from the anode to the ground surface and attached to the second terminal on the trace wire access box. The shunt between the terminals will be installed in the closed position.

C. Trace Wire at Water Services

1. Public property - a single strand of trace wire will be connected to the main wire and installed along the service to the location of the curb stop. A one-pound grounding anode rod will be installed at the base of each curb stop. Both the blue trace wire and the black/red anode wire will be extended to the ground surface and attached to the trace wire access box.

D. Trace Wire at Connections to Existing Watermains and Dead Ends

1. Where a connection is made to an existing main with an existing trace wire, the trace wires will be connected. A grounding anode will be connected to the trace wires at the connection point.

2. Where connection is made to an existing main without trace wire, or where constructing a new dead-end stub, or where connecting to existing conductive pipe material, the trace wire will terminate at the

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end of the new main. Provide a grounding anode at the end of the trace wire. Do not connect trace wire to conductive mains.

E. Trace Wire along Forcemains

1. Provide an access box and grounding anode in the turf area, near the gate valve downstream of the valve vault.

2. Provide trace wire access boxes and grounding anodes at various locations along the forcemain, as noted in the plans.

3. Where the trace wire terminates at an existing sanitary sewer manhole, connect to a grounding anode. Do not extend wires to the surface.

3.3 GROUNDING

A. Trace wire must be properly grounded at all dead ends/stubs.

B. When grounding the trace wire at dead ends/stubs, the grounding anode will be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.

C. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire nor the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire will be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.

D. Where the anode wire will be connected to a trace wire access box, a minimum of 2.0-ft of excess/slack wire is required after meeting final elevation.

3.4 FIELD QUALITY CONTROL

A. The Contractor shall demonstrate the ability to locate the entire trace wire system using a hand-held locating device. Locating will be witnessed by the Owner and Engineer.

B. All new trace wire installations will be located using typical low frequency (512Hz) line tracing equipment, witnessed by the Contractor, Engineer, and facility owner as applicable, before acceptance of ownership.

C. This verification will be performed upon completion of rough grading and again before final acceptance of the project.

D. Continuity testing instead of actual line tracing will not be accepted.

******END OF SECTION******

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SECTION 33 14 00 - WATER UTILITY TRANSMISSION AND DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to watermain and service line construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Watermain

(a) Tracer wire system shall be installed, as specified, and considered incidental to the associated watermain pipe bid items, for which no direct payment will be made.

(b) No additional exception to the referenced specification is made.

2. Hydrants

(a) No exception to the referenced specification is made.

3. Valves and Valve Boxes

(a) No exception to the referenced specification is made.

4. Fittings

(a) Unless otherwise noted on the plans, watermain fittings will be measured by the pound without joint accessories. The standard weight of watermain fittings, for payment purposes, will be as follows:

Bends, Caps, Plugs & Sleeves							
	Fitting Weights, lbs. (AWWA C153)						
	Bends – MJ x MJ, (degrees)				Caps	Plugs	Sleeves[1]
Size	90	45	22.5	11.25	MJ x MJ	MJ x MJ	MJ x MJ
3	19	16	15	14	8	8	17
4	25	22	18	16	9	10	20
6	39	32	31	30	15	16	29
8	57	46	42	38	22	26	45
10	83	70	64	58	32	36	61
12	115	98	80	72	42	46	76
14	195	146	136	121	66	75	128
16	252	188	172	148	92	95	159
18	335	250	228	205	114	121	200
20	411	309	266	245	125	135	236
24	555	419	353	315	166	175	306
[1]Weights are based on the use of long sleeves.							

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Tees, Crosses & Reducers				
		Fitting Weights, lbs. (AWWA C153)		
Run Large	Branch Small	Tee MJ x MJ	Cross MJ x MJ	Reducers MJ x MJ
4	4	32	40	-
6	4	46	52	24
6	6	56	68	-
8	4	60	68	32
8	6	72	84	36
8	8	86	105	-
10	4	78	84	46
10	6	90	100	47
10	8	105	119	50
10	10	114	133	-
12	4	94	103	58
12	6	110	121	58
12	8	125	139	57
12	10	140	161	61
12	12	160	182	-
14	4	152	-	-
14	6	178	190	93
14	8	193	209	92
14	10	211	-	92
14	12	228	-	94
14	14	262	313	-
16	6	228	229	120
16	8	233	-	118
16	10	253	-	118
16	12	272	299	112
16	14	307	-	131
16	16	335	399	-
18	6	275	-	-
18	8	295	-	165
18	10	315	-	160
18	12	335	360	152
18	14	372	-	168
18	16	401	-	174
18	18	439	520	-
20	6	315	-	-
20	8	349	364	-
20	10	374	-	206
20	12	395	423	205
20	14	440	-	216
20	16	469	-	209
20	18	509	-	205
20	20	543	640	-
24	6	423	434	-
24	8	450	464	-
24	10	480	-	-

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Tees, Crosses & Reducers				
		Fitting Weights, lbs. (AWWA C153)		
Run Large	Branch Small	Tee MJ x MJ	Cross MJ x MJ	Reducers MJ x MJ
24	12	508	529	285
24	14	550	-	298
24	16	588	641	299
24	18	632	-	305
24	20	670	757	291
24	24	752	870	-

(b) The weight for fittings not listed in the tables above will be in accordance with AWWA C153. Discrepancies between the weights listed above and AWWA C153 shall be resolved using the weights listed in AWWA C153. The weight for fittings not listed in the tables above or in AWWA C153 will be the actual weight of the fitting(s) furnished and installed based on acceptable documentation provided by the Contractor.

5. Corporation Stops & Curb Stops

(a) Payment for each corporation stop shall also include locating the existing service lines, shortening the existing service lines to the new watermain location, and reconnecting the existing water service to the new corporation stop. All materials and labor required to reconnect the existing service pipe to the new corporation stop at the new watermain shall be considered incidental to the corporation stop bid item.

(b) No additional exception to the referenced specification is made.

6. Water Service Lines

(a) The quantities for water service line items shown in the proposal are approximate. Since the extent of service line work that will be required is unknown, the Owner reserves the right to increase or decrease the quantities by any amount with no adjustment in unit price.

(b) Tracer wire system shall be installed, as specified, and considered incidental to the associated water service bid items, for which no direct payment will be made.

7. Cut in Tee (Wet Tap)

(a) Payment for cutting in a new tee with valve in an existing watermain, under pressure, will be measured and paid per each of the size tee specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. Any “Connect to Existing Watermain” bid item will not be paid for wet taps.

8. Polystyrene Insulation (4-inch thickness)

(a) Polystyrene insulation will be measured by the square yard in place and will be paid at the unit price bid.

(b) Since the extent of insulation work that will be required is unknown, the Owner reserves the right to increase or decrease the quantities by any amount with no adjustment in unit price.

9. Adjustments to Existing Curb Stop Boxes

(a) Payment for adjusting existing curb boxes to grade will be measured and paid per EACH for all labor, equipment, and materials required to cut or extend the standpipe, weld new pipe, rethread existing pipe, rekey existing key rods, disassemble and reassemble any portion of the curb stop box necessary to bring the top of the box to grade, regardless of adjustment height.

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10. Curb Stop Box Replacements

    (a) Payment for removing and replacing existing curb stop boxes with a new curb stop box will be measured and paid per EACH for all labor, equipment, and materials required to remove the existing curb stop box, furnish a new curb stop box, and install the new curb stop box to grade, as specified.

11. Temporary Water Service

    (a) Payment shall be measured per LUMP SUM for the entire temporary service system required. The amount bid shall include all temporary piping, disinfection, testing, excavation (if necessary), coordination, and maintenance. Temporary water service shall be provided to all properties scheduled to have their water shut off for a period in excess of 6 hours. The contractor shall submit a temporary water service plan to the Engineer for review/approval.

12. Connect to Existing Watermain

    (a) The unit price bid per EACH for this item shall include all costs to connect the new watermain to an existing watermain (4" diameter and larger). DIP fittings shall be paid separately per POUND.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the water system items, as indicated. Such items of work include but are not limited to:

1. Furnishing and installing underground utility location system.
2. The furnishing and installing polyethylene encasement material will be included in the price bid for the watermain.
3. Concrete blocking or metal ties will be included in the price bid for the watermain.
4. Valve umbrella anchorage assembly will be included in the unit price bid for valves.
5. Locating and connecting to an existing watermain or a hydrant will be included in the price bid for the watermain.
6. Locating and connecting to an existing water service line will be included in the price bid for the watermain.
7. Compaction, hydrostatic, leakage, disinfecting, coliform bacteria, and conductivity testing will be included in the price bid for the watermain.
8. Furnishing and installing thrust block, tie rods, joint restraints, and sacrificial zinc anode caps as shown on the plans and as specified.
9. Turning hydrant heads to a location as directed by the Engineer will be included in the price bid for hydrants.
10. If a separate bid item for temporary water service is NOT included in the Schedule of Unit Prices, providing continuous temporary water service to affected users will be included in the price bid for the watermain.
11. The wood and/or metal parts necessary to identify the ends of the unattached service lines and curb stops will be included in the price bid for water services.
12. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping/control of stormwater flows around the construction zone will be included in the price bid for the watermain.
13. The painting or re-painting of hydrants with scratches and/or abrasions will be included in the price bid for hydrants.

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14. Providing temporary corporations, copper pipes, plugs, etc. for hydrostatic watermain testing will be included in the unit price bid for the watermain.
15. The cost to furnish and install copper water service couplings will be included in the unit price bid for the water service pipe.
16. If the watermain is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill, and grout seals will be included in the unit price bid for the watermain.
17. Additional excavation, backfill, and compaction necessary for additional watermain bury depth to avoid conflict with utilities.
18. Hydrant extensions and lowering of hydrants in lieu of additional bends in the watermain system to avoid conflicts with utilities.
19. Protection in place structure such as fences, trees, shrubs, retaining walls, and others as required by the Engineer. Protecting and avoiding such structures may involve excavation and installation to the water service around them, include in the price bid for water service pipe.
20. Additional work required to install curb stops (and the connected water service) outside of in place driveways, include in the price bid for water service piping.
21. Additional costs for the use of oversized fittings on existing cast iron pipe at points of connection to the existing water main, include in the price bid for connect to existing watermain.
22. Adjusting new curb stop boxes to the proposed finished grade.
23. Verifying an active service when connecting to an existing water service.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:
   1. ANSI/AWWA C550 and C116/A21.16
   2. ASTM D1248
   3. ASTM D1784
   4. ASTM D2513
   5. ASTM D3261
   6. ASTM D3350
   7. ASTM D2412
   8. ASTM D3034
   9. AWWA C651
   10. AWWA C900
   11. AWWA C906
   12. CEAM 2611

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Work plan for temporary water service.

B. Watermain and Water Service Lines
   1. Hydrants - Certificates of Compliance.

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2. Valves & boxes - Certificates of Compliance.

3. Pipe & fittings - Certificates of Compliance.

4. Corporation stops, saddles, curb stops, curb boxes, copper pipe - Certificates of Compliance.

C. Record drawings

1. Contractor shall maintain at the construction site one complete set of drawings suitably marked to show all deviations from the original set of drawings and other information as specified.

2. Water service tie-in or stub-out locations will show station and distances left or right of the survey control centerline. Existing water service piping material type and size at the tie-in locations will be noted also.

3. All watermain bends and valves will be located with tie-off dimensions to known items on the plans or in the field to enable the Contractor or City personnel to locate these structure for adjustment.

4. The complete set of record drawings will be submitted to the Engineer before submittal of the final Application for Payment.

5. Failure of the Contractor to maintain an up-to-date set of record drawings on the project site will be a reason to withhold payments.

D. The Contractor shall fill out a service record form for each water service connection or stub out. A blank service record form will be supplied by the Engineer to be used by the Contractor.

E. Photos

1. The Contractor shall take photos of underground construction work before backfilling. Such items to be photographed include but are not limited to: connections to existing utilities, watermain fittings, small/private underground utilities, utility stub-outs, etc.

2. Photos will be named as follows:

(a) For services, the file will be named with the street address of the service.

(b) All other photos will be named to indicate the station number and offset left or right.

PART 2 - PRODUCTS

2.1 THREADED ITEMS

A. All threaded items furnished under this contract, including but not limited to mechanical joint connectors, flanged joint connectors, mainline valves, saddles, corporation stops, curb stops, hydrants, and air release valves will be furnished to the nominal size as specified with ENGLISH threads.

2.2 OPEN CUT WATERMAIN MATERIAL

A. The following water pipe materials will be allowed for use on this project:

1. Ductile Iron Pipe, Class 52 with conductive gaskets or conductivity strips will be used where identified on the plans.

(a) Tracer wire must be furnished and installed with all watermain pipe. A tracer wire locate box shall be installed at each hydrant location and a tracer wire shall be tied down with a proper connection to the DIP, including anode installation, as specified.

2.3 WATERMAIN FITTING MATERIALS

A. The following pressure pipe fitting materials will be allowed for use on this project:

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1. Mechanical Class 350 ductile iron fittings will be used. Adaptors, backup rings, and oversize sleeves will be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings will be long mechanical joints.

2. All fittings, valves, hydrants, and restraining rods will be protected by using sacrificial zinc anode caps, ASTM B418 6 oz. Large Zinc Anode Caps as manufactured by Trumbull Industries Inc., or an approved equal. Contractors shall supply 2 anode caps per mechanical joint gland installed.

3. All fittings, valves, hydrants, etc. will be secured utilizing **316 stainless steel** bolts.

4. Quality control of all fitting manufacturers will conform to the requirements of the International Organization for Standardization (ISO).

2.4 FIRE HYDRANTS

A. Hydrants will be Waterous Improved Pacer Style, Model WB-67-250, UL, 250 psi rating, with safety flange and stem coupling. The bury length will be 8.0-feet 6.0-inches unless otherwise noted on the plans. The break-off height will be 16.0-inches. The Contractor shall install the hydrant so that the center of the nozzle is 24.0-inches above the finished grade. The hydrant will be painted **yellow**.

B. All hydrants will have been manufactured in the year of construction or prior two calendar years.

1. All hydrant extensions will be manufactured by the same manufacturer as the hydrant.

2. The local fire department will be contacted before ordering hydrants to obtain the correct nozzle threads and type of operating nut and cap bolts.

C. Tracer wire locate boxes, as part of the tracer wire system, are required at each hydrant and shall be considered incidental to the associated bid item, for which no direct payment will be made.

2.5 VALVE AND VALVE HOUSING

A. All water valves will have been manufactured in the year of construction or prior two calendar years.

B. All nuts and bolts will be **316 stainless steel**.

C. Valve Housing

1. Cast-iron screw-type valve boxes will be installed where indicated on underground valves. The cast-iron valve boxes will be of either the two-piece or three-piece style and will be furnished with a stay-put cover with raised letters indicating "WATER." The shaft will be 5¼-inch inside diameter.

2. All valve box assemblies will be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly will be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.

3. High-Density Polyethylene valve housings will not be allowed on this project.

D. Gate Valves

1. All valves up to and including 12.0-inch diameter to be furnished and installed on the watermain will be, non-rising stem, iron body, resilient-seated gate valves, with two-inch square opening nut rated for a 200 psi working pressure conforming to the current editions of AWWA C-509-or AWWA C-515. Double disc-type valves (AWWA C-500) will not be allowed.

E. Butterfly Valves

1. All valves greater than 12.0-inch diameter will be butterfly valves conforming to the referenced specification.

2. All butterfly valves will be manufactured with the rubber seat bonded to the body. Valve discs will be furnished with 316 stainless steel seating edge.

2.6 WATER SERVICE PIPE AND FITTINGS

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A. Service Pipe and Fittings

1. General

   (a) Water service pipe and fittings will conform to the provisions of 2611.2D, AWWA C800, and the following:

   (b) Valves and fitting models vary according to watermain pipe size. See mfg. catalog data.

   (c) Saddles will be provided for all services if a PVC pipe is installed.

   (d) Saddles will be provided for all corporation stops larger than 1½-inches if DIP pipe is installed.

   (e) Curb boxes will be adjustable and 8.0-feet in length with Minneapolis Pattern. Stationary rods are required.

2. Copper Service Pipe Notes & Specifications:

   (a) Copper pipe will conform to ASTM B88, Seamless Copper Water Tubing, Type K, Soft Annealed Copper.

   (b) Copper water service pipe connections will be flared type.

3. Polyethylene (PE) Service Pipe Notes & Specifications

   (a) PE pipe will conform to Grade PE-3408 or PE-4710 pipe and will be rated for 200 psi working pressure, SDR-9.

   (b) PE pipe will conform to ASTM D-1248 & D-2737 for Copper Tube Size, outside diameter controlled.

   (c) PE water service pipe connections will be compression type.

   (d) PE pipe will be permanently marked at 2.0-foot intervals indicating Mfg., PE Material Type, Date of Manufacture, etc.

   (e) Type **316 stainless steel** pipe inserts/stiffeners will be furnished and installed in the ends of the PE pipe at all connections. Inserts will meet the requirements of AWWA C901 and ASTM A240-92B unless otherwise shown on the plans.

4. Tracer Wire

   (a) Tracer wire will be supplied for all water service pipe. Tracer wire will be fastened to the underside of the top of the curb stop boxes with waterproof connections unless otherwise shown on the plans.

5. **The Utility Owner should be contacted before ordering to verify the manufacturers' type and style. The water service materials style commonly used by the Utility are to be considered as a basis for quality are:**

WATER SERVICE PIPE & APPURTENANCES

ITEM:	SERVICE PIPE SIZE	FLARED TYPE Valves & Fittings For TYPE K COPPER PIPE		
		FORD MODEL #	A.Y. McDONALD / SMITH BLAIR MODEL #	MUELLER MODEL #
		FORD	A.Y. McDONALD	MUELLER
Corporation Stop	3/4"	FB600-3-NL	74701B	B-25000-N
	1"	FB600-4-NL	74701B	B-25000-N
	1.25"	FB600-5-NL	74701B	N/A
	1.5"	FB600-6-NL	74701B	B-25000-N
	2"	FB600-7-NL	74701B	B-25000-N

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Tapping Saddle		**FORD**	**FORD**	**SMITH-BLAIR**	**SMITH-BLAIR**	**MUELLER**
		for DIP WMN	for PVC WMN	for DIP WMN	for PVC WMN	
	3/4"	F202	FS323	313	372	N/A
	1"	F202	FS323	313	372	N/A
	1.25”	F202	FS323	313	372	N/A
	1.5"	F202	FS323	313	372	N/A
	2"	F202	FS323	313	372	N/A
Curb Stop		**FORD**		**A.Y. McDONALD**		**MUELLER**
	3/4"	B22-333M-NL		76104		B-25154-N
	1"	B22-444M-NL		76104		B-25154-N
	1.25”	B22-555M-NL		76104		N/A
	1.5"	B22-666M-NL		76104		B-25154-N
	2"	B22-777M-NL		76104		B-25154-N
Curb Box	1.5” Diam. Base Tap for ¾” to 1.25” Curb Stops	FORD 8'- EM2-80-56		A.Y. MCDONALD 5614		H-10300
Curb Box	2" Diam. Base Tap for 1.5" to 2" Curb Stops	FORD 8'- EM2-80-57		A.Y. MCDONALD 5615		N/A

WATER SERVICE PIPE & APPURTENANCES

ITEM:	**SERVICE PIPE SIZE**	**COMPRESSION TYPE Valves & Fittings For POLYETHYLENE PIPE**		
		FORD MODEL #	**A.Y. McDONALD MODEL #**	**MUELLER MODEL #**
Corporation Stop		**FORD**	**A.Y. McDONALD**	**MUELLER**
	3/4"	FB1000-3-Q-NL	74701BQ	B-25008-N
	1"	FB1000-4-Q-NL	74701BQ	B-25008-N
	1.25”	FB1000-5-Q-NL	74701BQ	N/A
	1.5"	FB1000-6-Q-NL	74701BQ	B-25008-N
	2"	FB1000-7-Q-NL	74701BQ	B-25008-N
Tapping Saddle		**FORD** **FORD**	**SMITH-BLAIR** **SMITH-BLAIR**	**MUELLER**
		for DIP WMN for PVC WMN	for DIP WMN for PVC WMN	
	3/4"	F202 FS323	313 372	N/A
	1"	F202 FS323	313 372	N/A
	1.25”	F202 FS323	313 372	N/A
	1.5"	F202 FS323	313 372	N/A
	2"	F202 FS323	313 372	N/A
Curb Stop		**FORD**	**A.Y. McDONALD**	**MUELLER**
	3/4"	B44-333M-Q-NL	76104Q	B-25155-N
	1"	B44-444M-Q-NL	76104Q	B-25155-N
	1.25”	B44-555M-Q-NL	76104Q	N/A
	1.5"	B44-666M-Q-NL	76104Q	B-25155-N
	2"	B44-777M-Q-NL	76104Q	B-25155-N

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Curb Box	1.5” Diam. Base Tap for ¾” to 1.25” Curb Stops	FORD 8'- EM2-80-56	A.Y. MCDONALD 5614	H-10300
Curb Box	2" Diam. Base Tap for 1.5" to 2" Curb Stops	FORD 8'- EM2-80-57	A.Y. MCDONALD 5615	N/A

2.7 RESTRAINED JOINT RETAINER GLANDS

A. Where stainless steel is not used restrained joint retainer glands shall be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16 or approved equal.

2.8 POLYETHYLENE ENCASEMENT

A. **The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.**

2.9 CURB BOX COVERS

A. When unavoidable, curb box covers for use in concrete or bituminous driveway or walk pavement shall be Ford Type A-1 covers, or an approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Temporary Service

1. Before proceeding with the project, the Contractor shall establish a work plan and submit the plan to the utility personnel and Engineer for review and comment. The plan will outline the method to be used to maintain service to the affected consumers and estimate the duration of any anticipated interruptions of service. The plan will include provisions to fully disinfect all temporary piping, valves, and fittings in accordance with CEAM Specification No. 2611. The Contractor is the sole party responsible to notify the Utility and consumers who may be affected by limitations and/or interruption of water service. Planned service interruptions will not exceed 6 hours in any 72 hour period unless previously approved by the Utility.
2. The Contractor shall coordinate watermain shut-downs with the water utility at least 24 hours before the requested shut-down.
3. If the Contractor fails to provide water service to affected residents within the constraints specified above, an amount equal to $500.00 may be deducted from the amount due to the Contractor for each occurrence.
4. No warranty is expressed or implied that privately owned valves in homes will be operable.
5. Contractor shall provide backflow prevention devices on the temporary water system.
6. Contractor shall coordinate with the Owner’s representative and private property owners as necessary to make temporary connections. If the Contractor elects to operate private valves or coordinate closure of private valves in homes, the Contractor shall make staff available for operation of such valves outside normal working hours for completion of such work at the schedule of private property owners.
7. The Contractor shall make available a contact list of three individuals capable of responding to and repairing the temporary water system at all times, including holidays, weekends, and outside of normal working hours. In emergency response conditions where property owners are left without water service, the Contractor may (as determined by the Owner) be deducted an amount of $100 per hour

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from the time water service is not provided until it is restored. This amount shall be in addition to any deductions made per occurrence.

8. **After loading the temporary water system but prior to connecting the temporary water system to services, the contractor shall perform a visual inspection of all pipe and fittings to ensure there are no leaks to the system.**

9. **The temporary water system will require two passing bacteria tests, taken 24 hours apart, prior to opening the system for service.**

3.2 INSTALLATION OF PIPE AND FITTINGS

A. Aligning and Fitting of Pipes

1. The Contractor, together with the utility's personnel, will jointly examine and operate all curb stops and mainline valves prior to final acceptance.

2. Anchoring of Pipe

(a) A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Restrained joint retainer glands will be provided at all bends, tees, hydrants, valves, and plugged crosses or wherever the watermain changes direction or dead ends

B. Polystyrene Insulation

1. The Contractor shall install polystyrene insulation in those areas where the watermain or services may be susceptible to frost or freezing, or as directed by the Engineer.

2. Rigid foam insulation will be placed between the watermain and storm or sanitary sewer where adequate vertical clearance cannot be maintained. The insulation will be placed on a bed of sand and sand will be placed above the insulation to isolate the insulation from rocks and other sharp objects. The ultimate thickness of insulation required will be achieved by using 2 layers of insulation, the second layer will be placed perpendicular to the first layer and the joints will be offset.

C. Water Service Installation

1. The Contractor shall imprint the concrete face of the curb at the locations of the utility service locations in accordance with City standards.

2. The Contractor shall keep accurate records as to the location of the service connections, as specified in the referenced specification. Final payment for the project will not be made until the information is in the possession of the Owner.

3. No warranty is expressed or implied as to the location, size, or material type of existing service lines. The Contractor shall furnish and install all fittings required to make the connections.

4. The Contractor shall install a new service pipe, at 7.0-foot bury depth, from the corporation stop to the property line, or as shown on the plans, or as directed by the Engineer.

5. The water services will be hydrostatically tested and disinfected.

6. All water services will be verified as operative and the corporation stops will be turned to open position prior to backfilling.

7. Contractor shall collect photos as described in Section 01 33 00 “Submittals Procedures” of this project manual prior to backfilling.

D. Polyethylene Encasement

1. The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.

E. Utility Location System

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1. The Contractor shall install an underground utility location system (tracer wire) with all watermain and services in accordance with Section 33 05 97.36 "Underground Utility Location System" of this Project Manual.

F. Adjust Curb Box

1. The contractor shall adjust existing curb stop boxes to final grade where the built-in adjustment exceeds what the existing curb stop box is capable of without removing or adding segments to the in-place curb stop box, as indicated on the plan drawings.
2. The typical range of adjustments is anticipated to be 4” to 24” (up or down) to meet the final grade.
3. The Contractor shall adjust the height of the curb box top to be 1” below the finished sod line, utilizing the following general process:
   (a) Shortening Curb Boxes
      (1) Remove the top portion of the curb stop box.
      (2) Cut the standpipe down to size and re-thread the standpipe.
      (3) Cut down the internal key rod to be approximately 2-ft below the top of the curb box and re-key the rod, if necessary.
      (4) Reinstall, or replace, the top portion of the curb stop box.
   (b) Lengthening Curb Boxes
      (1) Remove the top portion of the curb stop box.
      (2) Cut the standpipe down to size, if necessary, to accommodate a standard galvanized pipe extension.
      (3) Re-thread the standpipe, if necessary, to allow for proper connection.
      (4) Install a galvanized pipe extension to size and re-thread the new top of the standpipe.
      (5) Reinstall, or replace, the top portion of the curb stop box.
4. Alternatively, the contractor may elect to follow the above process but implement the installation of a new setscrew type curb stop box top. The standard Service Box Extension with Set Screws is manufactured for various standard diameter curb stops at various extension lengths (typically 3-inch intervals).

3.3 FIELD QUALITY CONTROL

A. Hydrostatic Testing

1. Hydrostatic tests will be conducted in accordance with the referenced specification. Individual tests from valve to valve are required. These tests will be conducted prior to the bacteriological tests required with the disinfection of the main. The test must maintain a minimum of 150 psi with no drop in pressure allowed during the last two hours of the pressure test.
2. Water services, including corporation and curb stops, will be tested. The Contractor may choose to include services at the time of watermain testing or as a separate operation at a reduced pressure of 100 PSIG. If performed separately, testing will be done with the corporation stops open.

B. Disinfection

1. Disinfect and complete bacteriological testing on all temporary and permanent water distribution systems in accordance with the provisions of AWWA C651.
2. Testing Option A as described in AWWA C651 and below will be required for the bacteriological testing for total coliform analysis.

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Option A: Before approving a main for release, take an initial set of samples after flushing and then resample again after a minimum of 24 hours using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release.

3. If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be re-flushed and will be resampled. If check samples fail to produce acceptable results, the main will be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained.

4. No lines will be placed in service until a satisfactory result is obtained.

******END OF SECTION******

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SECTION 33 31 00 - SANITARY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to sanitary sewer and service lateral construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Manholes

(a) Payment for all manholes will be at the unit price bid per linear foot of structure as measured from the invert of the outlet pipe to the top of the manhole casting. The amount bid includes all work and material required to complete the structure. Casting assemblies will be paid separately for each assembly furnished and installed.

2. Casting Assemblies

(a) Casting assemblies (Sanitary) will be measured per each, complete in place, and paid at the unit price bid, including a new external chimney seal and a new internal chimney seal. The amount bid includes all work and material required to furnish and install a new sanitary casting assembly and chimney seals. Chimney seals shall be considered incidental to the associated sanitary casting assembly bid item for which no direct payment will be made.

(b) Bituminous base patches shall be constructed adjacent to casting adjustments and casting replacements in mill & overlay areas. This work shall be considered incidental to the associated casting work bid item, for which no direct payment will be made. The requirements of Section 32 12 01 (Flexible Pavement Patching), included in these specifications, shall still apply to the patching work.

3. Chimney Seals

(a) No exception to the referenced specification is made.

4. Sewer Pipe

(a) No exception to the referenced specification is made.

5. Service Connections

(a) The exact number of service connections, i.e., new service lines or connections to existing service lines, is unknown. The quantities listed on the proposal are approximate. Final payment will be based upon the number constructed for the various diameter of services constructed.

6. Wye Branches

(a) No exception to the referenced specification is made.

7. Outside Drop Section

(a) Payment for the respective diameter outside drop connection will be at the unit price per linear foot of structure as measured from the invert of the lower pipe to the invert of the higher pipe.

8. Connect to Existing Sanitary Manhole

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(a) Payment for connecting a new sanitary sewer to an existing sanitary manhole will be measured and paid per each as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The amount bid will include removing the existing sewer pipe, enlarging the hole, constructing a water-tight joint, removing the bench, and reshaping the invert, if necessary to fit the proposed sewer pipe.

9. Raise / Lower Existing Manhole

(a) Payment for raising or lowering an existing sanitary manhole will be measured and paid per linear foot of depth as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The measurement will be based on the actual precast concrete structure height reconstructed (either removed or added to the existing structure), as indicated in the plan drawings. The payment shall include all cost of labor, materials and equipment required to complete the work under the RECONSTRUCT DRAINAGE STRUCTURE (SANITARY) bid item.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the sanitary sewer items, as indicated. Such items of work include but are not limited to:

1. Locating and connecting to an existing sanitary sewer pipe will be included in the price bid for sanitary sewer.
2. Dye water testing of all service lines encountered and the subsequent plugging of abandoned sewer services will be included in the unit price bid for sanitary sewer.
3. The costs of furnishing bends, adapters, cutting, and removing the existing sanitary sewer pipe will be included in the price bid for sanitary sewer.
4. Locating and connecting to an existing sanitary sewer service laterals will be included in the price bid for sanitary sewer.
5. Adapters to adjust the diameter of the new service connections to match the existing service lines will be included in the price bid for service connections.
6. All work and material required to complete the outside drop manhole structure as shown on the Design Detail Plate will be included in the price bid for the outside drop section.
7. Leakage, vacuum, air, and deflection testing will be included in the price bid for sanitary sewer.
8. Post-construction televising will be included in the price bid for sanitary sewer.
9. The wood and/or metal parts necessary to identify the ends of unattached service lines will be included in the price bid for sanitary sewer services.
10. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping/control of sanitary and stormwater flows around the construction zone will be included in the price bid for the associated sewer items.
11. Furnishing and installing an underground utility location system will be included in the price bid for sanitary sewer.
12. If the sewer is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand, fill, and grout seals will be included in the unit price bid for sewer.
13. Chimney seals to be furnished and installed with all new sanitary casting assemblies and sanitary casting adjustments.

(a) The furnishing and installation of new internal chimney seals with all new sanitary casting assemblies and sanitary casting adjustments, as detailed in section 33 01 30.81 - MANHOLE REHABILITATION of these specifications.

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(b) The furnishing and installation of new external chimney seals, as indicated in the plan details, with all new sanitary casting assemblies and sanitary casting adjustments.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. ASTM D2321
2. ASTM D3034
3. ASTM F679
4. ASTM D1784
5. ASTM D543
6. ASTM D1248
7. ASTM D3350
8. AWWA C900
9. AWWA C-906
10. CEAM 2621
11. MnDOT 2506

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. A sanitary sewer bypass pumping plan and traffic control plan will be submitted to the Engineer for review a minimum of 5 working days prior to beginning of work.

1. The bypass pump system will be of sufficient capacity to handle existing flow at peak flow times.

B. Work plan for temporary service.

C. Sanitary Sewer and Sanitary Sewer Service

1. Manhole structure - shop drawings.
2. Manhole casting - shop drawings.
3. Piping and fittings - Certificates of Compliance.

D. Final post-construction televised inspection report and video files.

PART 2 - PRODUCTS

2.1 OPEN CUT SEWER PIPE AND FITTINGS

A. All pipe and fittings must be laid on a continuous granular bed. Installation must comply with ASTM D2321

B. Solid Wall Polyvinyl Chloride (PVC) Pipe

1. 4.0-inch through 6.0-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of the Standard Dimension Ratio (SDR) of 26, unless otherwise specified on the plans.
2. 8.0-inch through 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM D3034 for the Standard Dimension Ratio (SDR) of 35, for depths of less than 20.0-feet, unless otherwise specified on the plans. The SDR for depths exceeding 20.0-feet shall be 26, unless otherwise specified on the plans.

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3. Over 15" Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46, for depths less than 20.0-feet, unless otherwise specified in the plans. A minimum SDR of 26 shall be used for depths exceeding 20.0-feet, unless, unless otherwise specified on the plans.

4. WYES: All wyes shall be heavy wall and shall conform with the requirements of ASTM D3034 for the Standard Dimension Ratio (SDR) of 26, unless otherwise specified on the plans.

5. The connection shall be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.

6. The pipe grade used shall be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D543.

C. Ductile Iron Pipe (DIP)

1. No exception to the referenced specification is made.

D. Reinforced Concrete Pipe (RCP)

1. No exception to the referenced specification is made.

2.2 TRENCHLESS PIPE MATERIAL & STRUCTURAL REQUIREMENTS

A. All pipe shall be made from virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.

B. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, and/or other deleterious faults.

C. Any section of pipe with a gash, blister, abrasion, nick scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above may be cut out and butt-fused in accordance with the procedures herein.

D. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from site.

2.3 INTERNAL PIPE DIAMETERS

1. The actual inside barrel diameter of the pipe used for gravity pipe shall not be less than that of PVC – SDR 35 for the corresponding nominal pipe size.

ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS GRAVITY PIPE MATERIALS					
Nominal	**PVC – SDR 35**	**HDPE 4000**	**HDPE 4100**	**PVC**	**Fusible C900 PVC**
		DR 11 ductile sizes	**DR 11 Ductile Iron Pipe sizes**	**DR 18 [1] Restrained Joint**	**DR-18**
8	7.92	7.375	6.963	8.044	8.05
10	9.90	9.041	8.679	9.866	9.87
12	11.78	10.750	10.293	11.734	11.73
14			11.301	12.444	13.60
15	14.426				
16		14.170	12.915	14.222	15.50

1 Certa-Lok® Restrained Joint Catalog

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ACTUAL INTERIOR PIPE DIAMETERS FOR VARIOUS GRAVITY PIPE MATERIALS					
Nominal	**PVC – SDR 35**	**HDPE 4000**	**HDPE 4100**	**PVC**	**Fusible C900 PVC**
		DR 11 ductile sizes	**DR 11 Ductile Iron Pipe sizes**	**DR 18 [1] Restrained Joint**	**DR-18**
18	17.629	15.925	14.532		17.30
20		17.590	16.146		19.20
21	20.78				
22			17.760		
24	23.381	21.014	19.374		22.90
27	26.35				

B. WASTE WATER APPLICATIONS - GRAVITY SEWERS

1. Fusible C900™/C905™

   (a) As manufactured by Underground Solutions (www.undergroundsolutions.com). ASTM D 1784-02. with Cell Classification 12454. The formulation for extrusion of Fusible C900™/C905™/PVC™ shall be compounded to the specific proprietary recipe for Fusible pipe and meet the requirements of PPI TR-2.

   (b) Butt joint fused PVC pressure pipe conforming to AWWA C900 for 150 psi pressure rating (SDR 18). However, structurally stronger pipe may be required to ensure resistance to pulling stresses.

   (c) Pipe fusing shall meet manufacturer requirements. See Paragraph 1.4.A, Items to be Included with the Bid.

   (d) A manufacturer's representative shall be present during fusing and installation.

2. Restrained Joint PVC Pipe and Fittings

   (a) Restrained Joint Polyvinyl Chloride (PVC) pressure pipe with a 150 psi working pressure. The working pressure dictates a maximum standard dimension ratio (DR) of 18, however, structurally stronger pipe may be needed to ensure resistance to damaging stresses relative to the trenchless construction technique. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D543.

   (b) Restrained joints shall be Certa-Lok® C900/RJ Restrained Joint PVC couplings, or equal.

2.4 MANHOLES

A. Precast Concrete Manholes

1. Sanitary sewer manholes will conform to the MnDOT Standard Plate No. 4007C, unless otherwise shown on the plans, including integral base sections and rubber gasketed tongue and groove joints. All pipe openings will have an integral cast watertight seal.

2. Reinforced polypropylene plastic steps will be furnished for all sanitary sewer manholes eight or more feet in depth.

B. Outside Drop Manhole

1. All pipe materials used to construct the drop section and the incoming pipe shall be PVC – SDR 26 with heavy-duty fittings.

2. The PVC pipe shall extend from the tee to 2.0-feet beyond the point where the elevation of the virgin soil becomes a uniform 6.0-inches below the invert elevation of the incoming pipe.

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C. Castings

1. The type of casting assembly to be used will be Neenah R-1733, or approved equal, with gasketed cover, concealed pick hole, and no lug, unless otherwise specified on the plan.

2. All casting assemblies will meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a MnDOT approved source.

D. Chimney Seal

1. Chimney seals accepted for use, when shown in the plans, will be one of the following listed as the standard of quality:

(a) Infi-Shield (exterior only)

E. Adjusting Rings

1. Concrete adjusting rings shall be used on all sanitary manholes.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

A. Sanitary Main Installation

1. No exception to the referenced specification is made.

B. Sewer Service Installation

1. The Contractor shall imprint the concrete face of the curb at the locations of the utility service locations in accordance with City standards.

2. The Contractor shall dye water test all existing sanitary sewer service line connections cut, severed, or encountered during the construction to determine whether they are still active. Those service lines which are no longer in use will be abandoned by plugging the severed upstream end with a suitable watertight plug approved by the Engineer.

3. The Contractor shall keep accurate records as to the location of the service connections, manholes, cleanouts, wyes, bends, risers, and connections to existing structures, pipes, and stub outs as constructed. Measurements to the service line will be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings) as directed by the Engineer. Final payment for the project will not be made until the information is in the possession of the Owner.

4. The Contractor shall install new service pipe from the wye branch to the property line, as shown on the plans.

5. At the end of all services that are not immediately connected to working services, the Contractor shall furnish and install a wood or metal pole that extends to just below the ground surface. If wood is used, there will be attached to the top of the pole a 6.0-inch x 2.0-inch metal piece, capable of being located by a metal detector from the ground surface.

6. The Contractor shall imprint the concrete face of the curb at the locations of the utility service locations in accordance with City standards.

3.2 MANHOLE STRUCTURE

A. Connect to Existing Sanitary Sewer

1. When connection to an existing sanitary sewer is made at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing sewer prior to laying any sanitary sewer to, or from, the connection point. If the elevation of the existing sewer does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.

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2. Connections to existing sanitary sewers will be watertight.

3. Connections to existing structures will be watertight. The installation of Cor-N-Seal boots, or equal, will be required.

B. Outside Drop Manhole

1. All pipe materials used to construct the drop section and the incoming pipe will be PVC - SDR 26 with heavy-duty fittings.

2. The PVC pipe will extend from the tee to 2.0-feet beyond the point where the elevation of the virgin soil becomes a uniform 6.0-inches below the invert elevation of the incoming pipe.

C. Raise / Lower Existing Manhole

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame. In some cases, the existing structure may require saw cutting.

D. Manhole Base

1. Pre-cast bases will be used for all manholes.

2. Integral cast base is required unless otherwise shown on the plans or approved by the Engineer.

3. Manholes will be set on a minimum of 6.0-inches of compacted foundation material.

E. Miscellaneous Work

1. If concrete adjusting rings are used, they will be set with bituminous mastic or cement mortar and will be plastered inside and out, with a minimum thickness of ½-inch of mortar. A maximum of 3 individual adjusting rings will be used. Taller 6.0-inch or 12.0-inch rings will be used where adjustment requires more than three 2.0-inch rings.

2. If HDPE adjusting rings are permitted in Part 2 and used, the sealant material and method will be in accordance with the manufacturer's recommendations.

F. Utility Location System

1. The Contractor shall install the underground utility location system (tracer wire) with all sanitary sewer and services in accordance with Section 33 05 97.36 "Underground Utility Location System" of this Project Manual.

3.3 FIELD QUALITY CONTROL

A. Deflection test

1. No exception to the referenced specification is made.

B. Sanitary sewer leakage testing

Leakage tests will be conducted as described in the referenced specification. However, leakage testing will not be necessary where existing services are connected directly to the new sewer as it is being constructed.

1. Air Testing

(a) No exception to the referenced specification is made.

2. Hydrostatic Testing

(a) Hydrostatic testing will not be allowed on this project.

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C. Cleaning and Televising

1. Cleaning and Televising is required after the installation and backfill are complete and prior to the placement of roadway aggregate base or pavement.

2. Reference Section 33 01 30.12 "Cleaning and Television Inspection of Sewers" of this Project Manual for cleaning and televising requirements.

******END OF SECTION******

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SECTION 33 31 23 - FORCE MAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to force main construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Force Main

(a) Force main will be measured by the linear foot and paid at the unit price bid. The amount bid for force main will be included in the costs of furnishing bends, adapters, granular materials for foundation, bedding, encasement, and backfill.

2. Polyethylene Encasement and Underground Utility Location System

(a) Unless separately itemized in the Schedule of Unit Prices, the furnishing and installation of polyethylene encasement material and location system will be incidental to the installation of force main.

3. Connect to Existing Forcemain

(a) The unit price bid per EACH for this item shall include all costs to connect the new forcemain to an existing forcemain pipe. DIP fittings shall be incidental to the connection price bid.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the force main items, as indicated. Such items of work include but are not limited to:

1. Furnishing and installing all bends, pipe restraints, blocking, and fittings will be included in the price bid for the force main.

2. Furnishing and installing the underground utility location system will be included in the price bid for the force main.

3. The furnishing and installing polyethylene encasement material will be included in the price bid for the force main.

4. Concrete blocking or metal ties will be included in the price bid for the force main.

5. Hydrostatic, leakage, and continuity testing will be included in the price bid for force main.

6. Delays due to other utility conflicts which result during construction will be included in the price bid for force main.

7. Protecting existing improvements from damage will be included in the price bid for force main.

8. Connecting to existing structures will be included in the price bid for force main.

9. Valve operating nut extension rod(s) will be included in the unit price bid for valves.

10. If the force main is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill, and grout seals will be included in the unit price bid for force main.

1.3 SPECIFICATION REFERENCES

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A. Reference the following Sections of this Project Manual as appropriate:

1. ASTM D1248
2. ASTM D1784
3. ASTM D2241
4. ASTM D2513
5. ASTM D3139
6. ASTM D3261
7. ASTM F477
8. AWWA C900
9. AWWA C906
10. CEAM 2621

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Manhole structure - shop drawings.

B. Manhole casting - shop drawings.

C. Piping and fittings - Certificates of Compliance.

D. Valves – shop drawings and Certificates of Compliance.

PART 2 - PRODUCTS

2.1 OPEN CUT FORCE MAIN PIPE AND FITTING MATERIALS

A. Ductile Iron Pipe (DIP)

1. Force main pipe material will be ductile iron pipe (DIP), class 52.

B. Pipe Fitting Materials

1. The following pressure pipe fitting materials will be allowed for use on this project:
2. Mechanical Class 350 ductile iron fittings will be used. Adaptors, backup rings, and oversize sleeves will be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings will be long mechanical joints.
3. All fittings, valves, hydrants, and restraining rods will be protected by using sacrificial zinc anode caps, ASTM B418 6 oz. Large Zinc Anode Caps as manufactured by Trumbull Industries Inc., or an approved equal. Contractors shall supply 2 anode caps per mechanical joint gland installed.
4. All fittings, valves, hydrants, etc. will be secured utilizing 316 stainless steel bolts.
5. Quality control of all fitting manufacturers will conform to the requirements of the International Organization for Standardization (ISO).

2.2 POLYETHYLENE ENCASEMENT

A. No exception to the referenced specification is made.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE AND FITTINGS

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A. Blocking and Anchoring of Pipe

1. A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as restrained joint retainer glands will be provided at all bends or wherever the force main changes direction, valves will be tied to the nearest force main fitting.

B. Polystyrene Insulation

1. The Contractor shall install polystyrene insulation in those areas where the force main may be susceptible to frost or freezing, or as directed by the Engineer.

C. Polyethylene Encasement

1. The Contractor shall furnish and install polyethylene encasement for the entire main and all appurtenances in accordance with the referenced specification.

3.2 UTILITY LOCATION SYSTEM

A. The Contractor shall install an underground utility location system (tracer wire) with all force main and services in accordance with Section 33 05 97.36 "Underground Utility Location System" of this Project Manual.

3.3 FIELD QUALITY CONTROL

A. No exception to the referenced Specification is made unless a non-conductive force main is installed, in which case the conductivity requirements, as specified are deleted.

B. The Engineer may require the Contractor to demonstrate that the force main meets the requirements of CEAM 2621 for pipe deflection.

C. The Engineer may require the Contractor to perform a hydrostatic pressure test as specified in CEAM 2611 to a pressure of 100 psi.

******END OF SECTION******

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SECTION 33 31 31 - SANITARY SEWERAGE PIPING POINT REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to gravity sewers as indicated on the drawings or as specified herein.

B. The point repairs to be constructed are randomly located at various points in the service area. Their general locations are shown in the plan drawings.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Point Repair

(a) The amount bid for SANITARY SEWER SPOT REPAIR by the EACH (EA), with or without service connection, will be full compensation for all work described except for pavement removal, bituminous patching, and turf establishment. For bidding purposes, the length of the sewer to be removed for each point repair will be considered to be 20.0-feet in length. Note that some of the point repairs may involve multiple service connections.

2. Surface Restoration

(a) The amount bid at the unit price indicated per square yard of patch will be full compensation for furnishing and installing all materials appropriate to the type and strength of the pavement indicated. i.e., compaction of backfill materials, subgrade preparation, aggregate base, and bituminous surfacing, or concrete surfacing required to complete the work.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated point repair items. Such items of work include but are not limited to:

1. Connection to an existing sanitary sewer pipe or sanitary sewer service or a manhole will be included in the price bid for point repair.

2. Bulkheading of existing pipes to be abandoned in place will be included in the price bid for point repair.

3. Maintenance of service and the by-passing of sewage around the construction zone will be included in the price bid for point repair.

4. Testing will be included in the price bid for point repair.

5. Turf restoration.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. ASTM D3034

2. ASTM F679

3. ASTM D543

4. CEAM 2621

5. MnDOT 2503

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B. The number in parentheses preceding each section indicates the CEAM Specification subsection being referenced.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Piping and fittings - Certificates of Compliance.

PART 2 - PRODUCTS

2.1 SEWER PIPE AND FITTINGS

A. Solid Wall Polyvinyl Chloride (PVC) Pipe

1. 4.0-inch through 15.0-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings will conform with the requirements of ASTM D3034 for the Standard Dimension Ratio (SDR) of 35.

2. Over 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings will conform with the requirements of ASTM F679 with a minimum wall thickness of T-1 wall for a minimum pipe stiffness of 46.

3. The connection will be push-on with elastomeric gasketed joints, which are bonded to the inner walls of the gasket recess of the bell socket.

4. The pipe grade used will be resistant to aggressive soil and corrosive substances in accordance with the requirements of ASTM D543.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Establishing Line and Grade

1. Grade and lines will match the existing pipe at each end of the section to be replaced.

B. Maintenance of Service

1. Sewage flow may be interrupted for short periods. Do not interrupt the flow without informing the City. If flooding occurs and property is damaged as a result of the Contractor's negligence in flow management, restitution to the affected property owners will be the responsibility of the Contractor.

2. If the sewage has to be pumped around the work zone, the Contractor shall furnish all equipment required.

3.2 EXCAVATION AND PREPARATION OF TRENCH

A. Excavation Limits and Requirements

1. The trench for all PVC pipes will be undercut 6.0-inches below the bell to permit the installation of crushed rock foundation material. The cost for the undercut will be incidental to the amount bid for the pipe in place.

2. The trench width at a point of 1-foot above the pipe will be no wider than the outside diameter of the bell plus 24.0-inches.

3. When the problem area has been located and exposed, remove the failed portion of the sewer. Protect adjacent undisturbed sewers to prevent debris from interfering with the free flow of sewage through the adjoining sewer system. If excessive quantities of debris enter the sewers, it will be the responsibility of the Contractor to clean the sewer at his expense.

3.3 INSTALLATION OF PIPE AND FITTINGS

A. Pipe Laying Operation

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1. Install the new segment of PVC pipe into position in direct alignment and to the grade of the existing sewer. Make a proper connection to the existing sewer with an appropriate Strong Back Fernco Coupler (or approved equal).

2. If the point repair is to reconstruct a sewer service connection that has failed, the work will be done as described above. In addition, expose a sufficient length of the service line to permit an examination of the remaining service line. Notify the City's Representative so observation of the condition of the service sewer can be conducted. When the examination has been completed, furnish and install the necessary length of the main sewer pipe complete with compatible wye, tee, or saddle. Furnish and install the necessary service pipe, bends, and compatible Strong Back Fernco coupler (or approved equal) to complete the connection of the sewer service line and maintain the proper alignment and grade. Furnish and install encasement material as previously described. The sewer service pipe may be 4.0-inches or 6.0-inches in diameter. Have a sufficient inventory of materials on site ready for use.

3.4 RESTORATION OF SURFACE IMPROVEMENTS

A. Pavement Restoration

1. It is recommended that the aggregate base courses be initially placed to meet the adjacent undisturbed street surface until the wearing courses are constructed. The Contractor shall maintain temporary surfaces until such time and the permanent surface is constructed.

2. Pavement restoration to be completed in accordance with Section 32 12 01 “Flexible Pavement Patching” of this Project Manual.

******END OF SECTION******

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SECTION 33 42 00 - STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to storm sewer construction as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Manholes

(a) Payment for all manholes/drainage structures shall be at the unit price bid per LINEAR FOOT of structure as measured from the invert of the outlet pipe to the top of the manhole casting, plus the depth of sump if applicable. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.

2. Catch Basins

(a) Payment for all catch basins shall be at the unit price bid per LINEAR FOOT of structure as measured from the invert of the outlet pipe to the flow line of the catch basin casting. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.

3. Drainage Structures Design Special (Sump & SAFL Baffle)

(a) Payment for all special drainage structures constructed with a sump and SAFL Baffle shall be at the unit price bid per EACH structure identified to construct a storm sewer manhole or catch basin manhole of the diameter and height indicated with a sump and SAFL Baffle, as shown in the plan details. The amount bid includes all work and material required to complete the structure. Casting assemblies shall be paid separately for each assembly furnished and installed.

(1) The SAFL Baffle is a system installed inside a storm sewer structure that is manufactured for the purpose of removal and containment of sediment, oils, phosphorus, and fuels and shall be installed where designated on the plan drawings.

4. Drainage Structures Design Special (Lift Station)

(a) No direct payment will be made for special drainage structures constructed for the storm lift station. All costs to construct a special storm sewer manhole of the diameter and height indicated, with access hatch, vent, forcemain, hose, and all other appurtenances and as shown in the plan details shall be included in the price bid for the associated Lump Sum Alternates.

5. Drainage Structures Design Special (OCS)

(a) Payment for all special outlet control drainage structures constructed shall be at the unit price bid per EACH structure identified to construct a storm sewer outlet control structure manhole of the diameter and height indicated, as shown in the plan details (including the City standard detail, if applicable). The amount bid includes all work and material required to complete the structure.

(1) No direct payment will be made for the identified grate and weir, and the costs of furnishing and installing the grate should be included in the price bid for the associated drainage structure.

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6. Casting Assemblies

    (a) Casting assemblies (Storm) shall be measured per each, complete in place and paid at the unit price bid, including a new internal chimney seal. The amount bid includes all work and material required to furnish and install a new storm casting assembly and chimney seal. Chimney seals shall be considered incidental to the associated storm casting assembly bid item for which no direct payment will be made.

    (b) Bituminous base patches shall be constructed adjacent to casting adjustments and casting replacements in mill & overlay areas. This work shall be considered incidental to the associated casting work bid item, for which no direct payment will be made. The requirements of Section 32 12 01 (Flexible Pavement Patching), included in these specifications, shall still apply to the patching work.

7. Chimney Seal

    (a) No exception to the referenced specification is made.

8. Sewer Pipe

    (a) No exception to the referenced specification is made.

9. Aprons

    (a) Payment for all new pipe aprons shall be at the unit price bid per EACH apron furnished and installed. The amount bid includes all work and material required to complete the apron with trash guard of the appropriate size, as identified on the plan detail. Trash guards shall be considered incidental to the associated pipe apron bid items for which no direct payment will be made.

10. RC Pipe Apron w/ Fish Barrier Grate

    (a) No direct payment will be made for the storm sewer pipe or the pipe apron with fish barrier grate associated with the storm lift station for Karth Lake. All costs to construct a RC storm sewer system of the size(s) indicated, RC pipe apron, fish barrier grate, and all other appurtenances as shown in the plan details and specified herein shall be included in the price bid for the associated Lump Sum Alternates.

11. Adjust Apron

    (a) Payment for all apron adustments shall be at the unit price bid per EACH apron adjusted, regardless of size. The amount bid includes all work and materials required to remove the existing RC apron, clean the existing RC apron and adjacent RC pipe, resetting the RC apron to the intended alignment and elevation, and tie the RC apron to the adjacent RC pipe(s) as indicated on the plans and specified herein.

    (b) This work may require minor excavation and/or backfilling to reset the apron and the intended alignment and elevation. It may also require drilling the existing RC apron and/or RC pipe to accommodate tying of the apron to the adjacent pipe(s). Care shall be taken to during removal, cleaning, and reinstallation to ensure the existing infrastructure remains undamaged.

12. Connect to Existing Storm Manhole

    (a) Payment for connecting a new storm sewer to an existing storm manhole shall be measured and paid per EACH, as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The amount bid shall include removing the existing storm sewer pipe, enlarging the hole, removing the bench and reshaping the invert, if necessary to fit the proposed storm sewer pipe.

13. Connect to Existing Storm Sewer

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(a) Payment for connecting a new storm sewer to an existing storm sewer shall be measured and paid per EACH, as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The amount bid shall include all materials required to make a watertight connection to the existing sewer.

(1) Neatly cut the existing pipe off and trim flush with the propose pipe or inside wall of the proposed structure, if applicable. Assure the pipe connection to the existing pipe is secure and waterproof. Repair any damage to the existing storm sewer at no cost to the Owner.

14. Grout Catch Basin or Manhole

(a) Payment for grout catch basin or manhole shall be a t the unit price bid per EACH structure repaired/grouted, as specified. The amount bid includes all work and material required to complete the repairs to the satisfaction of the Engineer, as detailed in the plans and these specifications, regardless of type or size. No additional compensation will be made for extent of repair(s), number of pipe connections requiring repair, or other work identified in the existing drainage structure.

15. Raise / Lower Existing Manhole

(a) Payment for raising or lowering an existing manhole will be measured and paid per linear foot of depth as specified in the Schedule of Unit Prices, complete and in place, at the appropriate unit price bid. The measurement will be based on the actual precast concrete structure height reconstructed (either removed or added to the existing structure), as indicated in the plan drawings.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the storm sewer items, as indicated. Such items of work include but are not limited to:

1. Locating and connecting to an existing storm sewer, include in the price bid for storm sewer.
2. The costs of furnishing bends, adapters, cutting and removing the existing storm sewer pipe, include in the price bid for storm sewer.
3. Locating and connecting to an existing storm sewer service laterals, include in the price bid for service connections.
4. Use of geotextile fabric to wrap pipe joints in lieu of using mastic, include in the price bid for storm sewer.
5. Maintenance of an appropriate storm water outlet during construction, include in the price bid for storm sewer.
6. The cost of all labor, equipment and materials necessary for testing of storm sewer, if required, included in the price bid for storm sewer.
7. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping / control of storm water flows around the construction zone, include in the price bid for the associated sewer items.
8. If the sewer is to be installed inside a casing pipe, furnishing and placing the carrier pipe, carrier pipe support materials, sand fill and grout seals, include in the unit price bid for sewer.
9. Furnishing and installing underground utility location system, include in the price bid for sewer.
10. Removal and disposal of castings not required for completion of the project or wanted by the City.
11. Salvaging castings for the City as directed by the Engineer and/or Owner.
12. Chimney seals to be furnished and installed with all new storm casting assemblies and storm casting adjustments.

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(a) The furnishing and installation of new internal chimney seals with all new storm casting assemblies and storm casting adjustments, as detailed in section 33 01 30.81 - MANHOLE REHABILITATION of these specifications.

1.3 SPECIFICATION REFERENCES

A. The following Sections of this Project Manual as listed:

1. Section 33 05 06 “Trenching and Backfilling”.
2. Section 33 05 07 “Trenchless Installation of Utility Piping”.
3. Section 33 01 30.81 “Manhole Rehabilitation”

B. ASTM D543 shall apply, except as modified herein.

C. ASTM D1248 shall apply, except as modified herein.

D. ASTM D1784 shall apply, except as modified herein.

E. ASTM D3034 shall apply, except as modified herein.

F. ASTM D3213 shall apply, except as modified herein.

G. ASTM D3261 shall apply, except as modified herein.

H. ASTM D3350 shall apply, except as modified herein.

I. ASTM F679 shall apply, except as modified herein.

J. ASTM F949 shall apply, except as modified herein.

K. AWWA C900 shall apply, except as modified herein.

L. AWWA C906 shall apply, except as modified herein.

M. CEAM 2621 shall apply, except as modified herein.

N. MnDOT 2503 shall apply, except as modified herein.

O. MnDOT 2506 shall apply, except as modified herein.

P. MnDOT 3236 shall apply, except as modified herein.

Q. MnDOT 3245 shall apply, except as modified herein.

R. MnDOT 3733 shall apply, except as modified herein.

S. MnDOT Standard Plates Manual with latest revisions.

T. City of Arden Hills Standard Plates Manual with latest revisions.

U. State of Minnesota Plumbing Code shall apply to all underground pipe sewers installed through areas to be occupied by buildings. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Storm Sewer

1. Manhole and catch basin structure - shop drawings.
2. Manhole and catch basin casting - shop drawings.
3. Piping and fittings - Certificates of Compliance.

B. RC Pipe Apron

1. Fish Barrier Grate - shop drawings.

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C. SAFL Baffle

1. Shop drawings of each sump manhole shall indicate dimensions and bottom elevation of SAFL Baffle, as well as the location and orientation of the SAFL Baffle within the manhole.
2. Manufacturer's Data
   (a) Installation manual
   (b) A letter from the manufacturer, signed by an officer, that all stainless steel is Type 304.
3. Approved Equal:
   (a) Installation manual.
   (b) Specification from manufacturer.
   (c) Design calculations demonstrating that the approved equal has been sized properly for the flow from the design storm event.
   (d) Analysis using SHSAM software.
      (1) The average sediment removal efficiency for the proposed equal device must be equal to or greater than the average sediment removal efficiency for the SAFL Baffle/sump manhole shown in the project plans.
      (2) Submit all of the input values used in the analysis and the output files.
   (e) For devices not included in the SHSAM software, submit the following:
      (1) A plot of sediment removal efficiency versus Peclet Number for the approved equal. This plot must be based on laboratory testing of the approved equal device that meets the following requirements:
         1. Testing at 100%, 75%, and 25% of the maximum flow rate for treatment.
         2. Sediment concentration of 200mg/L
         3. Sediment consists of 1/3 each of 545Nm, 335.5Nm, and 107Nm particles, each sieved to prevent particle size overlap.
         4. These procedures are described in more detail in "Improved Standard Sumps as Best Management Practice for Stormwater Treatment" found in the Conference Proceedings, Low Impact Development 2010: Redefining Wate in the City, ASCE 2010.
      (2) Plot of effluent concentration versus flow rate. This plot must be based on laboratory testing of the approved equal device that meets the following requirements:
         1. A means of accurately weighing the sediment in the sump before and after each test.
         2. Sediment consisting of US silica Sand F-110 with a mean bulk density of 107pcf.
         3. Run multiple tests with flow rates varying from 0.5 to 1.5 times the maximum flow rate for treatment as recommended by the manufacturer.
         4. Sort, dry, and weight the sediment in the sump before and after each test.
         5. This series of tests will be repeated for each different size/configuration of alternative device that is to be installed on this project.
         6. These procedures are described in more detail in "Improved Standard Sumps as Best Management Practice for Stormwater Treatment" found in the Conference Proceedings, Low Impact Development 2010: Redefining Wate in the City, ASCE 2010.

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PART 2 - PRODUCTS

2.1 OPEN CUT SEWER PIPE AND FITTINGS

A. Reinforced Concrete Pipe (MnDOT 3236)

1. Class V RCP shall be used.

2.2 MANHOLES & CATCH BASINS

A. Precast Concrete Manholes and Catch Basin Section

1. Storm sewer manholes shall conform to the MnDOT Standard for the design type shown on the plans.

2. Reinforced polypropylene plastic steps shall be furnished for all storm sewer manholes 8.0-feet or more in depth.

B. Castings

1. All casting assemblies shall meet the certification requirements of the Minnesota Department of Transportation and be manufactured by a MnDOT approved source.

2. The type of manhole casting assembly to be used shall be Neenah R-1733, unless otherwise specified on the plan.

3. The type of curb and gutter catch basin casting assembly to be used shall be Neenah R-3067, unless otherwise specified on the plan.

C. Adjusting Rings

1. Concrete adjusting rings shall be used for storm manholes and catch basins.

D. Chimney Seal

1. Chimney seals accepted for use, when shown in the plans, shall be one of the following listed as standard of quality:

(a) Internal chimney seal as detailed in section 33 01 30.81 - MANHOLE REHABILITATION of these specifications.

2.3 GEOTEXTILE FABRIC

A. MnDOT 3733, Type I, non-woven for use in wrapping joints in storm sewer.

2.4 FISH BARRIER GRATE

A. The fish barrier grate shall be designed and shop drawings submitted to the Engineer for approval to verify conformance with MnDNR requirements prior to manufacturing. The fish barrier grate shall be designed to limit fish passage while allowing sufficient water flow for the storm pump station by fully covering the hydraulic opening of the identified RC pipe apron (18”) with maximum clear opening spaces not to exceed 3-inches. The grate shall be designed such that it is affixed only at the top of the RC pipe apron and has a chain affixed to the bottom of the grate that is long enough to be accessible on shore, allowing for the grate to be raised/opened from land without requiring maintenance staff to enter the water.

1. The proposed design drawings shall show the frame sizing, anchors, hinges, net opening area, bar spacing, etc. to allow for Engineering review to confirm headloss will not impact the proposed pump system operations.

2. The grate and frame shall be galvanized carbon steel or stainless steel.

B. Photographs of an example fish barrier grate installed on an existing 36” RC Pipe Apron is below for informational purposes/guidance:

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C. The proposed fish barrier grate shall be designed similarly but with the appropriate dimensions to fit an 18” RC Pipe Apron, as indicated in the plan drawings and as described above.

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2.5 SAFL BAFFLE

A. Furnish and install SAFL Baffles as manufactured by Upstream Technologies Inc or approved equal. To the dimensions and elevation shown on the shop drawings.

B. Furnish and install appurtenant materials required for the installation of the SAFL Baffle or approved equal as shown on the shop drawings. Internal components shall be made of non-corroding material.

C. The average sediment removal efficiency of the sump manhole with the SAFL Baffle or approved equal must be 80% or higher.

D. There must be no re-suspension of sediment from the sump (all sediment in the sump before the storm event must remain in the sump) during slows of up to 1.5 times the 10-year storm flow for the storm sewer system.

E. Baffle Panels

1. Baffle panels shall be Stainless Steel Type 304 with minimum yield strength of 31,000 psi.

2. Minimum dimensions as follows:

(a) Unit width: 18 or 24 inches

(b) Unit height: 34, 44 or 54 inches

(c) Thickness: 1/8 inch

F. Frame

1. Shall consist of a 1”x1” square stainless steel tube with 1/8” thick walls.

2. Connector on top and bottom frame rails shall consist of a solid square stainless steel bar measuring 7/8”x7/8” in cross section.

G. Anchor Bolts

1. Must be 3/8” diameter

2. Must have a mechanism that expands against the sides of a hole drilled in the concrete sump wall, to secure the bolt.

3. Minimum pullout strength of each anchor shall be 2200 pounds and minimum shear strength shall be 2500 pounds.

H. Screws and Bolts shall comply with Mn/DOT 3319.2E

PART 3 - EXECUTION

3.1 MANHOLE AND CATCH BASIN STRUCTURES

A. Raise / Lower Existing Structure

1. Raising and/or lowering an existing manhole to meet a proposed finished rim elevation is performed when the addition and/or deletion of 2.0-inch adjusting rings will not reach a minimum of 2 rings or exceed a maximum of 6 rings. Typically, it will require: the removal of the manhole cone section or the concrete slab top; the addition, removal, or exchange of barrel sections; the replacement of the cone section or the concrete slab top; the installation of the proper number of adjusting rings; and the replacement of the manhole casting and frame.

B. Miscellaneous Work

1. If concrete adjusting rings are used, plaster all manhole adjusting rings installed inside and out, with a minimum thickness of ½-inch of mortar. A maximum of 3 individual adjusting rings shall be used. Taller 6.0-inch or 12.0-inch rings shall be used where adjustment requires more than three 2.0-inch rings.

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2. If HDPE adjusting rings are used, the sealant material and method shall be in accordance with manufacturer's recommendations.

3.2 GROUT CATCH BASIN OR MANHOLE

A. This work shall consist of concrete repair or grouting work to the inside of the structure walls, doghouses, and/or invert(s) of existing storm catch basins and manholes. Where structures are noted to be repaired, and specific clarification of the work is not provided in the plans, the Contractor will anticipate that the structure inverts, doghouses around the pipes, and manhole joints within the structure will all need to be repaired.

1. Repairs will be completed following these requirements:

(a) Clean all loose concrete and debris from interior walls, doghouses, and floor/invert of the structure using a rock hammer or other mechanical means.

(b) Following removal of loose debris, use a high-pressure water blast, and vacuum all debris from the structure.

(c) Once dry, patch or fill all voids in the walls, doghouses, and inverts with mortar and brick. Finish to a smooth surface.

3.3 SAFL BAFFLE

A. Furnish and install SAFL Baffles as manufactured by Upstream Technologies Inc, to the dimensions and elevation shown on the shop drawings.

B. The SAFL Baffle may be installed in a new manhole at the precast concrete plant, prior to delivery to the project site, or the SAFL Baffles may be installed on-site, after the manholes have been constructed.

C. The SAFL Baffle must be installed perpendicular to the inlet pipe, at the horizontal midpoint of the sump.

D. The bottom of the SAFL Baffle shall be established at the elevation shown on the plans, with a tolerance of +/- 0.5 inches.

E. Use 3/8” diameter bolts, cast into the concrete manhole wall, or used 3/8” diameter anchor bolts installed in a hole drilled in the concrete wall. Anchor bolts must be embedded 2 inches into the concrete sump wall and have a mechanism that expands against the sides of the drilled hole.

F. Torque applied to concrete anchor bolts at the frame side rails and torque applied to eye-bolts and set screws during assembly of the SAFL Baffle shall be to manufacturer’s specifications.

G. The top and bottom rails of the baffle must be level, with no tolerance on levelness.

H. Follow the manufacturer’s installation instructions.

I. The baffle panels must be vertical (plumb) when the installation is complete.

J. Upon completion of installation, baffle panels may overlap as much as 2inches, or the edges of adjacent panels may touch one another without overlapping. However, no gap is allowed between baffle panels.

3.4 FIELD QUALITY CONTROL

A. Deflection test - No exception to the referenced specification is made.

B. Visual Inspection - Storm sewer shall be visually inspected between all structures to verify pipe is straight and to grade and all joints are soil tight.

******END OF SECTION******

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SECTION 33 46 11.29 - STORMWATER DETENTION POND LINER AND PREFILL

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary to construct the pond liner system as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Payment at the unit price bid per CUBIC YARD for the compacted clay liner shall be considered full compensation for furnishing the clay borrow material, placing and compacting the clay liner system, as specified and shown in the plan drawings.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid per square yard for the associated pond liner systems, as indicated. Such items of work include but are not limited to:

1. Interference of other underground structures and utilities, include in the price bid for pond liner.

(a) The removal and restoration, or protection of existing utilities which are shown on the plans and for which there is no bid item for removing and restoring, or working around the utility.

2. Any dewatering necessary for storm sewer construction, include in the price bid for pond liner.

3. Subgrade excavation to the depth shown on the plans, including removal and disposal of subgrade excavation material, include in the price bid for pond liner.

4. Prefilling the pond(s) with water and leakage testing, include in the price bid for pond liner.

5. Maintenance of storm water drainage, include in the price bid for pond liner.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2106 shall apply, except as modified herein.

B. MnDOT 2112 shall apply, except as modified herein.

C. MPCA Minnesota Stormwater Manual, except as modified herein.

1. https://stormwater.pca.state.mn.us/liners_for_stormwater_management#Liner_specifications

D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Copies of all test results shall be submitted by the Contractor as determined at the pre-construction meeting.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contractor shall furnish and construct the compacted clay liner in detention basin as shown on the contract drawings.

B. The Contractor shall note the groundwater elevations found in the soils investigation. The potential, therefore, exists for liner floating. It shall be the Contractor's responsibility to install the liner at a time that groundwater will not affect the pond liner material or installation.

2.2 CLAY BORROW MATERIALS FOR LINER

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A. Clay Borrow for the compacted clay liner option shall be impervious clay suitable for pond lining. Permeability shall be a maximum of 1 x 10-7 cm/sec. The Owner may test the clay borrow material to confirm whether the material meets the permeability requirement.

2.3 BASE AND PROTECTION LAYER MATERIAL

A. The bedding material below the liner and the liner protection layer shall consist of sound durable particles of sand and gravel free of sharp and angular particles.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Excavation for Liner

1. Compacted Clay Liner

(a) The Contractor shall subcut 2.0-feet below the finished pond bottom elevation and 3.0-feet below finished top and the inside slope elevations (measured perpendicular to face) as shown on the plans to provide for placement and compaction of the clay liner.

B. Subgrade Preparation

1. The Contractor shall scarify, shape, compact and maintain the top 6.0-inches of the subgrade to at least 95 percent of Standard Proctor Density before placing the clay liner material. The subgrade shall be in accordance with MnDOT 2112-2112.

2. Any organic uncompactable material encountered in the subgrade preparation shall be removed. Excavation for correction of the subgrade materials, as may be required, shall be considered incidental to the earthwork excavation and replaced with salvaged suitable granular materials meeting the gradation for liner base material.

3. The Contractor shall replace the excavated unsuitable subgrade material with suitable, compactable material to bring the subgrade to the proper elevation. Subgrade correction materials shall be thoroughly blended with the existing subgrade material prior to compacting to the specified density. The moisture content of all soils shall be maintained within 2 percent of optimum moisture during placement and compaction, unless approved otherwise by the Engineer.

C. Compacted Clay Liner Construction

1. Inplace material at the subgrade shall be scarified to a depth of 1.5-foot and then re-compacted. The 2.0-foot thick clay liner (after compaction) shall be placed in four lifts of 6.0-inches of (compacted depth) each.

2. Scarified material, sub-cut material and liner material shall be compacted to a minimum of 98 percent of maximum density, based on the Standard Proctor of the material (ASTM: D698). The moisture content of the clay placed should be between 1-3 percent above optimum moisture. The Contractor shall dry or add water in order to obtain the required density at no additional cost to the liner construction. After clay liner placement, Contractor shall keep the liner at the optimum moisture or greater until the pond is prefilled. Compaction testing shall be by the Owner

3. All rocks 4.0-inches in diameter and larger encountered during the liner placement shall be removed and disposed of as directed by Engineer.

4. If unsuitable subgrade material is exposed during the excavation for the liner, this material shall be removed and replaced as specified for liner placement.

3.2 FIELD QUALITY CONTROL

A. Inspection and Testing

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1. The Owner may conduct density tests whenever subgrade, embankment, clay liner, protection layer or structure and trench backfill compaction operations are being conducted.
2. Field density tests may be conducted at a minimum rate of:
   (a) One test per 1500 cubic yards of placed material (compacted volume) or as directed by Engineer.
   (b) At least two Standard Proctor Density tests shall be conducted in accordance with ASTM D 698 on each type of soil used in the construction of the pond to establish the moisture density relationship.
3. A water balance test shall be done by the Engineer. The Contractor shall provide all necessary materials to complete the water balance test, including barrels, concrete pads and baffles.
4. After completion of the liner placement and prior to the pond prefill, permeability tests of the finished in-place liner will be made. One test per acre of bottom surface area with a minimum of four tests per pond bottom will be conducted. All replacement of liner material will be completed at no expense to the Owner.
5. The Contractor shall provide, at their own expense, the entire cost of the required water balance testing. The Contractor shall be responsible for reworking of any inadequate portions of the seal until the material passes the specification requirements.
6. Copies of all test results shall be submitted by the Contractor as determined at the pre-construction meeting.
7. At conclusion of the pond construction and prior to pond prefill, the Contractor, the independent engineering firm providing the onsite inspections, and the soils testing laboratory involved with the liner testing shall provide the city, in writing, the acceptance that the subgrade, embankment and liner meet the requirements of the specifications.
8. The finished pond bottom shall be constructed to the elevations shown on the plans. The finished pond grades shall not deviate from the plans by more than plus or minus 0.5-feet and in no case shall reduce capacity more than 1.5 percent from design. The Contractor shall take spot elevations of the finished pond bottom every 5,000 square feet of liner placed to verify the pond bottom elevations.
9. Prefill Pond and Water Balance
   (a) Detention Pond shall be constructed prior to October 15 to allow for the water balance test to be completed.
   (b) Upon acceptance of the installed liner system, examination and completion of all structures, piping and appurtenances, the Contractor shall prefill the pond to 1.0-foot below the permanent pool depth as determined from the plan.
   (c) The Contractor shall apply for and obtain all necessary permits for obtaining water used to prefill the pond.
   (d) All required tests must be reviewed by the Engineer prior to prefill. All pond prefill and testing procedures located in the Appendix must be completed by the Contractor for the new ponds. The Contractor shall be responsible for installing and removing water balance equipment for the new pond. The Contractor shall be responsible for payment to an independent testing firm or the Engineer for taking water level measurements and writing the appropriate report required.
   (e) The allowable mean seepage rate shall be 500 gallons/acre/day with a confidence interval of 1,000 gallons/acre/day defined by the water balance procedure outlined in the Appendix. If the water balance fails, the Contractor shall rework the seal at no additional cost to the Owner.

******END OF SECTION******

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SECTION 34 41 05 - TRAFFIC SIGNS AND DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools equipment and performances of all work and services necessary or incidental to project signing as indicated on the drawings or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. The amount bid per EACH for Salvage Sign shall include all costs for salvaging the existing sign and existing post and stockpiling in a secure location until ready for reinstallation or given to the Owner. Salvaged signs and posts lost or damaged during construction shall be replaced by the Contractor at no cost to the Owner.

2. The amount bid per EACH for Salvage Sign Panel shall include all costs for removing the existing sign panel from the existing post and salvaging the sign panel in a secure location until ready for reinstallation or given to the Owner. All other sign panels on the existing post, if applicable, and the existing post shall remain in place or be removed and disposed of by the contractor, as directed by the Engineer. Salvaged sign panels lost or damaged during construction shall be replaced by the Contractor at no cost to the Owner.

3. The amount bid per EACH for Install Sign shall include all costs for reinstalling the salvaged sign and post at the height and location specified.

4. The amount bid per EACH for Install Sign Panel shall include all costs for reinstalling the salvaged sign panel on a new post at the height and location specified.

5. The amount bid per EACH for Sign Panels Type Special shall include all costs for furnishing and installing new double-sided street name blade sign panels or No Outlet blade sign panels, as depicted on the applicable City standard detail. The amount bid shall be full compensation for all costs for furnishing and installing the project blade sign panels complete, in place as shown in the plans and specified herein.

6. Payment for new sign panels of type specified shall be at the contract price per SQUARE FOOT. The amount bid shall be full compensation for all costs for furnishing and installing the project signs complete, in place as shown on the plans and specified herein.

7. Traffic Signs shall be paid at the unit price bid for related items and includes the cost of providing and installing the sign, sign posts, stringers, brackets, attachment angles or strap mounting hardware, and all other materials and labor required for sign installation per the plan details.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated project signing item. Such items of work include but are not limited to:

1. Storing, keeping inventory, and protecting salvaged signs.

2. Furnishing and installing brackets and mounting hardware necessary for sign panel attachment to sign post, as specified, include in the amount bid for Traffic Signs.

3. Furnishing and installing U-Channel sign posts as specified for all new and salvaged sign panels to be installed.

1.3 SPECIFICATION REFERENCES

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A. MnDOT 2564 - Traffic Signs and Devices.

B. MnDOT 3401 - Flanged Channel Sign Posts.

C. Current "Minnesota Manual for Uniform Traffic Control Devices" - http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html

D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Street name blade signs – shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All signing materials shall conform to the requirements of MnDOT Specification 3352 and all Supplemental Specifications thereto.

B. All posts shall be galvanized steel U-Channel conforming with MnDOT Specification 3401 and MnDOT Standard Plan 'Type C&D Sign Structural Details" available at: https://www.dot.state.mn.us/trafficeng/signing/plansheets/C&D-SIGN-Groundmounted.pdf

C. Sign Panels shall be High Intensity Prismatic (HIP) reflective sheeting.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The lower portion of the post shall be air-driven into the ground. Signs will typically be installed in turf areas but when it's necessary to install in pavement areas, a PVC tube at least four inches in diameter shall be inserted and the post air driver inside the tube and then patched with concrete. Metal sign collars can also be used for round posts.

B. The Contractor shall construct/reinstall the posts and signs at the locations indicated on the drawings and must verify all sign/post locations with the Engineer prior to installation.

******END OF SECTION******

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SECTION 2565 – LOOP DETECTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performance of all work and services necessary or incidental to the testing, installation, repair, replacement, and splicing of saw-cut and preformed rigid PVC conduit loop detectors as indicated on the plans or as specified herein.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. The amount bid per EACH for RIGID PVC LOOP DETECTOR shall include all costs for furnishing and installing an operable loop detector system as indicated on the plans or as specified herein.

1.3 SPECIFICATION REFERENCES

A. MnDOT 2565 - Traffic Control Signals.

B. MnDOT 3803

C. MnDOT 3815

D. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be from the MnDOT Approval/Qualified Products List.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. **Loop Testing Prior to Milling**

Prior to roadway milling and overlaying operations the existing Preformed Rigid PVC Conduit Loop Detectors will be tested by the Contractor to determine if the loops are operational.

1. If any of the loops are found to be non-operational, then repair the loops or replace the loops as Extra Work in accordance with 1402, all to the satisfaction of the Engineer.

2. If the loops are found to be operational during initial Department testing, then any resultant damage to the loops during the construction process is the responsibility of the Contractor and requires reporting to the Engineer upon discovery.

3. At the Engineer's discretion, repair or replace, without delay, the damaged loop in accordance with MnDOT specifications, all at no expense to the Department.

4. Install any new loops prior to the final wear course being placed.

B. **Loop Detectors**

2565.3G "Loop Detectors" is deleted and replaced with the following:

Furnish and install saw cut and preformed rigid PVC conduit loop detectors as specified in the Contract, at the locations shown on the Plans, and in accordance with MnDOT Spec. 3803.2A "Rigid Polyvinyl Chloride (PVC) Conduit, MnDOT Spec. 3815.2B.2 "PVC Loop Detector Conductors", and MnDOT Spec. 3815.2B.3 "Saw Cut Loop Detector Conductors".

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Install loop detector conductors without splices except in handholes as specified on the Plans. The Engineer may make minor adjustments to the size and shape of saw cut loop detectors in the field at no additional cost to the Department. Install four turns of loop detector conductor for each detector. Install saw cut loop detector conductors in a clockwise direction. Remove any loop detector conductor slack within the loop detector.

Provide an additional 6 feet to 10 feet of conductor length for the loop detector conductor run leading from the detector to the handhole and twist the conductors together three turns per foot. Place the twisted conductors in rigid PVC conduit to the handhole as shown on the Plans. Use an approved method in accordance with the NEC for field bending conduit to the handhole. Do not use an open flame device.

For saw cut loop detectors use an approved loop detector sealant listed on MnDOT's APL-Signals to install into the saw cut.

Before splicing in the handhole, clean and prepare the loop detector conductors and loop detector lead-in cable. Cut the drain wire off the loop detector lead-in cable at the point where it exists the cable jacket at the end of the cable assembly. Solder the ends of loop detector conductors to the ends of loop detector lead-in cable and terminate using the appropriate size wire nuts before placing inside the mold body of the splice kit. Abrade the surface of the lead-in cable out jacket to allow for greater adhesion to the splice kit resin.

Use approved loop detector splice encapsulation kits listed on MnDOT's APL-Signals for roadway loop detector and loop detector lead-in conductor splices. Install the loop detector splice encapsulation kit in accordance with the splice kit manufacturer's installation instructions or obtain Engineer's approval to use an alternative installation method. Ensure the end of the loop detector lead-in cable jacket is encased in the loop detector splice encapsulation mold and resin to form a watertight seal. Suspend and secure the resin splices towards the top of the hand hole as shown on the Plan or as directed by the Engineer. Do not place the encapsulated resin splices on top of cables and conductors.

Terminate the loop detector lead-in cable assembly to the terminals located in the traffic control signal cabinet as shown on the Plan's cabinet print.

******END OF SECTION******

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ELECTRICAL TECHNICAL SPECIFICATIONS

for

2026 PMP Street & Utility Improvements

(Applies to Portions of Alternates 1-4)

City of Arden Hills

Arden Hills, MN

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. Section Includes, but not limited to:
   1. General Requirements for Electrical
   2. Equipment and Materials
   3. General Workmanship and Installation Requirements for Electrical.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 0 and Division 01 Specification Sections apply to this Section.

B. Division 26: Electrical

C. When a Specification Section refers to other Sections under the Article on Related Sections, this is for Contractor's convenience. It shall in no way relieve the Contractor of responsibilities stated in other Sections of the Specifications, even though these Sections are not referenced. The Contractor is responsible for all information contained in this Division's Specifications as well as for information contained in all other Divisions.

1.3 REGULATORY REQUIREMENTS

A. Meet or exceed all current applicable codes, ordinances, and regulations for all installations. Promptly notify the Engineer, in writing, if the contract documents appear to conflict with governing codes and regulations. Contractor assumes all responsibility and costs for correcting non-complying work installed without notifying the Engineer.

B. Higher quality of workmanship and materials indicated in the Contract Documents takes precedence over that allowed in referenced codes and standards.

C. Perform all work in compliance with the currently adopted version of the following codes and standards for this project:
   1. Energy Codes and Standards:
      a. International Energy Conservation Code (IECC)
      b. Illuminating Engineering Society of North America (IESNA)
      c. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE 90.1)
   2. International Code Council:
      a. International Building Code (IBC)
      b. International Fire Code (IFC)
   3. National Fire Protection Association Codes and Standards:
      a. NFPA 70 - National Electrical Code
      b. NFPA 72 - Fire Alarm Code
      c. NFPA 101 - Life Safety Code
   4. National Electrical Safety Code (ANSI C2)
   5. City, State and Local Building Codes and Ordinances
   6. City, State and Local Fire Codes and Regulations
   7. Occupational Safety and Health Administration Regulations (OSHA)
   8. Americans with Disabilities Act (ADA)
   9. Uniform Federal Accessibility Standards
   10. State Department of Health Codes and Regulations
   11. Testing Agencies:
      a. Underwriters Laboratory
      b. Intertek ETL

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1.4 REFERENCES

A. Use the latest edition of the standard or the edition required by governing code were referenced in the specifications by the following abbreviations:
   1. ANSI American National Standards Institute:
      a. C2 - National Electrical Safety Code.
      b. C62.41-IEEE - Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
   2. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
   3. CBM – Certified Ballast Manufacturer
   4. EPA-Environmental Protection Agency
   5. ETL – Electrical Testing Laboratory
   6. ICEA - Insulated Cable Engineers Association:
      a. S-95-658 - Thermoplastic-Insulated Wire and Cable.
      b. S-65-375 - Rubber-Insulated Wire and Cable.
   7. IEEE Institute of Electrical and Electronic Engineers:
      a. 112 - Standard Test Procedure for Polyphase Induction Motors and Generators.
      b. 519 - Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.
   8. IES - Illuminating Engineering Society
   9. NBFU - National Board of Fire Underwriters
   10. NECA – National Electrical Contractor's Association:
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   11. NEC - National Electrical Code
   12. NECA – National Electrical Contractors Association:
      a. NECA 101 – Standard for Installing Steel Conduit
      b. NECA 102 – Standard for Installing Aluminum Rigid Metal Conduit.
      c. NECA 111 – Standard for Installing Nonmetallic Raceways (RNMC, LFNC).
   13. NEMA National Electrical Manufacturers Association:
      a. TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
      b. MG 1 - Motors and Generators.
      c. PB 2 - Deadfront Distribution Switchboards.
      d. ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2,000 Volts AC or 750 Volts DC.
      e. 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
      f. WC 5 - (See ICEA S-95-658).
      g. WC 7 - (See ICEA S-95-658).
   14. NESC – National Electric Safety Code
   15. NFPA National Fire Protection Association
   16. OSHA Occupational Safety and Health Administration:
      a. 29 CFR 1910 - Occupational Safety and Health Standards.
   17. UL Underwriters' Laboratories, Inc.:
      a. UL-6 - Rigid Metal Conduit.
      b. UL-83 - Thermoplastic - Insulated Wires and Cables.
      c. UL-360 - Liquid-Tight Flexible Steel Conduit.
      d. UL-467 - Electrical Grounding and Bonding Equipment.
      e. UL 486D - Insulated Wire Connector Systems for Underground Use or In Damp or Wet Locations.
      f. UL-508 - Industrial Control Equipment.
      g. UL-651 - Schedule 40 and 80 Rigid PVC Conduit.
      h. UL-810 - Capacitors.
      i. UL-891 - Dead-Front Switchboards.
      j. UL-913 - Intrinsically Safe Apparatus and Associated Apparatus for Use In Class I, II, and III, Division 1, Hazardous (Classified) Locations.

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k. UL-1008 - Transfer Switch Equipment.
l. UL-1012 - Power Units Other Than Class 2.
m. UL-1277 - Electrical Power and Control Tray Cables With Optional Optical Fiber Members
n. UL-1449 - Surge Protection Devices
o. UL-1479 - Fire Tests of Through-Penetration Firestops.

1.5 DEFINITIONS

A. The terms defined below apply to all work included in Division 26.
1. The work – The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.
2. Furnish – to obtain in new condition ready for installation into the work.
3. Install – to store, set in place, connect, and place into operation into the work.
4. Provide – to furnish and install.
5. Connect – to bring service to the equipment and make final attachments including necessary switches, outlets, boxes, terminations, or other final connections.
6. Conduit – includes in addition to conduit, all fittings, pull boxes, hangers and other supports and accessories related to such conduit.
7. Concealed – hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces or buried.
8. Exposed: not installed underground nor concealed as defined above.
9. Building structure or building structural members - consists of steel columns, steel beams, steel joists (top chord and at panel points), concrete walls and concrete block walls. Metal decking, joist bridging, and bottom chords of bar joists shall not be construed as building structure nor as a building structural member for the purpose of support.

B. The drawing and specifications constitute the Contract Documents. Any item noted in the specification or shown on the drawings is part of the Contract Documents.

C. The contractor shall field-verify all dimensions and notify the Engineer of any conflicts or discrepancies, in writing, prior to submittals and installation. If prior notification is not provided, Contractor is responsible for resolution of all dimensional conflicts.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Initiate, maintain, and supervise all safety precautions required with this work in accordance with the regulations of the Occupational Safety and Health Administration (OSHA) and other governing agencies.

B. Environmental Requirements:
1. Do not remove or disturb any asbestos containing materials from the project. Immediately stop work and notify the Owner if asbestos containing materials are suspected.
2. Do not dispose of any PCB containing materials. Disposal of all PCB containing materials will be the responsibility of the Owner.

C. Provide new, first quality material for all products specified. Do not reuse materials unless indicated or approved by the Engineer.

D. The contractor shall have knowledge of the latest edition of NFPA 70 (NEC) and additional governing codes. In addition to the work shown in the Contract Documents, Contractor shall provide all work to comply with these references. Additional services will not be awarded for Contractor to perform work to satisfy the AHJ inspection comments. All work is to be included in Base Bid.

E. Provide equipment specified in this section which is listed and labeled by a nationally recognized testing laboratory.

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F. Comply with ANSI as applicable to equipment specified in this section.

G. Comply with NEMA as applicable to equipment specified in this section.

H. Provided SCCR ratings/labels shall show equipment has SCCR values exceeding the available short circuit current at the equipment connection point. Where short circuit current is not identified in the Contract Documents, the contractor is responsible for providing the necessary calculations for coordination.

1.7 PROJECT/SITE CONDITIONS

A. Site Inspections:
   1. Before submitting a proposal on the work contemplated, examine the site of the proposed work, and become thoroughly familiar with existing conditions and limitations. No extra compensation will be allowed because of misunderstanding as to the amount of work involved nor bidders' lack of knowledge of existing conditions which could have been discovered or reasonably anticipated prior to bidding.
   2. Conduits, pipes, ducts, lights, devices, speakers, etc., shown on the drawings as existing have been based on existing plans and casual site observations, and may not be installed as originally shown. It is the Contractor's responsibility to visit the site and make an exact determination of the existence, location, and condition of such facilities prior to submitting a bid.

B. Correlation of Work:
   1. Consult the drawings and specifications of all other Divisions for correlating information and lay out work so that it will coordinate with other trades. Verify dimensions and conditions (i.e., finished ceiling heights, footing and foundation elevations, beam depths, etc.) with all drawings. Notify the Engineer of any conflicts that cannot be resolved, in the field, by affected trades. Replacement of work due to lack of coordination and failure to verify existing conditions will be completed at no cost to the Owner.
   2. Install all conduits, cable tray, busduct, equipment, etc. allowing proper code and maintenance clearances and to avoid blocking passageways and access panels.
   3. Where work must be replaced due to the failure of the Contractor to verify the conditions existing on the job, such replacement must be accomplished at no cost to the Owner. This applies to shop fabricated work as well as to work fabricated in place.
   4. Throughout the course of the work, minor changes and adjustments to the installation may be requested by the Engineer. The Contractor shall perform adjustments without additional cost to the Owner, where such adjustments are necessary to the proper installation and operation within the intent of the Contract Documents. This does not include work already completed.
   5. Obtain exact location of connection to equipment, furnished by others, from the person furnishing the equipment.
   6. Include better quality, greater quantity or higher cost for an item or arrangement where a disagreement exists in the drawings and specifications.

C. The Contract Documents shall govern in the instances where requirements indicated are greater than those stated in the governing codes and standards.

1.8 FIRESTOPPING

A. Provide firestopping around all new penetrations, sleeves and openings through all partitions, walls, and floors.

B. Provide UL listed components installed by certified and factory trained personnel.

1.9 SEQUENCING AND SCHEDULING

A. Refer to General Conditions and Requirements.

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1.10 EQUIPMENT INSTRUCTIONS AND PARTS LITERATURE

A. Instruction and parts literature are generally packed with electrical equipment and devices. Contractors shall remove this literature from the packing container or equipment enclosure, identify the literature with the equipment to which it applies, and file the literature in loose-leaf binders with index tabs. Each binder shall have an index which lists each piece of equipment and the literature which applies to it. An index tab shall be provided for each piece of equipment.

B. Contractors shall establish a procedure with the other trades for receiving, identifying, and filing literature for devices which are removed from their packaging and installed by other trades.

1.11 SUBMITTALS

A. Submit the following items consistent with Division 0 and Division 1. Refer to each Section under Division 26 for additional submittal requirements particular to that Section.

B. Prior Approvals:
   1. Submit approval form for each request for prior approval.
   2. Submittals shall be formally presented to the Project Engineer. Submittals presented to the Engineer prior to approval of Owner Representative will not be reviewed or accepted.
   3. Submit electronic, written requests to use unspecified items, to the Engineer, no later than four (4) calendar days prior to the bid opening. Submit detailed information for proposed material or equipment specific to the project, clearly indicating all options included in the submittal.
   4. Accepted substitutions will be incorporated in an Addendum to the Contract Documents.
   5. The contractor is responsible for dimensional differences, electrical requirements, and any other resulting changes, when using accepted substitutions. The contractor is responsible for any additional costs incurred because of substitutions, including other contractors and Engineer fees.
   6. Material and equipment not specified or accepted in an Addendum will be removed and replaced at no cost or inconvenience to the Owner.

C. Work Scope Change:
   1. If a work scope change is requested and Contractor would like to be awarded additional compensation or a deduct from original contract is requested, Contractor shall provide a schedule of values for all associated proposed work.
      a. Pricing shall be grouped to represent each itemized work scope change.
      b. Each piece of equipment shall be itemized, along with cost of item. Labor to install said item shall be presented on a separate line item.
      c. Provide a final lump sum number for all work associated with the change and individual pricing for each item on the schedule of values.
      d. Engineer may request additional breakdown for improved clarity and Contractor must comply prior approval for the additional compensation or credit.
      e. Comply with the requirements set forth in Division 0 and Division 1.
   2. The contractor shall provide actual manufacturer and distributor invoices showing cost of work affected by the work scope change upon request of Engineer and/or Owner representative.
   3. Contractor is solely responsible for delays in schedule where Contractor is required to resubmit documentation, revise requested documentation or provide additional information associated to gaining approval for the work scope change.

D. Shop Drawings and Manufacturer's Information:
   1. Submit in accordance with Division 0 and Division 1. Unless noted otherwise, submit drawings to the Engineer for review within 30 calendar days after award of Contract.
   2. Provide digital copy in a PDF format:
      a. Files shall be accessible and neatly organized.

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b. Provide a table of contents which utilizes bookmarks and links. The links shall take the reader to a specific page when the reader clicks on the desired title in the table of contents. A link shall be provided for materials associated with each piece of equipment included in the O&M manual.
c. Product literature which demonstrates compliance with the specifications shall be highlighted or otherwise identified to be easily found.

3. Provide separate files for each submittal for each section. Combination submittals will be returned to the Contractor without review and count as 1 submittal. Do not combine submittals from multiple sections.
4. Include project name, name of Engineer, contractor, sub-contractor, manufacturer, supplier, and sales representative, include name, address, and phone number for the sales representative. Clearly identify section number and description of equipment submitted. Shop drawings not including all this information will be returned without review, and count as 1 submittal.
5. Examine all shop drawings noting capacity, arrangement, and physical dimensions. Clearly mark all relevant items on catalog data and cross-out unrelated information.
6. Submittals for equipment provided by the Electrical Contractor shall bear a stamp or specific written certification from the Electrical Contractor, certifying the submittals have been reviewed and approved by the submitting Electrical Contractor.
7. Provide the following shop drawing and manufacturer information:
   a. Product Data Sheets:
      1) Product and component data sheets which describe all equipment and devices to be provided.
      2) Include all features specified.
      3) Provide dimensioned prints with weights.
      4) Highlight or otherwise accentuate on each data sheet the specified product features and product numbers.
      5) Features or part numbers which do not apply shall be struck through, crossed out, blacked out, or otherwise identified as not applicable.
   b. Composite Drawing:
      1) Include power and control wiring for all systems and equipment.
      2) Show basic systems on composite drawing.
      3) Use terminal numbers on drawings and schematics.
      4) Use separate drawings to show details of sub-systems.
      5) Identify sub-system drawing interface points on composite drawing and sub-system drawings; terminal numbers of interface points shall be the same on both drawings.
      6) Revise or redraw manufacturer's standard drawings to meet above requirements.
   c. Record all Changes to Existing Systems:
      1) Revise all wiring diagrams and schematic diagrams to show final installation:
         a) Includes all new and existing equipment diagrams.
   d. Programmable Systems:
      1) Description of programmable system operation, including but not limited to input/output functions, control capabilities, configuration procedures, starting setpoints, etc.
      2) Preliminary graphic screens and reports.
         a) This submittal shall occur prior to shipment of the system.
   e. Manufacturers Installation Instructions:
      1) Include with shipment.
8. If the Engineer rejects (Make corrections noted/Submit corrected copy, Rejected/Submit specified item) two (2) times for material under the same section the Engineer will be compensated for the additional reviews. Compensation will be incorporated by Change Order and deducted from the Contractor's application for payment. The contractor is solely responsible for any project delays caused by having to resubmit submittals.

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E. Operating and Maintenance Manuals:
   1. Include all the information provided with the approved shop drawings and manufacturer's information.
      a. Update and complete control system drawings and descriptions for all equipment.
      b. All documentation shall include modifications made which reflect the final installation.
      c. Provide all completed testing reports.
   2. Date the manuals with the day, month, and year they are provided to the Owner/Engineer.
   3. Provide manufacturers' user manuals and installation instructions.
   4. Provide 2 digital copies in a PDF format saved to an USB drive. The saved files shall be clearly identified and organized in a similar manner to the hard copies.
      a. Digital files shall be accessible and neatly organized.
      b. Provide a table of contents which utilizes bookmarks and links. The links shall take the reader to a specific page when the reader clicks on the desired title in the table of contents. A link shall be provided for materials associated with each piece of equipment included in the O&M manual.
   5. Record all Changes to Existing Systems.
   6. Insert revised documents into the Owner's existing operation and maintenance manuals in place of original documents, if such O&Ms exist.

F. Record Documents:
   1. Provide three sets of hard copy record documents and two digital pdf copy. Record Drawings shall be of the same size as the original published contract drawings.
   2. Shall be provided with the O&M's.
   3. Record drawings shall include all work scope changes, including addenda.
   4. Record drawings shall show locations of all above ceiling control devices, such as relays, contacts, control modules, monitor modules, power packs, fire/smoke detection equipment, etc.
   5. Refer to Contract Documents for additional Record Drawing requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All electrical and control equipment and materials shall be provided as specified in the Contract Documents.

B. All equipment and materials shall be new and shall bear the Underwriters Laboratories (UL) label if such products are listed by UL.

C. Where applicable, equipment and materials shall conform to ANSI, ICEA, IEEE, and NEMA Standards.

2.2 HAZARDOUS LOCATIONS

A. An area identified where fire or explosion hazards may exist due to flammable gases, flammable liquid-produced vapors, combustible liquid-produced vapors, combustible dusts or ignitable fibers/flyings.

B. Installations in areas identified as hazardous locations, at a minimum, meet the requirements of the latest edition of the National Electrical Code (NFPA 70). Where specifications are more conservative than the National Electrical Code requirements, the specification shall be followed.

C. Refer to drawings for hazardous location identifications.

D. All installations in Class 1, Division 1 and 2 hazardous locations shall meet the NEC requirements for a Class 1, Division 1 hazardous location. Unless noted otherwise.

2.3 CORROSIVE ENVIRONMENTS

A. A corrosive environment is an area or space which there are gases, vapors, liquids, or other material cause a caustic effect on materials, more so than standard air.

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B. All products supplied in corrosive environments shall be suitable for installation and resist corrosion which may be caused by the potentially present caustic agent.

C. The following areas shall be considered as a corrosive environment.
   1. Storm lift station wetwell.

PART 3 - EXECUTION

3.1 CONSTRUCTION LIGHTING & POWER SYSTEM - REMODELING

A. Provide construction power and lighting that adheres to the NEC Article 590 – "Temporary Installations."

B. Refer to Division 1 for temporary electrical services.

C. For remodeling work use existing distribution systems for construction power.

D. Replace all receptacles, switched, cover plates, etc., damaged by any Contractor during construction.

E. Materials furnished for the temporary light and power system remain Contractor's property. Remove when there is no longer any need for temporary light and power or when directed by the Project Representative.

F. The Owner shall pay electrical energy costs.

3.2 PREPARATION

A. Continuity of Service:
   1. No Division 26 systems are to remain inactive at the end of the workday. Assure that the systems are all operational at the end of each workday. Coordinate temporary outages with the Owner.
   2. Coordinate/schedule all work with the Owner to minimize any disruptions. Confine all interruptions to the smallest possible area. Provide temporary connections if required to provide continuity of service.
   3. Inspect all areas affected by the interruptions and return all automatically controlled equipment, electrically operated equipment to the same operating condition prior to the interruption.

B. Use of Facility:
   1. Do not disturb normal use of the facility, except within the immediate construction area. Keep walks, driveways, entrances, etc. free and clear of equipment, material and debris.
   2. Store all equipment and material in a place and manner that minimizes congestion and is approved by the Owner.

3.3 INSTALLATION

A. Material and Workmanship
   1. Provide new material and equipment, unless noted otherwise. Protect equipment and material from damage, dirt, and the weather.
   2. Provide the highest quality workmanship and perform all work only by skilled mechanics. Install material and equipment in accordance with manufacturers' recommendations, instructions and current NECA standards.
   3. The Engineer reserves the right to reject material or workmanship not in accordance with the specifications, before or after installation.
   4. Engineer and Owner have the right to determine if equipment, boxes and covers are not accessible. Where electrical work is determined to be not accessible, Contractor shall modify the work as directed at no additional cost to the Owner.

B. Excavation and Backfilling:
   1. Provide all excavation and backfilling required to complete the installation of the electrical system. Conform with the provisions of Division 31 Earthwork of these specifications for all work.

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2. Bed all conduit and structures on a 6" thick compacted layer of granular material. Should unsatisfactory soil conditions be discovered, the Owner Representative will inspect the excavation and determine the necessary additional support required.
3. Backfill around conduit and structures by hand using coarse sand, pit run gravel or the native material if it is like the above. Remove all large stones, frozen lumps, perishable rubbish, and excessive amounts of clay. Carefully compact this material in 6" layers to a depth of 8" above the conduit, cable, or duct. Compact to not less than 90% outside the building and 95% within the building limits of maximum density given by ASTM D698-70T (Standard Proctor Density). Owner Representative reserves the right to require soil compaction tests in any areas which do not appear to be compacted properly with the cost of the test paid by the Contractor.
4. Replace all existing surface improvements (i.e., street pavement, curbs, sidewalks, finish sodding, etc.) removed or damaged in the course of the work unless such improvements are to be reconstructed under the general contract. Make all necessary arrangements to perform such repairs, pay all costs in connection therewith and include them in the bid.

C. Cutting and Patching:
1. Perform all cutting and patching necessary to work, unless specifically delegated to be performed under a different Division.
2. Obtain special permission from the Engineer before cutting structural members or finished material.
3. Perform all patching in a manner as to leave no visible trace and return the area affected to the condition of undisturbed work. Perform all patching by workers experienced, skilled, and licensed for the work involved. Work deemed unacceptable by Engineer or Owner Representative will not be accepted.
4. Patch all holes left because of demolition of electrical equipment and devices.
5. Drill all holes in masonry with rotary drill. Impact tools are not allowed. Core drill all holes in masonry and concrete for electrical raceway. Provide and dispose of all water required for core drilling. Coordinate with other trades to prevent damage from water.
6. Prevent the spread of dust, debris, and other material into adjacent areas.

D. Painting:
1. Refinish all electrical equipment damaged during shipping and/or installation to its original condition. Remove all rust; prime, and paint per manufacturer's recommendations for finish equal to original.

E. Coordination:
1. Coordinate the location of all outlets and associated equipment with all systems before installation. Work which must be replaced due to the failure of the Contractor to verify the job conditions and coordinate with other disciplines shall be completed at no additional cost to the Owner.
2. Coordinate all door swings in the field before locating devices.
3. Coordinate all equipment dimensions before submitting equipment. This includes all shop fabricated work as well as work fabricated in place. It shall be assumed that equipment submitted has been coordinated by Contractor and the submission indicates Contractor verifies equipment will fit in allocated location space. If Contractor believes there is or finds a workspace issue, Contractor shall notify Engineer prior to submitting equipment. Replacement or modification of equipment and/or space due to lack of coordination and failure to verify existing conditions shall be completed by the Contractor at no additional cost to the Owner.
4. The contractor shall be responsible for obtaining the exact location of connection to equipment furnished by others, from the person furnishing the equipment.
5. The contractor is responsible for coordinating elevator equipment ratings with the elevator equipment supplier. Incorrect equipment installation due to failure to coordinate equipment ratings shall be replaced by Contractor at no additional cost to Owner.

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6. If conduit, wiring or equipment cannot be installed as specified, including but not limited to installing concealed or in designed space, Contractor shall notify Engineer with ample time to review the request before Contractor purchases and/or installs such equipment. Owner and Engineer cannot and will not be held responsible for delays in project for Contractor failure to provide ample notice to review and respond to the potential issue.

3.4 FIRESTOPPING

A. Provide firestopping around all new penetrations, sleeves and openings through all partitions, walls, and floors.

B. Install firestopping on both sides of each partition, completely filling the void around the opening.

C. The firestopping of interior of conduits and sleeves is by the contractor providing the cabling inside the conduit or sleeve.

3.5 RECEIVING AND STORING EQUIPMENT

A. All equipment shall be handled and stored in accordance with the manufacturer's instructions.

B. In general, equipment packaging is not designed to protect the contents for outdoor storage. As a minimum, Contractor shall store the equipment prior to installation in a clean, dry location free from excessive temperatures, humidity, or foreign materials normally encountered at a Site. If the storage facility is unheated, Contractor shall provide heating to protect equipment from condensation, which could cause components to corrode or to be otherwise damaged.

3.6 EQUIPMENT MOUNTING

A. Unless noted otherwise, equipment which is not free-standing shall not be mounted on wood panels, but shall be attached to concrete or masonry walls, support channels, or building structural steel.

3.7 FIELD QUALITY CONTROL

A. Refer to Contract Documents for additional requirements.

B. Final Observation:
   1. A final inspection of the electrical systems will be required before the Contract can be closed out. Request a final inspection by the Engineer after all systems are fully completed and operational. The Engineer will schedule an observation and generate a list of items to be corrected or completed before Contract Closeout. If the Contractor notifies the Engineer the work is ready for final observation, final evaluation of control systems, or commissioning exercise by the Contractor, and the Engineer finds the work is not complete enough to perform that observation, the Contractor will compensate the Engineer time used. The Contractor will then perform the necessary work to complete the project and again request a Final Observation.

3.8 CLEAN UP

A. Keep the premises free from accumulation of waste material or rubbish, caused by his employees or work, always. Remove rubbish, tools, scaffolding, and surplus materials from and about the building, and leave work areas "broom clean" or its equivalent upon completion of the work. Clean electrical equipment and remove temporary identification. In case of dispute the Owner will remove the rubbish and charge the cost to the Contractor.

B. After tests have been made and accepted clean light fixtures, panels and other equipment installed by the Contractor, leaving the entire work area in a clean and complete working order.

3.9 PROTECTION

A. Cover openings and equipment, where set, to prevent obstruction to conduits, breakage, misuse, or disfigurement of equipment. Cover openings in equipment immediately upon uncrating or receipt at the job site and keep covered until permanent connection is made.

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B. Contractor is responsible for any damage to electrical equipment or materials until final acceptance of the entire project by the Owner. Keep all equipment clean materials until final acceptance of the entire project by the Owner.

C. If a portion of the project is to be occupied by the Owner prior to Substantial Completion of the entire project make arrangements with the Owner to transfer responsibilities for protection and housekeeping.

**** END OF SECTION ****

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SECTION 26 05 10 - SELECTIVE ELECTRICAL DEMOLITION

PART 1 -- GENERAL

1.1 SUMMARY

A. This Section includes all labor, material, equipment, and services necessary and incidental to complete all the selective and or complete demolition and removal of electrical systems in the areas of remodeling or affected by remodeling, and the rework and extension of electrical systems indirectly affected by electrical system served “downstream” from the demolished electrical systems.

1.2 REFERENCES

A. Sections 26 05 00 and all references contained therein form a part of this Section of the Specifications.

PART 2 -- PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Demolition Drawings are diagrammatic and based on casual field observation and existing record documents. Report discrepancies to Owner Representative before disturbing existing installation.

B. Examine the building to determine actual conditions and extent of work prior to bidding on the project. Refer any unclear details or conflicts to the Owner Representative for clarification prior to bidding the drawings.

C. Refer to all documents for additional demolition requirements which may be required to include in the bid.

D. Verify that field measurements and circuiting arrangements are as shown on Drawings.

E. Verify that abandoned wiring and equipment serve only abandoned facilities.

F. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Coordinate phasing of the demolition work with the construction sequence schedule.

B. Coordinate utility service outages with Utility Company.

C. Erect, and maintain temporary safeguards, including warning signs and lights and barricades for protection of the public, Owner, Contractor’s employees, and existing improvements to remain.

D. Provide temporary emergency lighting and illuminated exit signage as required by the Building Official or AHJ.

E. Electrical Service:
   1. Notify and obtain permission from Owner Representative at least 24 hours before partially or disabling system.

F. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.

G. Conduct demolition to minimize interference with adjacent and occupied building areas.

H. The contractor assumes responsibility if damage occurs to all devices to be reinstalled. If Contractor finds a damaged piece of equipment prior to demolition, Contractor shall note the equipment and notify the Owner’s Representative and Engineer prior to removing the items. If Contractor does not

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provide the proper notification, Contractor will be held responsible for repairing or replacing the damaged equipment.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. The owner reserves the right of first refusal to obtain material shown to be removed under this contract. Items not retained by the Owner become the property of the Contractor and must be removed from the premises and disposed of at no additional costs to the Owner.

B. Demolish and extend existing electrical work under and this Section or as indicated on the Drawings. Remove devices, conduit, wire, boxes, and fastening devices to avoid any interference with new installation.

C. Demolish and remove all electrical systems indicated for demolition. No portion of these systems may be abandoned in place.

D. Remove abandoned wiring to source of supply.

E. Remove exposed abandoned conduit.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Repair adjacent construction and finish damaged during demolition and extension work.

H. If conductors are required to be removed from existing raceways, install with new conductors.

3.4 CLEANING AND REPAIR

A. Prior to reinstallation of used equipment, thoroughly inspect each item and report any defects to the Owner Representative in writing. Instructions for corrective measures will be given at the time and the Contract amount adjusted accordingly. If no defects are reported, the material will be included under the contractor's one-year guarantee.

B. Equipment: Clean exposed surfaces and interior. Check tightness of electrical connections.

C. Repair adjacent construction and finishes damaged during demolition and extension work.

3.5 INSTALLATION

A. Install relocated materials and equipment as indicated on the drawings.

**** END OF SECTION ****

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SECTION 26 05 19 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes, but not limited to:
   1. Wire
   2. Multi-conductor Instrument Cable.
   3. Terminals and connectors.
   4. Installation.
   5. Splices, Taps, and Terminations.
   6. Identification.

1.2 REFERENCES

A. Section 26 05 00: Common Work Results for Electrical

1.3 SUBMITTALS

A. Submit shop drawings and descriptive data in accordance with Section 26 05 00.

PART 2 - PRODUCTS

2.1 WIRE

A. All wire and cable shall be:
   1. New and coiled or on reels.
   2. Each coil and/or reel shall have a label with the manufacturer's name, trade name of wire, size of wire, and UL label.

B. Provide conductors with a 90ºC insulation system, 600-volt rating, U.L. approved and listed for specific application.

C. Feeder and Branch Circuit Wire:
   1. Stranded conductor, unless noted otherwise.
      a. Solid copper conductors shall be used for lighting and convenience receptacle circuits.
   2. THWN insulated for conductor sizes #4 AWG and smaller.
   3. XHHW or THWN insulation for conductor sizes #3 AWG and larger.

D. Provide minimum No. 14 AWG conductor size, unless noted otherwise.
      a. Wiring for power circuits shall not be less than 12AWG in size, unless noted otherwise.
      b. Unless otherwise specified elsewhere in these specifications, control wiring shall be not less than No. 14 AWG.
      c. Control wiring shall be sized such that the voltage drop under in-rush and continuous operation conditions does not adversely affect operation of the controls.

E. All conductors to be copper; aluminum conductors will not be allowed.

F. All cables in wetwell shall be protected by Techflex Flexo heavy duty rodent resistant braided sleeve, or equal product to protect cables from rodent damage.

2.2 MULTI-CONDUCTOR INSTRUMENT CABLE

A. 2-conductor, 3-conductor, or 4-conductor as required by the process or equipment.

B. Twisted shielded cable, Aluminum foil shield and drain wire.

C. Stranded tinned copper conductors, minimum size of #16 AWG copper.

D. Polyethylene color-coded insulation.

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E. Overall PVC or neoprene jacket which is resistant to oil, ozone, moisture, and sunlight.

F. Contractor shall verify cable and signal requirement with equipment manufacturer recommendations. Special instrument and signal cable shall be provided with the equipment which requires them.

2.3 WIRE COLOR CODING

A. Contractor may use color coding at his discretion, except for the following colors, which shall be used only as designated below for both power and control circuits.
   1. Control Circuits
      a. Dark Blue - Direct current circuits.
      b. Light Blue - Intrinsically safe conductors.
      c. Green - Grounding conductor.
      d. White - Neutral conductor.
   2. Power Circuits

	120/240V	208Y/120V	480Y/277V
Phase A	Black	Black	Brown
Phase B	Red	Red	Orange
Phase C		Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green

   3. Use solid colors through Size No. 8 AWG.
   4. Use black conductors with tape color identification No. 6 AWG and larger.

2.4 TERMINALS AND CONNECTORS

A. Tool compressed terminals and connectors shall be made of 1 piece seamless highly conductive copper with a uniform tin-plate coating to minimize corrosion.

B. Step-down adapters shall be copper compression type.

C. Electrical spring connectors:
   1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for application used.
   2. The integral insulator shall have a skirt to completely cover the stripped conductors.

D. Electrical push-in connectors:
   1. Nylon/PC housing material.
   2. Copper contacts with tin plating.
   3. Rated for 221-degree F.
   4. 2,3 or 4 port as needed per circuit. Do not provide unused ports.
   5. Sized per wire gauge.
   6. To be used with wire gauge 12 and smaller.
   7. UL Listed.
   8. Manufacturer:
      a. Ideal
      b. Or pre-approved equal.

E. Fork Terminals:
   1. Vinyl or nylon self-insulated locking type.
   2. Terminal insulation that supports wire insulation.

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3. Manufacturer:
    a. Thomas & Betts Type FL
    b. Burndy Type TP-LF
    c. Panduit Type PNF
    d. 3M Type MNG.

F. Electrical Tape:
1. UL Listed.
2. Weather resistant.
3. Moisture resistant vinyl.
4. Rated for the voltage system which it is applied.
5. Temperature rating suitable for the application on which it is applied.

G. Motor Connection Kit:
1. UL Listed.
2. Qualified to ANSI standards.
3. Rated to withstand 1000V.
4. For use on in-line or stub motor lead splices.
5. Resistant to abrasion.
6. Installed per manufacturer's recommendations.

H. Underground Splices for No. 10 AWG and Smaller:
1. Solderless, screw-on, reusable pressure cable type, with integral insulation. Listed for wet locations and approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped conductors.
3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

I. Underground Splices for No. 8 AWG and Larger:
1. Mechanical type, of high conductivity and corrosion-resistant material. Listed for wet locations and approved for copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. The insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be products of the same manufacturer.

2.5 CONDUCTOR PULLING COMPOUND

A. Rated for use with conductor insulation and conduit material.

B. Non-conductive.

C. Non-cementing.

D. Dry to a fine lubricating powder or a thin film which does not harden in conduit.

E. UL Listed.

F. Rated for repeated exposure to high heat or freezing temperatures.

2.6 CONDUCTOR IDENTIFICATION

A. Imprinted labels
1. UL Listed.
2. Machine typed in blank ink.

B. Label Sleeves
1. Non-burning.
2. Heat-shrinkable.
3. Clear.
4. UL Listed.

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C. Self-Laminating
   1. Vinyl.
   2. Wrap around.
   3. Acrylic adhesive.
   4. Water and Oil Resistant.
   5. UL Listed
   6. Machine typed in blank ink.

D. Manufacturers:
   1. Brady
   2. 3M
   3. Raychem TMS
   4. Thomas & Betts E-Z Code

PART 3 - EXECUTION

3.1 WIRE INSTALLATION

A. Install conductors in accordance with the NEC, as specified, and as shown on the drawings.

B. Install all conductors in a continuous raceway system.

C. Splice conductors only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.

D. Pulling compound shall be approved by the cable manufacturer.

E. Conductors of different voltage systems shall not be installed in the same raceway.

F. Examine all wires before installation. Do not use any wire with insulation that is damaged in any way.

G. Do not pull wire into the conduit until the conduit system is complete. Pull all conductors into the raceway at the same time.

H. Adequate measures shall be employed to determine that the raceways are free of foreign material and moisture before pulling wire or cable.

I. Test all cable and wire for continuity and for shorts prior to energizing any circuits.

J. Conductors shall extend at least 4” past the point of the cover on any junction or pull box installed.

K. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

L. Conductors shall be without splice from termination to termination, unless indicated otherwise on the Drawings.

M. Provide an equipment grounding conductor with each circuit.

N. The use of a shared neutral on multiwire branch circuits will not be allowed. Each circuit shall be provided with its own neutral conductor(s), unless noted otherwise in the Contract Documents.

O. The contractor shall provide conductors with the appropriate rating and quantity for each circuit.
   1. Voltage Drop Calculations:
      a. Wire shall be sized for a voltage drop no greater than 2% measured for circuits used to feed panelboard, distribution panels, switchboards, and service equipment.
      b. Wire shall be sized for a voltage drop no greater than 3% measured from the feeder panelboard or switchgear to its point of load termination.
      c. Contractor shall provide documentation of voltage drop calculations upon request of Engineer or Owner.
   2. Where multiple conductors are used in a shared raceway, conductor ratings shall be derated per the NEC.

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3. Where conductor sizes are specified in the Contract Documents, these sizes are based on copper conductors.

P. All analog control circuits, i.e. 4-20mA signal circuits, shall be multi-conductor instrument cable.

3.2 SPLICES, TAPS AND TERMINATIONS

A. Splices to feeders and service entrance conductors are not permitted unless specifically noted on the plans.

B. Electrical spring connectors shall be used for splices and taps in lighting and 120-volt receptacle circuits and motor leads #10AWG or smaller.

C. Use pressure or compression type connectors for all splices or taps in copper conductors.

D. Do not splice conductors of dissimilar metals together.

3.3 IDENTIFICATION

A. Control circuits may be color-coded using available colors, except gray and green. They shall be identified at each terminal at the respective control panel with a label. Imprinted labels shall be protected by a heat shrinkable sleeve.

B. Each control circuit shall be identified at both ends with the same number; the wire number shall be the same as the wire number shown on the Contractor's Equipment Drawings. Spare conductors shall also be identified.

**** END OF SECTION ****

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SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grounding Electrode System

B. Equipment grounding

PART 2 - EQUIPMENT

2.1 GROUND RODS

A. Grounding Electrode System:
   1. Provide ¾" x 10' long solid copper electrodes, where ground rods are specified.

2.2 GROUNDING CONNECTORS

A. Clamps and pressure connectors.
   1. Clamps for connection to piping and conduit:
      a. Approved Manufacturer:
         1) OZ Gedney type ABG
         2) Burndy "Hyground"
         3) Thomas & Betts "Blackburn" Series.
   2. Clamps for connection to enclosures and bus work:
      a. Approved Manufacturer:
         1) OZ Gedney type KGM
         2) Burndy "Hyground"
         3) Thomas & Betts "Blackburn" Series.
   3. Bar taps for connection to bus bars which are UL listed (UL-467).
      a. Approved Manufacturer:
         1) OZ Gedney type KGM
         2) Burndy "Hyground"
         3) Thomas & Betts "Blackburn" Series.

B. Welded connections using non-reversable exothermic process:
   1. Approved Manufacturer:
      a. Cadweld
      b. Thermoweld.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Raceways provided for grounding electrode conductors shall be rigid nonmetallic.

B. The conductor shall be connected to the equipment ground bus or to the enclosure if there is no ground bus.

C. Separately derived systems shall be grounded in accordance with NFPA 70.

D. The grounding bushings on conduits entering distribution equipment shall be connected to the ground bus in accordance with the requirements of NFPA 70.

E. All conductors used for grounding electrode bonding, equipotential bonding and between wall mounted grounding buses shall be copper.

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3.2 GROUNDING ELECTRODE SYSTEM

A. Contractor shall provide a grounding electrode system as required per NFPA 70 in addition to items noted in the Contract Documents.

B. New Construction
   1. Provide a #3/0 concrete-encased electrode installed within the foundation of the building, tied to the steel reinforcing, in accordance with the NEC.
   2. Bond all the following building members (if present) together to form the grounding system for the building:
      a. All metal underground water pipes
      b. Metal frame of the building or structure
      c. Concrete-encased conductor identified in item 1 above.
      d. Other local metal underground systems or structures such as piping systems, underground tanks, and underground metal well casings that are not bonded to metal water piping.

C. Bond the neutral bus to the grounding electrode system at the service entrance switchboard.

3.3 EQUIPMENT GROUND

A. Solidly ground all conduit systems, switch boxes, cabinets, motor frames, switchgear, transformers, and all other permanently installed equipment to form a continuous, permanent, and effective grounding system. Bond expansion joints and metal raceway sections.

B. An equipment grounding conductor shall be installed with each conduit run or cable, includes but not limited to feeder circuits, motor circuits, lighting circuits, and control circuits.

3.4 BONDING

A. Bond all systems per the NEC including raceway, cable tray, enclosures, metal piping systems, structural metal, and other items identified in the Contract Documents or the National Electrical Code.

3.5 SPECIAL REQUIREMENTS

A. The contractor shall determine if there are any other special grounding requirements for equipment furnished on this Project and shall provide grounding as recommended by the manufacturer.

3.6 SPLICES AND TERMINATIONS

A. In general, splices and terminations of the grounding electrode system shall be brazed, shall be exothermic welded, or shall be made with tool-compressed fittings.

B. Connections to bus bars or equipment enclosures shall be made with tool-compressed lugs which are bolted to the equipment or with bar taps.

C. Connections to ground rods shall be exothermic welded. Provide adapter sleeves as required for #6 AWG conductors or smaller.

**** END OF SECTION ****

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SECTION 26 05 29 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. Manufactured Supporting Devices.

B. Fabricated Supporting Devices.

C. Installation.

1.2 DESCRIPTION OF WORK

A. Type of support hardware, anchors, sleeves, and seals specified in this section include the following:
   1. Clevis hangers
   2. Riser clamps
   3. C-clamps
   4. One-hole conduit straps
   5. Two-hole conduit straps
   6. Round steel rods
   7. Expansion anchors
   8. Toggle bolts

B. Supports, anchors and sleeves furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division 26 sections.

1.3 QUALITY ASSURANCE

A. Provide supporting devices, of types, sizes, and ratings required that are manufactured by firms regularly engaged in the manufacture of such devices.

B. Comply with NEC as applicable to construction and installation of electrical supporting devices.

C. Comply with applicable requirements of ANSI/NEMA std Pub No. FB 1, "Fittings and Supports for Conduit and Cable Assemblies".

D. Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports and equipment mounting.

E. Provide electrical components which are UL-listed and labeled.

PART 2 - PRODUCTS

2.1 MANUFACTURED SUPPORTING DEVICES

A. Provide supporting devices; complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation; and as herein specified. Where more than one type of device meets indicated requirements, selection is Installers' option.

B. Structural flat surfaces:
   1. Caddy snap close clamp with z shot-fire bracket; mechanical fastener appropriate for deck type; spring steel, snap close conduit opening, static load of 100lbs or greater;
      a. Conduit Sizes: ½" – 1"
   2. Caddy bolt close clamp with z shot-fire bracket; mechanical fastener appropriate for deck type; spring steel, conduit strap with threaded openings and hex-head bolt, static load of 100lbs or greater;
      a. Conduit Sizes: ½" – 1"
   3. One-hole conduit straps for supporting metal conduit; galvanized steel:
      a. Conduit sizes: ½" & ¾"

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4. Two-hole conduit straps for supporting metal conduit; galvanized steel:
   a. Conduit sizes: 1” and larger.

C. Provide anchors of types, sizes and materials indicated; and having the following construction features:
   1. Expansion Anchors: 1/2".
   2. Toggle Bolts: Springhead; 3/16" x 4".

D. Provide sleeves and seals, of types, sizes, and material indicated; having the following construction features:
   1. Provide Schedule 40 galvanized steel pipe sleeves 1 1/2" larger than O.D. of pipe.
   2. Set all sleeves true to line, grade and position and plumb or level after concrete is poured. Correct any deviation from proper position.
   3. Provide minimum of three (3) concrete anchors for Schedule 40 pipe sleeves.
   4. Subject to compliance with requirements, provide water-tight seals by Thunderline or pre-approved equal.

E. Provide channel strut system for supporting electrical equipment, 16-gage hot dip galvanized steel, or types and sizes indicated; construct with 9/16" dia. holes, 8"o.c. on top surface, with standard green finish, and with the following fittings which mate and match with channel provided:
   1. Fixture hangers
   2. Channel hangers
   3. End caps
   4. Beam Clamps
   5. Wiring stud
   6. Thin wall conduit clamps
   7. Rigid conduit clamps
   8. Conduit hangers
   9. U-bolts

2.2 FABRICATED SUPPORTING DEVICES:

A. Provide sleeves of one of the following:
   1. Sheet-metal fabricated from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage. Sheet metal sleeves shall not be used for cable.
   2. Steel-Pipe fabricated from Schedule 40 galvanized steel pipe; remove burrs.
   3. Iron-Pipe fabricated from cast-iron or ductile-iron pipe; remove burrs.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUPPORTING DEVICES

A. Install hanger, anchors and sleeves in accordance with manufacturer's written instructions and with recognized industry practices to ensure supporting devices comply with requirements of NECA, NEC and ANSI/NEMA. Extend sleeves 3/4" above floor surface.

B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

C. Support surface mounted conduit runs with galvanized pipe straps. Fasten pipe straps to masonry surfaces with self-drilling anchors or toggle bolts. Fasten pipe straps to wood or sheet metal surfaces with pan head sheet metal screws.

D. Provide stainless steel screws where electrical equipment is mounted on or attached to fire treated plywood. Hold equipment away from the plywood with either plastic or stainless-steel washers or spacers.

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E. Tighten sleeve seal nuts until sealing grommet have expanded to form water-tight seal.

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SECTION 26 05 33 - RACEWAYS, FITTINGS, AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
1. Conduit.
2. Conduit fittings.
3. Conduit accessories
4. Underground warning tape.
5. Pull and junction boxes.
6. Fire stop material.
7. Handholes.
8. Conduit Identification.
9. Execution/Installation.

1.2 REFERENCES

A. Section 26 05 00: Common Work Results for Electrical

B. Section 26 05 26: Grounding and Bonding for Electrical Systems

C. Section 26 05 29: Supporting Devices

D. Section 33 05 05: Trenching and Backfilling.

1.3 SUBMITTALS

A. Submit shop drawings and descriptive data in accordance with Section 26 05 00 in addition to the requirements of this section.

PART 2 - PRODUCTS

2.1 STEEL RIGID METAL CONDUIT (RMC) AND FITTINGS.

A. Provide hot-dip galvanized or electro-galvanized (inside and outside) conduit having a bichromate finish conforming to UL standard UL-6.

B. Provide zinc coated, threaded type fittings, couplings, and bushings.

2.2 RIGID NON-METALLIC CONDUIT (RNMC) AND FITTINGS.

A. Schedule 40/80 polyvinyl chloride (PVC) rigid plastic conduit conforming to NEMA Specifications TC-2.

B. Provide plastic fittings, couplings, and bushings per manufacturer's recommendations for rigid non-metallic conduit, designed for use with solvent cement.

2.3 EXTERIOR IN-GROUND HAND HOLES

A. Precast concrete box and cover or fiber reinforced polyester box and polymer concrete cover.
1. Covers and boxes design/test load rating (lbs.):
a. Grass/landscaping areas: 5,000/7,500lbs – ANSI Tier 5
b. Sidewalks and in areas of vehicle traffic: 22,500/33,750 lbs.– ANSI Tier 22

B. A minimum of 2 stainless steel bolts to secure cover to the box.

C. Sized as Required Per Code:
1. Minimum Size 13 inches wide, 24 inches long, and 36 inches deep.

D. For fiber optic conduit runs, the word “FIBER” shall be formed on the cover.

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E. When mounted in a pavement/paver/concrete surface, provide tinted cover to match the surrounding surface.

F. Approved Manufacturers:
   1. CDR Systems Corp.
   2. Quazite “Composite”
   3. Newbasis.
   4. Approved equal.

2.4 UNDERGROUND WARNING TAPE

A. 6 inches wide, 4-mil polyethylene film.

B. Vivid, opaque, long-lasting red color with bold, black letters.

C. Lettering
   1. Top line – “...CAUTION CAUTION CAUTION...”
   2. Bottom line – “...ELECTRIC LINE BURIED BELOW...”

D. Approved Manufacturers:
   1. Seton Name Plate Corp. No. 210 ELE, EMED Co. Stock No. UT27737-6
   2. Approved Equal.

2.5 FIRE RETARDANT MATERIAL

A. Fire stop foam.

B. Fire stop sealant.

C. 3-hour fire rating.

D. UL Classified per UL-1479.

E. Chase Technology Corp., Dow Corning, General Electric, 3M, or equal.

2.6 DUCT SEALING COMPOUND

A. Soft, fibrous, slightly tacky, non-hardening, and easily applied by hand at all working temperatures.

B. Clean and non-staining.

C. J.M. Clipper Corp. Duxseal, O-Z/Gedney DUX, or equal.

2.7 CONDUIT SEALS

A. Conduit seals shall be provided wherever conduits penetrate exterior concrete walls below grade, or cross hazardous location boundaries.
   1. For conduits less than 60 inches below grade; OZ/Gedney Type FSK, or equal.
   2. For conduits more than 60 inches below grade; OZ/Gedney Type WSK, or equal.
   3. For Class 1 Division 1 or Division 2 hazardous location boundaries, conduits shall be sealed at the point where they leave the room. Fittings shall be "EYS," Appleton or Chico "X" Fiberdam and Apelco or Chico "A" compound or approved equal.

2.8 CONDUIT IDENTIFICATION

A. 3/4 Inch By 3-1/2 Inches
   1. Nylon plates.
   2. Marked in black with a marking pen specifically designed for such use.
   3. Manufacturer: Panduit MP350, or equal.

B. 2-3/8 Inches By 4-3/4 Inches
   1. Medium weight shipping tags with reinforced eyelet.
   2. Marked in black with a marking pen specifically designed for such use.
   3. Manufacturer: Dennison Size 5, Grade G, or equal

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C. Tag Protection
   1. Adhesive-backed plastic or clear polyester film tape.
   2. Manufacturer: 3M Scotch Brand 3750 Clear Box Sealing Tape, or equal.

PART 3 - EXECUTION

3.1 CONDUIT SIZES

A. Verify conduit sizes indicated on the Contract Documents prior to installation. Provide proper size conduit based on the NEC maximum fill requirements, including any derating factors. Where conduit sizes are indicated on the plans, it is a minimum size allowed. It is the Contractor's responsibility to provide the proper conduit size, including any grounding conductors and flexible connections to equipment.

B. Where conduit sizes are not shown, provide conduit with the minimum sizes:

   1. 1.25" conduit for underground

   2. 3/4" conduit size everywhere else

C. Spare conduits shall be sized as noted in the Contract Documents. Where spare conduit sizes are not identified provide a minimum size of 1.25".

3.2 INSTALLATION

A. Installation of conduit shall meet the requirements of the NEC and the National Electrical Contractors Association (NECA) conduit installation standards. Where the documents may conflict, the requirements of the NEC take precedence.

B. Install all conductors in a continuous raceway system.

C. Circuits of different voltage systems shall be installed in separate raceways, unless specifically noted otherwise in the Contract Documents.

D. Provide pull and junction boxes as required by the NEC and as site pulling requirements dictate.

E. Conduits entering boxes and equipment from a flat surface shall be provided with an offset 3" from the box to allow the conduit to be fastened securely to the flat surface it is run on.

F. Do not route any conduits across the top of slabs, concrete, or earth.

G. Do not support conduit with wire, nylon ties, nor perforated pipe straps. Remove wire used for temporary support.

H. Do not run conduits in the following:
   1. Columns except feed column mounted devices.
   2. Through structural slabs, beams, or columns, unless approved by the Structural Engineer.
   3. Concrete topping.
   4. Through the same penetrations through floors and walls as mechanical piping unless noted otherwise or if approved by the Engineer.

I. Do not run conduit on or directly in front of access doors, removable panels, equipment removal spaces, control devices or other spaces necessary for normal maintenance and repair of the equipment.

J. Install all exterior underground branch circuit conduits continuously from the source to the load. Do not install in-ground boxes as pull boxes. Oversize the conduits if required.

K. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system. Install exterior underground conduits to drain away from the panel.

L. Provide suitable fittings to accommodate expansion, contraction, and deflection where conduits cross seismic, control and expansion joints. Avoid crossing expansion joints where possible.

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M. Cap or plug conduit ends during construction. Cap or plug ends of conduit that are to remain empty and make watertight. Clean and swab conduits prior to pulling in conductors.

N. Provide nylon pull string in all empty conduit with a stamped plastic label indicating future use.

O. Underground Conduit:
   1. Underground conduit runs shall have a minimum cover of 2 feet.
   2. Conduit shall be sloped to drain to handholes or pull boxes.
   3. Rigid metal conduit installed underground or passes through concrete shall have a corrosion resistant coating or covering at the points it contacts earth and/or concrete.
   4. Contractor shall do all trenching for underground conduit with a minimum size trench. 3 inches of sand shall be placed below and above buried conduit in trench. All fill material shall be placed in 12-inch lifts and compacted to 90-Percent Standard Proctor Density. Underground warning tape shall be laid in the trench approximately 9 inches below the surface.
   5. The roadway, sidewalk, or grade beneath which conduit is routed shall be restored to its original or better condition.
      a. Provide grading, soil, and seeding or sod to restore turf to original or better conditions.
      b. Coordinate type of soil, seeding and/or sod with Owner to match existing.
   6. Excavating, backfilling, and grading shall comply with Division 31.

P. Conduit installed in slabs shall conform to the following requirements:
   1. Conduit shall not be tied parallel to reinforcement bars.
   2. Conduit must not be tied to each other and shall be spaced a minimum of 1 1/2 inches apart and preferably 3 inches apart.
   3. Whenever possible, conduit should not cross over other conduit. All crossing conduits must be reviewed and approved by the Engineer prior to placement of concrete.
   4. Conduit must not be placed on top of the bottom mat of reinforcement bars. There should be a minimum of 1 inch separation from the bottom of the conduit to the top of the steel bars in the bottom mat of steel.
   5. Prior to placement of the conduit, the contractor must submit an appurtenance embedment drawing that shows the proposed locations of all conduits.

3.3 HAZARDOUS AREAS

A. Install all conduit and raceways located in hazardous areas in accordance with National Electrical Code requirements for that classification of hazardous locations. Provide all fittings and equipment approved by the Underwriter's for this type of location.

B. Conduit fittings installed in Class 1, Division 1 and Class 1, Division 2 locations shall be rated for Class 1, Division 1 locations, unless noted otherwise.

C. Boxes installed in Class 1, Division 1 and Class 1, Division 2 locations shall be rated for Class 1, Division 1 locations, unless noted otherwise.

3.4 EXTERIOR IN-GROUND HANDHOLES

A. Reference NEC for handhole requirements and installation.

B. All handholes shall have a drain opening in bottom. Excavating handholes shall be dug at least 24 inches deeper than the depth of the bottom of the handhole and the area below the handhole shall be filled with pea gravel.

C. Handhole covers shall be bolted in place when Work is complete.

3.5 CONDUIT BODY INSTALLATION

A. Provide conduit bodies in accessible locations. Provide accessibility to the cover. Coordinate location of conduit bodies with other divisions (trades) prior to installation. Do not locate conduit bodies in exposed finished spaces without the specific approval of the Owner Representative.

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3.6 OPENINGS

A. Contractor shall review the size and location of all openings to be sure they meet the requirements of the equipment that is furnished and/or installed as a part of this Contract. The contractor shall be responsible for providing all required openings necessary for a complete installation. All required openings are not shown on the Drawings.

B. All openings shall be filled with an approved sealant, caulking, or grout after the conduit or cable installation is complete.

C. Openings through grating shall have the bars of the grating banded.

D. Provide watertight seal around conduit in openings which are approved by the Owner Representative, for all roof, below grade and exterior wall penetrations.

3.7 IDENTIFICATION

A. Provide panel and circuit number(s) identification on the cover of all junction boxes and pull boxes located in accessible areas.

B. Provide clear, hand-printed lettering using a black permanent marker.

C. Perform stenciling after the building has been painted so that overspray from building painting does not cover up stenciling performed under this specification section. Re-label any boxes that have been painted over by the painter.

D. Conduit containing control cabling/wiring which utilize Intrinsically Safe methods shall be identified with permanently affixed labels with the wording “Intrinsic Safe Wiring.”

3.8 RACEWAY AND BOXES APPLICATIONS

A. Apply products as specified below, unless otherwise indicated.

B. All conduit to be installed underground.

C. Outdoors (non-corrosive):
   1. Exposed Conduit: RMC.
   2. Underground Conduit: RNMC SCH 40 or 80.
   3. Boxes and enclosures, aboveground: NEMA 3R

D. Under interior slabs-on-grade:
   1. RMC, RNMC SCH 40

E. Embedding in precast or poured concrete:
   1. RMC, RNMC SCH 40

F. Exposed in lift station wetwell:
   1. RNMC SCH 80.

G. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

**** END OF SECTION ****

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SECTION 26 24 19 - MOTOR CONTROL

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. Section includes:
   1. Variable frequency drivers.
   2. Installation.

1.2 DEFINITIONS

A. CPT: Control power transformer.

B. EMI: Electromagnetic interference.

C. GFCI: Ground fault circuit interrupting.

D. IGBT: Insulated-gate bipolar transistor.

E. LAN: Local area network.

F. LED: Light-emitting diode.

G. MCC: Motor-control center.

H. MCCB: Molded-case circuit breaker.

I. MCP: Motor-circuit protector.

J. NC: Normally closed.

K. NO: Normally open.

L. OCPD: Overcurrent protective device.

M. PCC: Point of common coupling.

N. PID: Control action, proportional plus integral plus derivative.

O. PT: Potential transformer.

P. PWM: Pulse-width modulated.

Q. RFI: Radio-frequency interference.

R. SCR: Silicon-controlled rectifier.

S. TDD: Total demand (harmonic current) distortion.

T. THD(V): Total harmonic voltage demand.

U. SPD: Surge Protection Device

V. VFC: Variable-frequency motor Controller.

W. VFD: Variable-Frequency Drive

1.3 SUBMITTALS

A. In addition to the requirements of this section, submit shop drawings and descriptive data in accordance with Division 1 and Section 26 05 00.

B. Product Data: For each type of motor controller, include the following:
   1. Dimensioned plans and elevation diagrams.
   2. Enclosure type and construction material.
   3. Electrical ratings; Voltage, Current, and KAIC rating.

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4. Conductor lug size ratings.
5. Conduit entry locations.
6. Schematic wiring diagrams that show power, signal, and control wiring for each installed controller.
7. Factory installed devices.
8. Nameplate legends.
9. Furnished specialties and accessories.
10. System and operating description.
11. Parts list.
12. Local sources of supply and service.

C. Manufacturers Installation Instructions:
1. Include documents with shipment.

D. Spare Parts:
1. Provide a list of recommended spare parts with unit prices.
2. Provide with the Operation and Maintenance Manual.

E. Coordination Drawings:
1. Provide where free standing equipment is to be provided.
2. Provide floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around electrical equipment where pipe and ducts are prohibited.
   a. Show layout and relationships between electrical components and adjacent structural and mechanical elements.
   b. Show support locations, type of support, and weight on each support. Indicate field measurements.
3. Show dimensions of housekeeping pad.

F. Operation and Maintenance Manual:
1. Shall meet the requirements of Division 1 and Section 26 05 00.
2. Operating instructions for equipment.
3. Wiring and installation instructions for equipment.
4. Settings, adjustments, and calibrations for equipment as required.
5. Recommended maintenance schedules and procedures for equipment.
6. Equipment manufacturer's name, address, and telephone number.
7. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
8. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.
9. Sample of special warranty offered by Manufacturer, Supplier or Contractor, if any.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain motor controllers of a single type from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

D. Manufacturer of the equipment shall have 2 stocking distributors of spare parts located within 150 miles of the project site.

E. Manufacturers of the variable frequency drives shall have factory-trained service personnel, test equipment, and a distributor which stocks replacement parts all located within 150 miles of the project site.

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1.5 COORDINATION

A. Coordinate features of equipment, and accessory devices with remote pilot devices and control circuits to which they connect.

B. Coordinate features, accessories, and functions of each controller and each installed unit with ratings and characteristics of supply circuits, motors, required control sequences, and duty cycle of motors and loads.

C. The contractor shall verify that the equipment being furnished can be installed in the available space. If available space is not adequate for the proposed equipment, Contractor shall notify the Engineer before releasing the equipment for manufacturing. The contractor shall be responsible for correcting equipment spacing conflicts which were not identified and coordinated with Engineer prior to releasing the equipment for manufacturing.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in shipping splits of lengths that can be moved past obstructions in delivery paths.

B. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside enclosures, and install temporary electric heating, with at least 250W per vertical section or connect factory-installed space heaters to a temporary electrical service as required to protect equipment from freezing and/or condensation.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (VFD'S)

A. Shall be electronic, with adjustable frequency and voltage, three phase output, capable of driving three-phase induction motors at full rated speed. The control technique shall be pulse width modulation (PWM) waveform, utilizing a full wave bridge design incorporating diode rectifier circuitry (third generation IGBT power electronics). Silicon controlled rectifiers or other control techniques are not acceptable.

B. Suitable for variable or constant torque loads, as required per the application.

C. Shall be capable of providing sufficient torque to allow the motor to break away from rest upon first application of power.

D. Shall operate within voltage parameters of plus 10 to minus 15 percent of line voltage and be suitably rated for the full load amps of the maximum watts (HP) within its class.

E. Minimum efficiency:
   1. 95 percent at full rated speed.
   2. 85 percent at half of the rated motor speed.

F. Displacement power factor shall not be less than 95 percent under any speed or load condition.

G. VFD shall include a DC link-choke equivalent of a 3% line reactor and this shall be located within the VFD housing.

H. Surge Suppression:
   1. Provide three-phase protection against damage from supply voltage surges in accordance with UL 1449.

I. VFD shall have the additional following features:
   1. Isolated power for control circuits.
   2. Manually resettable overload protection for each phase.
   3. Adjustable current limiting circuitry to provide soft motor starting. Maximum starting current shall not exceed 200 percent of motor full load current.

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4. Independent acceleration and deceleration time adjustment, manually adjustable from 2 to 2000 seconds. Set timers to the equipment manufacturer's recommended time in the above range.
5. Thermostatically controlled cooling fans, including fans integral to VFD and enclosure cooling fans if applicable.
6. An emergency stop push button as required by U.L. or other requirements as specified in the Contract Documents.
7. Speed Control input circuitry:
    a. 4 to 20 mA current or 0-10 VDC voltage control signals from an external source.
    b. Digital input from an external source.
    c. Manual via the local interface.
8. Automatic frequency adjustment from 1 Hz to 300 Hz.
9. Circuitry to initiate an orderly shutdown when any of the conditions listed below occur. The VFD shall not be damaged by any of these electrical disturbances and shall automatically restart when the conditions are corrected. The VFD shall be able to restart into a rotating motor operating in either the forward or reverse direction and matching that frequency.
    a. Incorrect phase sequence.
    b. Single phasing.
    c. Overvoltage more than 10 percent.
    d. Undervoltage more than 15 percent.
    e. Running overcurrent above 110 percent (VSMC shall not automatically reset for this condition.)
    f. Instantaneous overcurrent above 150 percent (VSMC shall not automatically reset for this condition).
    g. Short duration power outages of 12 cycles or less (i.e., distribution line switching, generator testing, and automatic transfer switch operations.)
    h. Automatic Power Transfer and Power Loss:
        1) VFD shall automatically repower and be ready to operate after power is restored.
        2) Provide automatic shutdown upon receiving a power transfer warning signal from an automatic transfer switch. VSMC shall automatically restart motor after the power transfer.
        3) Automatic Reset/Restart: Attempt three restarts after VFD fault or on return of power after an interruption and before shutting down for manual reset or fault correction, with adjustable delay time between restart attempts.
        4) Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Auto Speed Search" feature is available and engaged.
        5) Bidirectional Auto Speed Search: Capable of starting VFD into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to VFD, motor, or load.
10. Capable of phase conversion from single phase power input to three phase power output.

J. VFD shall include front-accessible operator station, with sealed keypad and digital display, which allows complete programming, operating, monitoring, and diagnostic capabilities.
1. Typical control functions shall include but not be limited to:
    a. HAND-OFF-AUTOMATIC, with manual speed control in HAND mode.
2. Typical monitoring functions shall include but not be limited to:
    a. Output frequency (Hz).
    b. Motor speed and status (run, stop, fault).
    c. Output voltage and current.
3. Typical fault and alarm functions shall include but not be limited to:
    a. Loss of input signal, under- and over-voltage, inverter overcurrent, motor overload, critical frequency rejection with selectable and adjustable dead bands, instantaneous line-to-line and line-to-ground overcurrent, loss-of-phase, reverse-phase, and short circuit.

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b. System protection indicators indicating that the system has shut down and will not automatically restart.

4. Interface shall allow the operator to adjust all application, protection, programming, and control parameters.
5. Operator station shall be mounted on the front exterior of the enclosure door.

K. Enclosure:
1. VFD and specified accessories, including but not limited to filter/reactors and bypass when to be provided per the Contract Documents, to be mounted inside a single enclosure.
2. UL listed.
3. Dimensions to be equal or less than that indicated in the Contract Documents.
   a. Where a conflict may be present, Contractor shall notify Engineer no less than 4 business days before the bid opening. If Contractor fails to do so and a conflict is present, Contractor is responsible for all corrective measures and costs with no additional costs to Owner.
4. Circuit breaker which will disconnect all input power, interlocked with the door so that the door cannot be opened with the circuit breaker in the closed position. Circuit breaker operator handle mounted on the exterior of the enclosure outer door.
5. SCCR rating which exceeds the available short circuit current in the circuit at the point of the connection.
   a. Minimum short circuit fault current rating of 10KAIC.
6. Continuous hinged front door.
7. An emergency stop push button as required by U.L. or other devices as specified in the Contract Documents mounted on exterior door.
8. Ventilation/Cooling: ventilation and/or cooling shall be per manufacturer to maintain proper operating temperature for the components in the enclosure. Cooling and/or ventilation shall be adequate for the environment where the enclosure is mounted per the Contract Documents.
   a. Ventilation – As recommended by equipment manufacturer:
      1) Thermostatically controlled vent fan and fixed intake/discharge louvers.
      2) Air filters, filter retainer, filter sealing gasket and finger guard.
   b. Air Conditioning – As recommended by equipment manufacturer:
      1) Closed loop air conditioner with removable filter and integral thermostat.
      2) UL Listed for application.
      3) Powered by VFD power feeder circuit. A separate feeder circuit for the air conditioner will not be accepted.
9. Wall mounted or floor mounted, as indicated on the Contract Documents.
   a. When floor mounted, provide a 2” housekeeping pad under the enclosure.
10. NEMA 1 or 12 when located indoors in a dry location.
11. NEMA 3R with shroud kits for the ventilation and cooling.
12. Operator station shall be mounted on the front exterior of the enclosure door.

L. Harmonic Distortion
1. Current and voltage harmonic distortion shall not exceed the values allowed by IEEE 519.
2. Drives shall be designed to limit the harmonic currents which are generated on the AC service, and which would produce electromagnetic interference (EMI) or radio frequency interference (RFI). Individual current harmonic distortion and the total demand distortion expressed as percent of maximum demand load current shall not exceed the values specified in IEEE 519 – Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, Table 10.3.
3. Total Harmonic Distortion (THD) shall not exceed 5 percent, and individual voltage harmonic distortion shall not exceed 3 percent per IEEE 519.
4. If the drives generate objectionable interference, EMI or RFI drive manufacturer shall provide the specifications for the equipment required to reduce it to acceptable levels. The VFD supplier shall have in possession filters to alleviate interference if encountered.
5. The Owner will provide the equipment specified to correct the problem through a direct purchase or a Change Order to the Contract.

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M. Manufacturer:
   1. Square D ATV320.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive equipment with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

B. Coordinate layout and installation of equipment with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

C. Examine enclosures before installation. Reject enclosures which are wet, moisture damaged, or mold damaged.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install equipment in accordance with the NEC, as shown on the Contract Documents, and as recommended by the manufacturer.

B. Install fuses if not factory installed.

C. Install equipment in accordance with manufacturer's instructions.

D. Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and electronic overload relay pickup and trip ranges.

F. Program variable speed motor controllers per the manufacturer's instructions in coordination with other trades so that a complete and functional system is delivered.

G. Adjust trip settings of circuit breakers and motor circuit protectors with adjustable instantaneous trip elements. Initially adjust at six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficiency motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.

H. Install wiring between equipment and remote devices as specified and as required for the control specified in other sections.

I. Bundle, train, and support wiring in enclosures.

J. Program equipment for required operational sequences, status indications, alarms, event recording, and display features.

K. An authorized service person with knowledge of the supplied VFD shall perform the following before energizing the equipment.
   1. Set all parameters and settings of the device.
   2. Check the units for correct installation and field connections.

L. After the equipment has been energized, an authorized service person with knowledge of the supplied controller, motor, and project control equipment shall perform the following:
   1. Make all final settings and parameter adjustments.
   2. Adjust controls and signals with coordination of the control system programmer.

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3.3 VARIABLE FREQUENCY DRIVE INSTALLATION

A. The contractor shall evaluate proposed conduit runs containing conductors to and from a VFD to reduce possible harmonic or VFD noise interference with other circuits. Such conduits shall be run perpendicular to other conduits wherever possible.

B. VFD conduits shall be separate as far as possible, or a minimum of 12-inches from other equipment and conduits containing circuits for sensitive equipment/instrumentation such as meters, level monitors, signaling circuits, network/communication cabling, supervisory control equipment, etc.

3.4 OVERLOAD PROTECTION

A. Before any motor is energized, Contractor shall obtain the nameplate information from the motor supplier. The nameplate current of all motors shall be recorded in the O&M manuals. Where a one-line diagram is provided, record the full load ampere rating in the space under the motor labeled as "FLA_____."

B. Overload relays shall be checked for correct class and setting in accordance with motor manufacturer's recommendations. Class 10 overload relays shall be provided unless the motor manufacturer specifies otherwise.

C. Motor overload settings shall be in accordance with the starter manufacturer's recommendation for the given motor nameplate current, service factor and power factor correction capacitors, if provided. Contractor shall be responsible for all damage that results from improper overload protection.

D. Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

3.5 FIELD QUALITY CONTROL

A. Engage a representative or Contractor personnel trained on the provided equipment to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:
   1. Inspect controllers, wiring, components, connections, and equipment installation.
   2. Test and adjust controllers, components, and equipment.
   3. Test continuity of each circuit.
   4. Verify that voltages at controller locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Construction Manager and Owner before starting the motor(s).
   5. Test each motor for proper phase rotation.
   6. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace them with new units and retest.
   7. Test and adjust controls, remote monitoring, and safety features. Replace damaged and malfunctioning controls and equipment.
   8. Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.

C. Enclosed controllers will be considered defective if they do not pass tests and inspections.

D. Each controller shall be operated at rated load. Duration of the load test shall be as directed by the Engineer or Owner and as determined by the operating conditions of the installation.

E. Each unit with adjustable parameters shall be set to provide sufficient starting torque for the pump/motor to begin rotation when it is called for.

F. Clear events memory after final acceptance testing and prior to Substantial Completion.

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G. Prepare test and inspection reports, including a signed report that identifies enclosed controllers and that describes testing results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

3.6 DEMONSTRATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the equipment is in good operating condition and properly performing the intended function.

3.7 TRAINING

A. Furnish the services of a competent, factory-trained engineer or technician for a 2-hour period, minimum, to instruct Owner personnel in operation and maintenance of the equipment, including review of the operation and maintenance manual, on a date requested by the Owner.

3.8 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components.

B. Provide warning signs as required by the NEC and when noted in the specifications.

C. Label each enclosure-mounted control and pilot device.

D. Mark up a set of manufacturer's connection wiring diagrams with field-assigned wiring identifications and return it to manufacturer for inclusion in Record Drawings.

**** END OF SECTION ****

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SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Convenience receptacles.

B. Wall plates.

1.2 SUBMITTALS

A. In addition to the requirements of this section, submit shop drawings and descriptive data in accordance with Division 1 and Section 26 05 00.

B. Submittals for pre-approval shall be submitted 2 weeks prior to the bid date. Manufacturers of equipment looking for approval shall schedule a demonstration meeting at the Engineer's office to demonstrate the capabilities and quality of the devices. This meeting shall be scheduled 2 weeks prior to the bid date. Manufacturer/Contractor is responsible for scheduling around Engineer's prior engagements.

1.3 QUALITY

A. All wiring devices shall be products of the same manufacturer, unless specifically noted otherwise.

1.4 DEVICE COLORS

A. Areas of New Construction:
   1. Provide gray wiring devices for all devices.

PART 2 - PRODUCTS

2.1 CONVENIENCE RECEPTACLES

A. Ground Fault Circuit Interrupter Receptacles:
   1. Specification grade, 3-wire grounding type, NEMA 5-20R.
   2. Side wired.
   3. Rated 20 amperes, 125 volts.
   4. In addition to when noted in the Contract Documents, tamper resistant devices shall be provided where required by the NEC and other governing codes.
   5. LED trip indicator.
   6. Approved Manufacturers:
      a. Cooper.
      b. Hubbell.
      c. Leviton.
      d. Pass & Seymour.

2.2 COVERPLATES

A. Exterior Coverplates: Provide weatherproof "while in use", cover plates for outlets and switches as indicated in the Contract Documents.
   1. Provide weatherproof boots for all drop cords as indicated in the Contract Documents.
   2. Weatherproof switch cover plates: Cast aluminum or Lexan with cover and vinyl gasket for weatherproofing switch; or cast aluminum with lever and weatherproof gasket.
   3. Weatherproof receptacle cover plates: Specification grade, weatherproof, cover plate, gasketed corrosion resistant hood/cover rated for extra-duty, for exterior and wet area receptacles.
   4. Coverplates shall be NEMA 3R rated and shall be watertight when in use.

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5. Approved manufacturers:
    a. Red Dot
    b. Leviton
    c. Pass and Seymour
    d. Pre-approved equal

PART 3 - EXECUTION

3.1 WIRING DEVICES

A. Provide new devices for all outlets indicated. Provide individual GFCI, isolated ground and surge suppression device for each duplex receptacle in ganged outlets.

B. Wire each device by wrapping the conductors around the terminals and torquing the screw terminal tight.

C. Mount all receptacles with the ground pin on the bottom.

D. Replace all receptacles and plates that have been damaged, burned or discolored during construction, prior to Substantial Completion.

E. Test all wiring devices for continuity, proper polarity connections and grounding.

F. Convenience outlets shall be provided where shown on the Drawings.

G. All receptacle outlets shall be grounded to a separate grounding conductor that has green insulation.

H. All boxes shall be plumb.

I. All receptacles on a GFCI breaker shall be identified with laminated plastic nameplates which read: "GFCI PROTECTED." Letters shall be 1/4-inch-high white on a red background. Feed through type GFCI receptacles which feed non-GFCI type receptacles when shown as GFCI type receptacles on the Contract Documents are not allowed, unless noted otherwise.
    1. For double-duplex and other multi-gang receptacles, one of the receptacles is to be a GFCI type receptacle and the remaining receptacles in the shared box may be fed through.

J. Contractor shall be responsible for providing GFCI and Arc fault protection where required per the NEC. Not all instances may be shown on the Contract Drawings. Protection may be provided either via an accessible wall device or a rated breaker at the feeding panelboard. Installation of a blank wall device with protection features to feed devices without the protection features will not be allowed, unless specifically noted in the Contract Documents.

3.2 COVERPLATE IDENTIFICATION

A. Provide ¼" high engraved, black-infilled lettering laser etching engraved cover plates or thermal machine printed labels which are permanently installed.
    1. This requirement is for all receptacle and lighting devices.

B. Provide identification on the plate immediately above the wiring device on the backside of the cover plate, unless noted otherwise.

**** END OF SECTION ***

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SECTION 26 90 01 - MEASURING AND CONTROL INSTRUMENTS

ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lift station submersible level transducer

B. Float level switch

1.2 RELATED SECTIONS

A. Section 26 05 00 - Common Work Results for Electrical.

1.3 SUBMITTALS

A. Refer to Section 26 05 00 - Common Work Results for Electrical.

PART 2 - PRODUCTS

2.1 LIFT STATION SUBMERSIBLE LEVEL TRANSDUCER (PROVIDED UNDER ALTERNATE 2 AND ALTERNATE 3)

A. Welded 316 stainless steel body.

B. 2.5-inch minimum diameter Teflon faced pressure-transmitting diaphragm.

C. Solid-state type internal transducer.

D. Stainless steel nose cage with a minimum of 4” diameter. Cage height 1-2”.

E. Accuracy (including effects of linearity, hysteresis, and repeatability) of ± 0.25 percent of full span.

F. Sealed cable entry.

G. Stainless steel connecting hardware, clamps, cables, etc. as required for mounting in wet well.

H. Pressure range as required.

I. Waterproof shielded cable.

J. Sufficient length of cable to reach from the bottom of the wet well to the control panel.

K. Manufacturer:

1. KPSI 750
2. MEAS LTB
3. APG PT-500
4. Or Equal.

2.2 FLOAT LEVEL SWITCH (PROVIDED UNDER ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3)

A. Impact/corrosion resistant ABS float body.

B. Non-Mercury mechanical switch rated 13.0 amp. at 120/240 Vac.

C. Foam-filled body.

D. Heavy duty, Type SJOW #16/2 cord. Cable long enough to reach control panel without a splice.

E. Completely potted switch-to-cable-to-body connection.

F. Stainless steel cable and 15-lb. plastisol-coated cast iron weight for mounting float switches.

G. Stainless steel fasteners with rubber sleeves for attaching floats to the stainless-steel cable.

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H. Manufacturer:

1. Anchor Scientific Eco-Float

2. Or Equal

PART 3 - EXECUTION

3.1 COMMISSIONING

A. Contractor shall change relay connections, position limit switches, and make all other adjustments required to obtain the proper operation of the equipment.

B. Contractor shall demonstrate to the Owner and the Engineer that all control systems operate as specified.

3.2 TESTING AND COMMISSIONING

A. Contractor shall check, test, calibrate, and put into operation all control systems specified herein and shall demonstrate their operation to the Engineer.

B. All changes shall be recorded and all control schematic and wiring diagrams shall be revised and re-issued with the changes.

3.3 IDENTIFICATION

A. All devices shall be identified with a laminated plastic nameplate which has white lettering of not less than 3/16 inch on a black background. Nameplates shall be attached with screws.

**** END OF SECTION ****

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SECTION 26 90 04 - LIFT STATION CONTROL SYSTEM

ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Quality assurance/control system supplier.

B. Control description.

C. Control panel.

D. Spare parts.

E. Installation.

1.2 RELATED SECTIONS

A. Section 26 05 00 – Common Work Results for Electrical

1.3 DEFINITIONS

A. Control System Equipment: All components that are used as part of a system to monitor, operate, interface, manage, command, direct, notify, or regulate the behavior of other devices or systems to achieve a desired result. This includes, but is not limited to, graphical interfaces, programable logic controllers, network switches, network routers, radios, media converters, relays, overcurrent protection, meters, monitors, and power supplies.

B. Human Machine Interface (HMI): Graphical interface on the inner door of the control panel which allows the Operator to interface with the control system.

C. Operator interface Terminal (OIT): Graphical interface on the inner door of the control panel which allows the Operator to interface with the control system.

D. PLC: Programmable logic controller

E. SCADA Screens: Operator interface terminal screens on new control panels, existing master control panel, all existing lift station control panels, and the PC HMI software.

F. SCADA Interfaces: Operator interface terminal screens on new control panels, existing master control panel, all existing lift station control panels, and the PC HMI software.

G. SCADA System: All control system equipment at sites under the Owner's supervision which have a control panel and communicates or receives signals to/from other remote sites, a master station, computer, server, and/or internet cloud-based site or server, using radio, cellular, ethernet, fiber, or other telecommunication or network systems.

1.4 SUBMITTALS

A. In addition to the requirements of this section, submit shop drawings and descriptive data in accordance with the contract documents, including but not limited to the contract and specification Section 26 05 00.

B. Drawings submitted for approval of control system equipment shall include the following information as applicable to each piece of equipment:

1. Detailed top, front, and end views.

2. Outline dimensions, including weights.

3. Control panel elevation drawings showing all components, both outdoor door and interior.

4. Control panel and starter electrical line diagrams and schematics.

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5. Component device and material lists.
6. Cutsheets for each accessory.
7. Nameplate entries and schedules.
8. Features and accessories furnished to meet Specification requirements.
9. Cable access and exit areas, termination spaces, terminals and wire ways.
10. Operator interface screens shall be submitted and reviewed with the Owner prior to the completion of the PLC and operator interface programming.

C. Operating and Maintenance Manuals

1. Provide Operating and Maintenance Manuals in a pdf format, compiled into a single pdf utilizing an interactive table of contents (TOC) with bookmarks and/or links to identify each component in the pdf and to take the reader directly to that page from the TOC.
2. All information contained in shop drawings.
3. List of spares provided.
4. List of spares recommended for stock.
5. Description of the operation, proper maintenance, and repair of all components.
6. Local sources of service and supply.
7. As built drawings.
8. Manufacturer's operation and maintenance manuals.
9. Provide complete electronic copies of PLC, operator interface, and SCADA PC programs on USB drive.
    a. USB drive shall be labeled to identify the equipment of which programs it contains.
    b. 1 copy of the programming shall be provided in PDF format
    c. 1 copy shall be provided in the PLC program's original format.
    d. Contractor shall demonstrate to the Owner and Engineer that these drives contain all required documentation by opening up the drives on the Owner's computer and displaying the information to the satisfaction of the Owner and Engineer.

1.5 CONTROL SYSTEM INTEGRATOR

A. Base Bid Control System Integrator shall be as follows:

1. Electric Pump – New Prague, MN

B. Scope of Work:

1. Control system integrator is responsible for providing all control hardware, PLC's, graphical interfaces, measuring devices and instrumentation, control panels, computer hardware, programing, calibration, testing and all other work needed for a fully operating control system.

C. Certifications:

1. All panels provided under this Section shall meet the requirements of UL-508 & UL-508A. The supervisory control system supplier shall maintain in-house UL-508 and UL-508A shop procedures for both open and enclosed Industrial Control Panels.

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2. Control panels with intrinsically safe circuit extensions shall meet the requirements of UL-698A and shall be labeled as such, thereby certifying that the panel satisfies the UL requirements for an enclosed industrial control panel relating to hazardous locations with intrinsically safe circuit extensions.

3. All panels shall be provided with a label to identify the Short Circuit Current Rating (SCCR) given to the control panel assembly. Where the available short circuit rating or interrupting capacity is not identified in the contract documents, Contractor is responsible for coordinating with the electrical utility and for calculating these values. Panels which do not have an SCCR label or are provided with an inadequate SCCR value shall be replaced or corrected by the manufacturer. Corrective measures and work shall be covered by the Contractor at no additional cost to Owner. Nor will an extension to the project schedule be given for the corrective measures to be made.

4. All panels shall be UL labeled or third party certified in accordance with the governing state electrical code requirements.

5. All panels shall be labeled when delivered to the Site. All field modifications shall be in conformance with UL. When the Owner accepts the panels, the Contractor certifies that the panels have retained their UL labeling or other third-party certification accepted by the AHJ.

D. Experience:

1. The control system integrator shall for a minimum of 10 years, have been in business under their present name designing and implementing municipal water and wastewater system controls of equal or greater size in the State the project site is located. Experience of companies purchased may be included as relevant experience as long as the purchased company's experience relates directly to this type and size of project. Relevant projects must include:

a. Lift station control systems.

b. SCADA telemetry systems.

c. SCADA PC and HMI software.

E. Maintenance and Service

1. The control system integrator shall have programmers, designers, and field service personnel who are permanent, full-time employees. The field service personnel shall be available 24 hours each day to assist the Owner with onsite issues.

2. Service representative shall maintain an inventory of all control components and shall be equipped with all tools required to repair the control panel.

3. Service representative shall respond promptly to a request for service.

4. Control panel manufacturer shall be located within a 100-mile radius of the project site.

F. Liability & Insurance:

1. Unless stated otherwise, the control system supplier shall carry a minimum of $5,000,000 in both product liability and errors and omissions insurance.

1.6 ALTERNATE 1 LIFT STATION CONTROL DESCRIPTION

A. Provide an outdoor control panel at the lift station site to control the operation of the submersible pump. Control panel will have local alarms only and will not be connected to the Owner's existing SCADA system. Provide simplified control with relay logic or an optional simplified pump control module.

B. A Hand-Off-Auto control mode selector switch is to be provided on the control panel door for the pump.

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1. Hand: the associated pump shall run regardless of if the control system is operational. Alarms, except motor overload or any other alarm that would void the pump manufacturer's warranty, shall not shut the pump down. VFD shall operate at a speed preset at the VFD.
2. Off: the associated pump shall not be called to run.
3. Auto: the control panel shall run the pump dependent on the liquid level of the wet well.

C. AUTO control mode:

1. The control panel pump control shall operate the pump based on the liquid level in the wet well.
2. On a rising level, the pump shall be started, pump shall be stopped at low level. Floats shall provide normal control.
3. Pump starting/stopping shall be as follows:
    a. The level control mentioned below shall be as sensed by the floats.
    b. When the wet well level is below the Pump Start elevation, the pump shall be off.
    c. When the wet well level rises above the Pump Start elevation for a preset time, the pump shall start.
    d. When the wet well level falls below the Pump Off elevation, the pump operation shall be discontinued.
4. A restart delay relay shall prevent the pump from starting for an adjustable time delay of 0 to 3 minutes after it has stopped.
    a. The restart delay timer setpoints shall be operator adjustable via relays or timers.

D. Process engineer will provide programmer with initial VFD ramp times and operating speeds.

E. If when in AUTO and the process level drops below the "Low Water Alarm" float, the system shall shut down the pump and signal a LOW LEVEL ALARM after an adjustable time delay.

F. If when in AUTO and the process level activates the "High Water Alarm" float, the system shall signal a HIGH WATER LEVEL ALARM after an adjustable time delay.

G. Pump Run Monitoring:

1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of run status and for run time accumulation.
2. Run time meter shall be provided on the control panel inner door to indicate the totalized run time. Run time meter shall track operation anytime the pump is running.

H. Pump fail monitoring:

1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of fail status. Upon activation of such signal, the pilot light shall indicate a pump fail alarm.
2. If a pump is required to run, and a run signal is not received by the control system after an adjustable time delay expires, the control system and pilot lights shall indicate a pump fail alarm.
3. The control system shall monitor a 4-20mA speed feedback signal from the VFD. If the speed feedback doesn't match the desired operating speed after an adjustable setpoint triggered when the pump is required to run, the control system shall signal a pump failure alarm.
4. An associated pump failure red pilot light shall illuminate on the control panel inner door. This shall occur regardless of the mode of control the motor control system is in.

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I. Pump protection signals:

1. Temperature sensors supplied with the pump shall initiate a pump fail alarm and stop the pump upon an over temperature condition. Pump shall be locked out until manually reset. Temperature monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. This shall create a pump failure alarm.

2. Seal chamber moisture sensors supplied with the pump shall initiate a pump fail alarm upon detection of moisture in the seal chamber. Moisture monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. A moisture alarm bypass switch shall be provided inside the control panel's inner door to allow disconnecting the moisture alarm from any alarm horn, exterior alarm light, and telemetry, if provided. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the moisture sensor circuitry when the circuit breaker is in the off position.

3. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the pump protection signals circuitry when the circuit breaker is in the off position.

J. Power monitoring:

1. Surge protection device (SPD):

a. An SPD shall be connected to the utility incoming lines to protect the downstream from surges which may be present on the incoming power supply.

2. Control Power backup battery:

a. Provide an AGM battery for control power backup in case of loss of normal power.

K. Alarm Handling:

1. Appropriate lights shall illuminate on the control panel.

2. Refer to Owner's control system programmer for operational description of alarming procedures and notifications.

L. General Requirements

1. Restart After Power Failure:

a. After a power failure, the control system shall automatically restart equipment in a timed sequence.

2. The control system shall be fully operational in manual modes.

1.7 ALTERNATE 2 LIFT STATION CONTROL DESCRITION

A. Provide an outdoor control panel at the lift station site to control the operation of the submersible pump. Provide simplified control with relay logic or an optional simplified pump control module. Provide an Omnisite remote monitoring system to monitor and trend a submersible level transducer for pond level, monitor a motor fail alarm, and high water level alarm.

B. A Hand-Off-Auto control mode selector switch is to be provided on the control panel door for the pump.

1. Hand: the associated pump shall run regardless of if the control system is operational. Alarms, except motor overload or any other alarm that would void the pump manufacturer's warranty, shall not shut the pump down. VFD shall operate at a speed preset at the VFD.

2. Off: the associated pump shall not be called to run.

3. Auto: the control panel shall run the pump dependent on the liquid level of the wet well.

C. AUTO control mode:

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1. The control panel pump control shall operate the pump based on the liquid level in the wet well.
2. On a rising level, the pump shall be started, pump shall be stopped at low level. Floats shall provide normal control.
3. Pump starting/stopping shall be as follows:
    a. The level control mentioned below shall be as sensed by the floats.
    b. When the wet well level is below the Pump Start elevation, the pump shall be off.
    c. When the wet well level rises above the Pump Start elevation for a preset time, the pump shall start.
    d. When the wet well level falls below the Pump Off elevation, the pump operation shall be discontinued.
4. A restart delay relay shall prevent the pump from starting for an adjustable time delay of 0 to 3 minutes after it has stopped.
    a. The restart delay timer setpoints shall be operator adjustable via relays or timers.

D. Process engineer will provide programmer with initial VFD ramp times and operating speeds.

E. If when in AUTO and the process level drops below the “Low Water Alarm” float, the system shall shut down the pump and signal a LOW LEVEL ALARM after an adjustable time delay.

F. If when in AUTO and the process level activates the “High Water Alarm” float, the system shall signal a HIGH WATER LEVEL ALARM after an adjustable time delay.

G. Level measurement:
1. A submersible level transducer is to be mounted in the wetwell for monitoring of the pond level.
    a. The transducer shall create a 4-20mA signal proportional to the wetwell level and shall be monitored by the lift station control system.
    b. The wetwell level is to be displayed, monitored, and trended on the Omnisite cloud website.

I. Pump Run Monitoring:
1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of run status and for run time accumulation.
2. Run time meter shall be provided on the control panel inner door to indicate the totalized run time. Run time meter shall track operation anytime the pump is running.
3. Omnisite to monitor run times. Run time shall be shown in daily, weekly, and total on Omnisite.

J. Pump fail monitoring:
1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of fail status. Upon activation of such signal, the pilot light shall indicate a pump fail alarm.
2. If a pump is required to run, and a run signal is not received by the control system after an adjustable time delay expires, the control system and pilot lights shall indicate a pump fail alarm.
3. An associated pump failure red pilot light shall illuminate on the control panel inner door. This shall occur regardless of the mode of control the motor control system is in.
4. Omnisite shall monitor these signals and provide a remote alarm upon activation of signals.

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K. Pump protection signals:

1. Temperature sensors supplied with the pump shall initiate a pump fail alarm and stop the pump upon an over temperature condition. Pump shall be locked out until manually reset. Temperature monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. This shall create a pump failure alarm.

2. Seal chamber moisture sensors supplied with the pump shall initiate a pump fail alarm upon detection of moisture in the seal chamber. Moisture monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. A moisture alarm bypass switch shall be provided inside the control panel's inner door to allow disconnecting the moisture alarm from any alarm horn, exterior alarm light, and telemetry, if provided. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the moisture sensor circuitry when the circuit breaker is in the off position.

3. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the pump protection signals circuitry when the circuit breaker is in the off position.

L. Power monitoring:

1. Surge protection device (SPD):

   a. An SPD shall be connected to the utility incoming lines to protect the downstream from surges which may be present on the incoming power supply.

   b. The control system shall monitor a common alarm contact at the SPD. Upon activation of the contact, the alarm shall be displayed on the Omnisite cloud based website.

2. Control Power backup battery:

   a. Provide an AGM battery for control power backup in case of loss of normal power.

M. Alarm Handling:

1. Appropriate lights shall illuminate on the control panel.

2. Alarm shall be signaled on the SCADA screens with a flashing text displaying the date/time and description of the alarm.

3. All alarms shall be logged with date/time and description of alarm.

4. Operator may silence an alarm by utilizing the SCADA system. Once silenced, the alarm will stop flashing on the displays, but the alarm shall remain displayed until the operator disables the alarm via the SCADA system, or the alarm condition has been cleared.

5. Operator may utilize the alarm dialer software to enable or disable any alarm. If an alarm is enabled in the SCADA system, operator may choose to disable it from being signaled out via the alarm dialing software and alarm dialer.

6. SCADA system shall log the time and who acknowledges an alarm, enables an alarm or disables an alarm.

7. The alarm dialing software shall send notifications of an alarm condition. Notification shall be by text message, email, and voice notification via a telephone call. Operator shall be able to enable or disable the remote notification for every alarm in the SCADA system.

8. An OmniSite Crystal Ball shall be provided at the control panel for the use of remote monitoring and alarm notifications. System shall provide a remote alarm notification to operators upon the following notifications:

   a. Utility Power Alarm

   b. Control Power Alarm

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c. Communication/Telemetery Alarm

d. High Water Level Alarm

e. Pump 1 Fail

f. SPD

g. Seal Fail

h. Pump Running

i. Pump Run Times

j. Spare

k. Spare

9. Refer to Owner's control system programmer for operational description of alarming procedures and notifications.

N. General Requirements

1. Restart After Power Failure:

a. After a power failure, the control system shall automatically restart equipment in a timed sequence.

2. The control system shall be fully operational in manual modes.

3. Run times, analytical instruments, levels, flows, equipment run/fail indication, etc. shall be monitored/accumulated/displayed.

4. All variables, such as starting sequence, on/off/alarm set points, time delays, etc., shall be operator adjustable via the control system interfaces.

1.8 ALTERNATE 3 LIFT STATION CONTROL DESCRITION

A. Provide an outdoor control panel at the lift station site to control the operation of the submersible pump. Provide an Omnisite remote monitoring system to monitor and trend a submersible level transducer for pond level, monitor a motor fail alarm, and high water level alarm. Add an Allen-Bradley PLC with Panelview Plus 7 OIT for pump controls using the submersible level transducer with back-up float controls to replace the basic relay logic control.

B. A Hand-Off-Auto control mode selector switch is to be provided on the control panel door for the pump.

C. Hand: the associated pump shall run regardless of if the control system is operational. Alarms, except motor overload or any other alarm that would void the pump manufacturer's warranty, shall not shut the pump down. VFD shall operate at a speed preset at the VFD.

D. Off: the associated pump shall not be called to run.

1. Auto: the control panel shall run the pump dependent on the liquid level of the wet well.

E. AUTO (PLC) control mode:

1. The control panel pump control shall operate the pump based on the liquid level in the wet well.

2. On a rising level, the pump shall be started, pump shall be stopped at low level. A submersible level transducer shall provide normal control.

3. Speed control and pump starting/stopping shall be as follows:

a. Process Engineer will direct programmer on desired speed (VFD HZ) for each of the following setpoints.

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b. The level control mentioned below shall be as sensed by the level transducer.

c. When the wet well level is below the PUMP START elevation, the pump shall be off.

d. When the wet well level rises above the PUMP START elevation for a preset time, the pump shall start. The VFD shall then modulate to the adjustable PUMP MINIMUM SPEED setpoint.

e. If the wet well level stays at the PUMP START elevation or starts to drop, the pump shall stay at the minimum pumping speed. If the level rises, the pump's speed shall be increased until the maximum speed setpoint is reached.

f. If the wet well level starts to drop, the pump shall decelerate until it eventually reaches the PUMP MINIMUM SPEED. If the level drops below the PUMP STOP elevation for an adjustable time, the pump shall be stopped.

4. A restart delay relay shall prevent the pump from starting for an adjustable time delay of 0 to 3 minutes after it has stopped. The RESTART DELAY indicator shall be displayed on the operator interface screen during the restart delay period.

a. The restart delay timer setpoints shall be operator adjustable via the operator interface.

F. Process engineer will provide programmer with initial VFD ramp times and operating speeds.

G. When a VFD is required to operate while under PLC control, PLC shall produce a digital required signal to the VFD and a 4-20mA analog signal generated by the PLC for use of VFD speed control. The analog signal shall be proportional to the desired speed.

H. If when in AUTO and the process level drops below the "Low Water Alarm" level setpoint, the system shall shut down the pump and signal a LOW LEVEL ALARM after an operator entered time delay.

I. If when in AUTO and the process level activates the "High Water Alarm" level setpoint, the system shall signal a HIGH WATER LEVEL ALARM after an operator entered time delay.

J. Two float backup control mode (While in control mode selector switch is AUTO position):

1. Backup control shall be provided by 2 floats. Control relays and timers is to be provided for the backup control and shall be independent of the transducer and PLC controller.

2. High Level Float: If the wetwell level rises to an elevation which activates the High-Level Float for an adjustable amount of time, the control system shall go into a Backup Control Mode. The High-Level Alarm float shall initiate a High Wetwell Alarm which shall be signaled over the SCADA system, and start the pump.

3. Low Level Float: If the wetwell level drops below the Low-Level Float the control system shall discontinue the required signal to the operating pump and the control system and shall go into the Backup Control Mode if not already in this mode.

4. When backup control mode is active, an alarm shall be indicated on the SCADA system screens. Operator may transfer control back to PLC control by utilizing a simulated pushbutton on the OIT screen.

5. The backup start signal shall be connected to a preset speed input of each VFD. Speed setpoint shall be coordinated with the process engineer at time of startup.

6. When in float backup mode, the control system shall not signal a high- or low-level alarm when the floats are activated. The low- and high-level alarms shall be signaled when the system is under PLC and transducer control.

a. The exception to this, is if the high wetwell float remains activated for a preset amount of time after pump is called to operate while backup mode is activated, the control system shall signal a backup mode high level alarm.

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7. A relay shall be provided for monitoring PLC fault. PLC shall keep the relay open, upon failure of PLC to maintain the relay position, the relay shall close, an alarm shall be indicated on the SCADA system, and the float backup control mode shall be activated.

K. Level measurement:

1. A submersible level transducer is to be mounted in the wetwell.

   a. The transducer shall create a 4-20mA signal proportional to the wetwell level and shall be monitored by the lift station control system.

   b. The wetwell level is to be displayed and trended on the control system interfaces and used for control as described above.

   c. Operator is to utilize the control system interface screens to enter a High and Low Wetwell Alarm level setpoints. Upon the measured wetwell level rising or falling to the associated level for an operator adjustable amount of time, the control system shall signal the appropriate alarm.

L. Pump Run Monitoring:

1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of run status and for run time accumulation.

2. Run time meter shall be provided on the control panel inner door to indicate the totalized run time. Run time meter shall track operation anytime the pump is running.

3. Omnisite to monitor run times. Run time shall be shown in daily, weekly, and total on Omnisite.

M. Pump fail monitoring:

1. The control system shall monitor motor controller auxiliary contacts or outputs for indication of fail status. Upon activation of such signal, the pilot light shall indicate a pump fail alarm.

2. If a pump is required to run, and a run signal is not received by the control system after an adjustable time delay expires, the control system and pilot lights shall indicate a pump fail alarm.

3. The control system shall monitor a 4-20mA speed feedback signal from the VFD. If the speed feedback doesn't match the desired operating speed after an adjustable setpoint triggered when the pump is required to run, the control system shall signal a pump failure alarm.

4. An associated pump failure red pilot light shall illuminate on the control panel inner door. This shall occur regardless of the mode of control the motor control system is in.

5. Omnisite shall monitor these signals and provide a remote alarm upon activation of signals.

N. Pump protection signals:

1. Temperature sensors supplied with the pump shall initiate a pump fail alarm and stop the pump upon an over temperature condition. Pump shall be locked out until manually reset. Temperature monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. This shall create a pump failure alarm.

2. Seal chamber moisture sensors supplied with the pump shall initiate a pump fail alarm upon detection of moisture in the seal chamber. Moisture monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. A moisture alarm bypass switch shall be provided inside the control panel's inner door to allow disconnecting the moisture alarm from any alarm horn, exterior alarm light, and telemetry, if provided. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the moisture sensor circuitry when the circuit breaker is in the off position.

3. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the pump protection signals circuitry when the circuit breaker is in the off position.

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O. Power monitoring:

1. Surge protection device (SPD):

    a. An SPD shall be connected to the utility incoming lines to protect the downstream from surges which may be present on the incoming power supply.

    b. The control system shall monitor a common alarm contact at the SPD. Upon activation of the contact, the alarm shall be displayed on the OIT screens.

    c. The control system shall monitor a surge counter contact at the SPD. OIT shall display the number of surges the SPD has protected against. Upon activation of the contact, the alarm shall be displayed on the Omnisite cloud based website.

2. Control Power backup battery:

    a. Provide an AGM battery for control power backup in case of loss of normal power.

P. PLC Operation Monitoring

1. SCADA system shall send repeated signals to the local PLC. When the local PLC receives this signal, it shall send a signal back to the SCADA master. If the SCADA master doesn't receive a signal back from the local PLC after up to 5 attempts, SCADA system shall signal a communications alarm for this station.

Q. Alarm Handling:

1. Appropriate lights shall illuminate on the control panel.

2. Alarm shall be signaled on the SCADA screens with a flashing text displaying the date/time and description of the alarm.

3. All alarms shall be logged with date/time and description of alarm.

4. Operator may silence an alarm by utilizing the SCADA system. Once silenced, the alarm will stop flashing on the displays, but the alarm shall remain displayed until the operator disables the alarm via the SCADA system, or the alarm condition has been cleared.

5. Operator may utilize the alarm dialer software to enable or disable any alarm. If an alarm is enabled in the SCADA system, operator may choose to disable it from being signaled out via the alarm dialing software and alarm dialer.

6. SCADA system shall log the time and who acknowledges an alarm, enables an alarm or disables an alarm.

7. The alarm dialing software shall send notifications of an alarm condition. Notification shall be by text message, email, and voice notification via a telephone call. Operator shall be able to enable or disable the remote notification for every alarm in the SCADA system.

8. An OmniSite Crystal Ball shall be provided at the control panel for the use of remote monitoring and alarm notifications. System shall provide a remote alarm notification to operators upon the following notifications:

    a. Utility Power Alarm

    b. Control Power Alarm

    c. Communication/Telemetery Alarm

    d. High Water Level Alarm

    e. Pump 1 Fail

    f. SPD

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g. Seal Fail

h. Pump Running

i. Pump Run Times

j. PLC Failure

k. Spare

l. Spare

9. Refer to Owner's control system programmer for operational description of alarming procedures and notifications.

R. Telemetry:

1. A watchdog loop shall be provided and signal a communication failure via the SCADA system if it or another PLC fails.

2. A cellular alarm dialer is to be provided at the control panel to provide communications to the Owner's existing SCADA system.

3. Provide programming at all sites as needed to incorporate the control system in the existing SCADA system.

S. General Requirements

1. Restart After Power Failure:

a. After a power failure, the control system shall automatically restart equipment in a timed sequence.

2. The control system shall be fully operational in manual modes.

3. Run times, analytical instruments, levels, flows, equipment run/fail indication, etc. shall be monitored/accumulated/displayed.

4. All variables, such as starting sequence, on/off/alarm set points, time delays, etc., shall be operator adjustable via the control system interfaces.

PART 2 - PRODUCTS

2.1 LIFT STATION OUTDOOR CONTROL PANEL

A. Free standing mounted on a concrete pad, low profile, rainproof, Type 3R.

B. UL-508, UL-698A rating.

C. Stainless steel door-in-door construction. Interior white.

D. Panel(s) mounted on 18 inch tall floor stands. Skirt to cover space between floor stands. Material and finish to match the panel.

E. Maximum overall height with floor stands is 60 inches. Enclosure width shall be as required.

F. Exterior gasketed doors with continuous hinge and 3-point handle-operated latching system. Handle with provisions for padlocking; tumbler type lock is not acceptable.

G. Internal doors, painted white with continuous hinge and quarter-turn latches.

H. Removable backpanel, painted white and mounted on studs secured to the back of the enclosure. All devices mounted in the panel shall be mounted to this backpanel with the use of DIN rail. Devices shall be removable without the need to remove screws and bolts.

I. Control devices and indicating lights mounted on interior doors.

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J. Circuit breaker operating handles accessible with interior doors closed.

K. All control relays, timers, pushbuttons, selector switches, PLC's, power supplies and other devices shall be provided in the control panel to meet the intent of the Contract Documents.

L. Internal heaters with adjustable thermostat control to prevent condensation and freezing. Heaters shall be sized as required to maintain temperature required for proper operation of all components inside the panel.

M. Panel Ventilation/Cooling: ventilation and/or cooling shall be per manufacturer to maintain proper operating temperature for the components in the control panel.

1. Ventilation – As recommended by Control Panel Supplier
    a. Thermostatically controlled vent fan and fixed intake/discharge louvers.
    b. Air filters, filter retainer, filter sealing gasket and finger guard.
    c. Stainless steel shroud kits with finish to match panel.
2. Air Conditioning – As recommended by Control Panel Supplier
    a. Closed loop air conditioner with removable filter and integral thermostat.
    b. UL Listed for outdoor use.
    c. Mount on the side of control panel.
    d. Size: Air conditioner shall maintain an ambient temperature inside of the enclosure of at least 10 degrees F less than the maximum operating temperature of all devices in the control panel.
3. Design shall be for the following environment extremes:
    a. Summer: Direct sunlight exposure on the cabinet with an outdoor air temperature of 105 degrees F and all components, drives and devices operating at 100% capacity.
    b. Winter: Outside ambient temperature as low as -60 degree F in darkness.

N. Control panels shall be provided with a control circuit surge arrestor, power supplies, and UPS.

O. Each control panel shall include a means for the PLC to monitor a power failure condition on the line side of the UPS.

P. All input and output circuits which tie to field terminals shall be individually fused. Additionally, each analog circuit shall include individual transient voltage surge protections as specified in the section.

Q. All interface with instrumentation located outside of the panel shall be via interface relays. Terminations directly to PLC output or input module terminals is not acceptable.

R. 1/2" EVA Foam insulation on interior of panel. Foam shall be secured to the panel in such a manner the glue or tape doesn't degrade for a minimum of 20years.

S. A 12" tall x 12" wide x 1" deep pocket secured to the inside of the exterior door shall be provided for clipboard, control panel schematic drawings and other document storage.

T. Interior light for each compartment which turns on when the compartment door is opened.

U. A compartment barrier shall be provided to separate the high voltage components from the control components.

V. Sized to house all control components, with spare space on back panel to add 10% of each relay, fuse, PLC I/O card, breaker, and terminal blocks provided under this project.

W. The dimensions of panel shall be as such to allow for the UPS to sit on the bottom or base of the control side compartment. Mounting the UPS to the side, the back, the top or any other space other than setting on the bottom of the panel will not be accepted.

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2.2 MAIN SERVICE DISCONNECT CIRCUIT BREAKER

A. Electronic trip, molded case.

B. Operating mechanism shall be quick-make, quick-break with provisions for padlocking in the open position.

C. Visible trip indication.

D. True RMS sensing.

E. Adjustable settings for
1. Long-time pickup.
2. Long-time delay.
3. Short-time pickup.
4. Short -time delay.
5. Instantaneous pickup.
6. Ground Fault

F. Interchangeable rating plugs.

G. Thermal magnetic backup protection.

H. Long time and ground fault memory.

I. Trip indicators for overload and short circuit.

J. Approved Manufacturers:
1. Cutler-Hammer
2. ABB
3. Square D

2.3 POWER DISTRIBUTION BREAKERS:

A. Thermal magnetic, molded case.

B. Operating mechanism shall be quick-make, quick-break with provisions for padlocking in the open position.

C. Adjustable magnetic trip.

D. Approved Manufacturer:

1. Cutler-Hammer

2. ABB

3. Siemens

4. Square D

2.4 PUMP BREAKERS

A. Molded Case Circuit Breaker (MCCB):

1. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.

2. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

3. High switching capacity.

4. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

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5. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
6. Auxiliary contact that operates only when MCCB has tripped.

B. Approved Manufacturer:
1. Cutler-Hammer
2. ABB
3. Square D
4. Allen Bradley

2.5 CIRCUIT BREAKER LOAD CENTER

A. To be used for loads other than motors and less than 100A.

B. Provide molded case, non-adjustable, thermal-magnetic, quick-make, quick-break, type circuit breakers.

C. Provide multi-pole breakers where indicated.

D. Handle ties on single pole breakers are not acceptable.

E. Tandem breakers are not allowed.

F. Provide circuit breakers with engraved ratings on the handle that are visible without removing covers and with the interior doors closed.

G. Series rating of circuit breakers is not allowed.

H. GFCI rated breakers:
1. Class A GFCI protection, HACR rated.
2. Sense current imbalance of 4 milliamps or greater.
3. Ground fault sensor to trip the circuit upon current imbalance.
4. Test pushbutton on breaker.

I. Approved Manufacturer:
a. Square D
b. Cutler Hammer
c. ABB
d. Pre-approved equal

2.6 PROGRAMMABLE LOGIC CONTROLLER (PROVIDED UNDER ALTERNATE 3)

A. Provide backup memory module and battery backed RAM, with 25% spare capacity for future programing and control functions.

B. Power supply.

C. Discrete inputs, discrete outputs, analog input modules, and analog output modules as required for the control scheme.

D. Diagnostic indicators for CPU status and status indicator for each I/O point.

E. All I/O shall be optically isolated.

F. Provide fusing for all inputs and outputs.

G. Cables and all accessories as required for complete system operation.

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H. Communications port, cards, software, programming, and all required appurtenances for a complete and operating system.

I. Minimum of 2-spare digital inputs (each type used), 2-spare digital outputs (each type used), and 1-analog input.

J. Provide communications ports/modules for a data connection to allow for remote monitoring and programming.

K. Minimum of 2 or 15% of the following spare inputs and outputs shall be provided:

1. Digital inputs (each type used)
2. Digital outputs (each type used)
3. Analog input (each type used)
4. Analog output (each type used)

L. Approved Manufacturer:

1. Allen Bradley Micrologix 1400
2. Allen Bradley Compactlogix
3. Allen Bradley Micro800 series

2.7 OPERATOR INTERFACE (PROVIDED UNDER ALTERNATE 3)

A. Color touchscreen display.

B. Minimum size: 10” (measured diagonally)

C. Manufacturer’s latest firmware and software for each OIT.

D. Program files shall be free of any locks, passwords, or restrictions as they are to become the sole property of the Owner at project completion.

E. Rated for high visibility in direct sunlight. If it is determined by Owner, Owner Representative, or Engineer that the unit is difficult to read under sunlight, Contractor shall replace the unit at no additional cost or modification of the schedule.

F. Approved Manufacturer:

1. Allen Bradley Panelview Plus 7
2. Or equal from Maple System Industrial Touchscreen

2.8 FUSE TERMINALS

A. DIN rail mounted, touch safe, modular type.

B. 250V RMS, amp rating as required for application.

C. Use ¼” x 1 ¼” standard fuses sized according to application.

D. Blown fuse indicator light.

E. Manufacturer/Model:

1. Allen Bradley
2. Phoenix Contact
3. Or Equal

2.9 SERVICE SURGE PROTECTION DEVICE

A. Type 1 surge protection device, UL 1449 4th edition

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B. Shall provide protection on all incoming phases.

C. Dry contact status indication for common alarm.

D. Dry contact indication for surge counter.

E. LED indicator when protection is on-line for each phase

F. Maximum surge current rating: 40kA per phase

G. Nominal discharge current rating (L-N): 10KA

H. Short Circuit Current Rating: 200kA

I. Modes of protection: L-N, L-G, N-G, L-L

J. To be DIN rail mounted in the power side of the control panel.

K. Minimum of 10 year full coverage and replacement warranty.

L. Manufacturer/Model:

1. Schneider Electric SDSA series.
2. Or Equal.

2.10 CONTROL CIRCUIT SURGE PROTECTION DEVICE

A. 120 VAC In-Line Device

B. Din rail mounted

C. L-L, L-PE, and N-PE protection.

D. Indication flags and voltage free contacts for remote status monitoring.

E. To be located ahead of the UPS, and downstream of the control circuit breaker.

F. Manufacturer/Model:

1. Erico
2. Edco
3. Or equal

2.11 POWER SUPPLIES 12 & 24VDC

A. UL listed for use in UL 508 and UL 698 panels.

B. Line regulation 4% line variations from 105 to 132.

C. Load regulation 4% load variations from 0 to full load.

D. Not to exceed 100mv peak to peak on noise.

E. Hold time at max load shall be 16msecs.

F. Output current limited and overvoltage crowbar sensing circuit.

G. Output voltage adjustment.

H. DIN rail mountable.

I. The power supply shall provide surge protection, isolation and outage carry-over of up to 6 cycles of the AC line or 40ms at 24VDC.

J. AC input to the power supply shall be fused.

K. LED indicator to indicate it is powered on.

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L. Power supplies shall be sized appropriately to handle the full load connected to them.

1. Provide an additional 50% spare capacity.
2. Power calculations showing the required load with additional spare capacity shall be provided during the submittal phase.

2.12 ENCLOSURE FORCED AIR HEAT

A. Manufactured unit with aluminum housing and integral thermostat and 0 to 100ºF adjustable range.

B. UL labeled.

C. Provide quantity and size as required to meet temperature requirements specified (min. of 45ºF).

D. Manufacturer/Model:

1. Hoffman DAH Series or equal.
2. Or Equal.

2.13 CONTROL RELAYS

A. Blade plug-in type with dust cover and socket.

B. Coil: continuous operation at 120VAC ±10% unless required to be otherwise per the circuit it is used in.

C. Contacts, 3 pole, double throw, minimum.

1. 10 amps, make-break, 120 VAC. Resistive.
2. Insulation resistance: 1000 megohms at 500 VDC.
3. Dielectric: 2000 VAC, 60 Hz.

D. Operating time:

1. 35 milliseconds (nominal) energization.
2. 100 milliseconds (nominal) De-energization.

E. Mechanical life: 10^6 operations.

F. Temperature: 0° to 70°C

G. Manufacturer/Model:

1. Allen-Bradley
2. Idec
3. Pre-approved equal.

2.14 POWER RELAYS

A. Coil rating to work with control system power.

B. Contact rating which matches or exceeds the circuit's overcurrent protective device.

C. Approved Manufacturer:

1. Allen-Bradley
2. Square D
3. Pre-approved equal.

2.15 SELECTOR SWITCHES

A. Heavy duty, 30.5 mm, oil tight units.

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B. Selector switches with black knob lever operator with white insert.

C. Contacts as needed for control scheme.

D. Approved Manufacturer:

1. Allen-Bradley 800T/H
2. Equal from Square D
3. Pre-approved equal.

2.16 PUSHBUTTONS

A. Heavy duty, 30.5 mm, oil tight units.

B. Black operator.

C. Contacts as needed for control scheme.

D. Approved Manufacturer:

1. Allen-Bradley 800T/H
2. Equal from Square D
3. Pre-approved equal.

2.17 INDICATING LIGHTS

A. Heavy duty, 30.5 mm, oil tight units.

B. High visibility cluster LED.

C. Push-to-test type.

D. Lens color as indicated in Contract Documents:

1. R = red for fail and alarm indication
2. G = green for run indication
3. A = amber for called for or warning indications

E. Approved Manufacturer:

1. Allen-Bradley 800T/H
2. Equal from Square D
3. Pre-approved equal.

2.18 INTRINSICALLY SAFE BARRIER

A. UL labeled unit suitable for using nonrated devices in NEC Class 1, Division 1 and Class 1, Division II, group D hazardous locations.

B. Supply for each instrument located in the hazardous location(s).

C. Terminal strip connections

D. Approved Manufacturer:

1. Phoenix Contact
2. Or Equal

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2.19 GFCI RECEPTACLE

A. GFCI receptacle near the bottom of the enclosure mounted on the back panel. Provide on inner door if shown as such on the Contract Documents.

B. Receptacle shall be fed by a 10A min. circuit breaker powered from the control panel power circuit, ahead of the UPS.

C. Specification grade, 3-wire grounding type, NEMA 5-20R.

D. Side wired.

E. Rated 20 amperes, 125 volts.

F. LED trip indicator.

G. Approved Manufacturers:

1. Cooper.
2. Hubbell.
3. Leviton.
4. Pass & Seymour.

2.20 CONTROL POWER BACKUP BATTERY

A. Provide an AGM battery located inside of the control panel for control power backup in case of loss of normal power.

2.21 CONTROL PANEL LIGHT KIT

A. Integrated automatic switch, spring-loaded, turning on when door is opened and shutting off when door is closed.

B. 120VAC, LED.

C. Provide one light for each compartment of the control panel.

2.22 IDENTIFICATION

A. Devices on the door exterior shall be identified with engraved phenolic tags which are engraved with white lettering on a black background and are attached with stainless steel screws.

B. Devices on interior doors shall be identified with engraved phenolic tags which are engraved with white lettering on a black background and are attached with stainless steel screws.

C. Devices mounted inside the panel shall be identified with embossed labels with adhesive backs as shown on the Contractor submitted wiring diagrams. Labels shall be on the mounting panel, near the device.

2.23 TERMINAL BLOCKS

A. DIN rail mounted, touch safe, modular type.

B. 600V RMS, 30 amps minimum or higher amp rating as required for application.

C. Connector metal body material: Copper alloy, min 85% copper with nickel or tin plating.

D. Terminal screw material: Bronze with tin plating.

E. Screw terminals on both side only. No other types shall be allowed.

F. Shall terminate wires without additional preparation: i.e. tinning of wire ends, application of ferrules, etc.

G. The insulation housing shall have primary entry funnels to facilitate insertion of wires.

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H. The insulation housing shall prevent stray strands from shorting to adjacent terminal blocks.

I. The termination shall be gastight to prevent corrosion due to corrosive atmospheres.

J. Terminal screws shall be captive in the metal body or via the insulation housing.

K. Once tightened the terminal screws shall be locked in place to prevent loosening due to shock and vibration.

L. The terminal block shall be useable with accessories such as center or insertion bridges; test sockets; separating plates; and end covers, etc. The accessories used shall also be touch safe.

M. For wire identification, the terminal block shall provide space for marking with pre-marked labels. Handwritten labels shall not be allowed.

N. Manufacturer/Model:

1. Allen Bradley
2. Phoenix Contact
3. ABB
4. Or Equal

2.24 CONTROL PANEL WIRING

A. Stranded copper conductors with color-coded 600-volt insulation.

B. Both ends of all conductors identified with wire tags which are numbered in accordance with the wiring diagrams, and which are protected with a clear, heat-shrinkable sleeve.

C. Complete wiring diagrams prepared specifically for this Site. All termination points shall be numbered.

D. Both ends of all conductors identified with wire tags which are numbered in accordance with the wiring diagrams, and which are protected with a clear, heat-shrinkable sleeve.

E. Provide enclosed wire ways in the panel.

1. Wireways shall be mounted parallel or perpendicular to panel enclosure lines.
2. Wire ways shall have removable covers, which do not require the use of tools.

F. All spare PLC inputs/outputs shall be wired to terminal blocks.

G. Provide separate terminal block grouping or segments for digital inputs, outputs, analog inputs and analog outputs.

H. Designated wire coloring shall be used to identify the function of the wire. Example, all digital input cabling shall be a designated color different than digital output wiring.

2.25 NETWORK COMMUNICATION EQUIPMENT (PROVIDED UNDER ALTERNATE 2 AND ALTERNATE 3)

A. Unmanaged Ethernet Switches

1. Unmanaged, store and forward wire speed switching.
2. Automatic address learning, aging and migration.
3. 10-35VDC input power with redundant input terminals.
4. Operating humidity levels 5 to 95%RH.
5. Operating temperature of 0 to 60°C and storage temperature of -40 to 85°C
6. DIN rail mounting
7. Minimum of 5 ethernet ports and 2 fiber ports

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8. Manufacturer/Model:
    a. Allen-Bradley Stratix
    b. NTron
    c. Or Equal

B. CAT6 Copper Patch Cables:
    1. Provide quantity needed for a complete system.
    2. Length of each patch cable shall be as needed for each individual application. Excess length of any patch cables shall be minimal.
    3. Provide snag resistant type patch cords.

2.26 AUTOMATIC TELEPHONE DIALER (PROVIDED UNDER ALTERNATE 2 AND ALTERNATE 3)

A. Communication Method: 4G/LTE Cellular Modem for use on Verizon and AT&T

B. Solid-state, microprocessor-based unit with digital voice storage.

C. Monitor 12 dry alarm contacts.

D. Field-recorded, electronically stored voice message.

E. Eight-hour rechargeable battery backup.

F. The system shall send alarm notification messages via email, text message and/or voice telephone call.

G. Alarm messages will be delivered in English. Alarm messages sent via telephone shall be delivered in digitized human voice using text-to-speech technology.

H. The system will continue to call telephone numbers and send text and email messages in succession until a positive acknowledgment of the alarm message is received. Acknowledgment is accomplished by entering a numeric code from the called telephone, or by replying to a text or email message, or by logging-in to the website or App and requesting acknowledgement. The alarm may also be acknowledged by pressing the 'Acknowledge' button on the device itself.

I. The system will call each programmed telephone number up to 4 times. Once the alarm is acknowledged the system shall halt the dialing process. The system shall allow for an unlimited number of users with an unlimited number of contact methods per user. The system shall allow for tiered alarm delivery schedules so that a time delay may be inserted between tiers.

J. Provide manufacturer antenna and antenna cabling between the unit and antenna. In areas of low cellular coverage provide manufacturer's high gain antenna.
    1. If cellular dialer has issue with cellular connection, and high gain antenna is not provided, Contractor shall provide high gain antenna at no additional cost to owner.

K. Owner shall be given full access to the cloud based server website. Contractor shall assist Owner in setting up the account and access information.

L. Contractor shall fully setup and program the alarm dialer under the Owner's guidance.

M. Approved Manufacturer
    1. OmniSite Crystal Ball
    2. Or approved equal

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PART 3 - EXECUTION

3.1 INSTALLATION

A. Control panels shall be secured to concrete pad using stainless steel hardware.

B. Panels shall be constructed using fabrication techniques that allow for removal and maintenance of all equipment after installation without removal of unrelated components.

C. Contractor shall provide all hardware required to install equipment. The Contractor shall review the wiring diagrams for the equipment furnished and modify the wiring to conform to the requirements of the equipment furnished. The Contractor shall not be compensated for extra labor and materials, which are required to change wiring which was not confirmed with the equipment manufacturer's drawings.

D. All programmable devices shall be completely programmed by the Contractor. This shall include modification in the field to obtain the mode of operation as specified herein. Programming shall be done in such a manner as to allow complete access to the program in the future by the Owner for changes and or additions. Program locks shall not be used.

E. Adjust trip settings of circuit breakers and motor circuit protectors with adjustable instantaneous trip elements. Initially adjust at six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficiency motors if required). Where these maximum settings do not allow starting of a motor, notify Engineer before increasing settings.

F. Install wiring between equipment and remote devices as specified and as required for the control specified in other sections.

3.2 CONTROL PANEL

A. The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.

B. All wiring within the enclosure shall be through the plastic wiring ducts with maximum 60% fill. All wiring not in ducts shall be in plastic spiral bindings. All I/O devices shall be wired to rail mounted terminal blocks.

C. All field wiring shall terminate at the rail mounted terminal blocks that shall be mounted either at the bottom or on the side of the enclosure back panel depending on where the I/O conduits penetrate the enclosure.

D. The field wiring terminals shall be clearly identified as to which I/O terminals they are wired.

E. Jumpers between adjacent terminal blocks shall be copper jumper bars supplied by the terminal block manufacturer.

F. Install all the system equipment including PLCs and interconnecting cabling as required. This work shall include all interconnection wiring from new and existing equipment as required for the completion of the system.

G. It shall be the responsibility of Contractor to ascertain that all field devices are compatible and consistent with the new system design. This includes reviewing drawings and data to ascertain the compatibility and consistency of the system with the field devices on such considerations as:

1. Equipment size and available space.
2. Power levels.
3. Power sources.
4. Logic schemes.

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5. Signal types and levels.
6. Interface devices where required.
7. Operating environment conditions.
8. All other aspects of field devices impacting on the design of the system.

H. All spare and unused I/O shall be wired to terminal strips. This wiring shall include all auxiliary devices and components to complete the installation (e.g., interposing relays, wireways).

I. It shall be the responsibility of Contractor to include all the inputs and outputs required to maintain existing functionality and to meet all aspects of this specification, regardless of whether they are specifically included in the I/O listing in this specification.

3.3 SCADA SYSTEM PROGRAMMING

A. Provide all programming, wiring, and hardware modifications to transmit, receive, display, trend, report, alarm, and handle the data.

B. Programming shall include but not be limited to

1. Local PLC
2. Local OIT
3. All other sites which may need programming modifications to integrate new lift station.

C. A copy of the complete PLC program shall be saved on the respective PLC memory card.

D. The PLC's shall be programmed to retain setpoint and other critical data so that the PLC will automatically resume the process controls when power is restored to the panel after a power failure.

E. SCADA system shall be designed and programmed to operate without the use of either the SCADA PC or HMI. Meaning, programming, data processing, control loops, algorithms and other programming features shall reside on the PLC. If the SCADA PC or HMI is off or not operating, the control system shall still operate as specified.

F. Screens shall be programmed to display each process, monitoring point, and setpoint for the Lift Station. Graphics shall be designed in such a manner to symbolize in 2D of the actual process and equipment being controlled. Screens with text buttons and text indicators only will not be allowed.

G. Screen background shall be a solid color, other graphics in the background will not be accepted.

H. Display the call, run, fail, position and other status points of each piece of equipment and alarms for the associated equipment.

I. Screen(s) shall allow the operator to adjust all variables and view real-time data associated with the process control and equipment.

J. Screens(s) shall display alarms and allow the operator to acknowledge the alarms at any location.

K. Provide screens required for the system operations as specified in Contract Documents.

L. Systems integrator shall expect approximately 8 additional hours of coordinating screen layouts and display options with the Owner. Systems integrator shall make programming changes to the screens as requested by the Owner/Engineer, at no additional cost to the Owner.

1. Contractor to schedule this meeting with the Owner Representative no less than one week prior to the meeting.
2. A copy of all screen shall be provided to the owner no less than one week prior to the meeting to allow adequate time to review.

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3.4 EXISTING SCADA SYSTEM MODIFICATIONS

A. Provide all programming, wiring, and hardware modifications to transmit, receive, display, trend, report, alarm, and handle the data between the lift stations and the SCADA Master.

B. Programming shall be done in a manner consistent with the existing programming and shall include but not be limited to

1. Master radio.
2. Master PLC.
3. Human Machine Interface Software.
4. Software Alarm dialer.

C. Alarm dialer shall be modified as required to incorporate the new alarms in similar fashion to existing lift station alarms.

D. Screens/Reports

1. Addition of new Lift Stations to existing map screen.
2. Modify existing lift station screens to incorporate new monitoring points, alarms and setpoints.
3. Add alarms to SCADA PC alarm dialing software.

3.5 SYSTEM TESTING

A. All components of the system shall be thoroughly simulated and testing in the control supplier's facility prior to shipment.

1. Contractor shall provide testing approval certification from the panel manufacturer prior to receiving shipment.

B. On Site Testing:

1. Verify that each instrumentation and control device is wired and operating correctly. Owner control system programmer will provide "online" PLC testing of each field device, and coordinate with Contractor the proper operation of each instrumentation and control device.
2. Provide services of a factory-trained person to checkout, test, and commission the system on Site.
3. Place equipment into service and provide operation as specified.
4. Provide actual activation of each control function and alarm in the system. If actual activation is not possible, the function shall be simulated.
5. Record all Changes in the Control Systems
    a. Revise all wiring diagrams and schematic diagrams to show final installation.
    b. Insert revised diagrams into each operation and maintenance manual in place of original diagrams.

3.6 SYSTEM COMMISSIONING & DEMONSTRATION

A. Upon completion of Contractor's acceptance checks, settings, and tests, the Contractor shall demonstrate that the equipment is in good operating condition and properly performing the intended function.

B. Process Engineer will witness operational tests and instruct programmer to adjust setpoints to achieve the operation desired by the Process Engineer.

C. Contractor shall have system programmer at site for the commissioning process.

D. A minimum of 2-week notice will be provided to the Contractor for scheduling of commissioning dates.

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E. If Contractor has not completed programing and system tests prior to the system commission and demonstration, Contractor shall reschedule the demonstration at Contractor's expense.

3.7 OPERATOR TRAINING

A. System commission and demonstration shall be completed before factory-trained personnel instruct the operating personnel.

B. Training shall be not less than two 2-hour sessions. Sessions shall be on 2 separate dates selected by the Owner.

C. Training time specified shall be time actually spent at the Site and shall not include travel time.

D. Training time does not include startup, testing, demonstration and time used for system modifications.

3.8 ADDITIONAL PROGRAMMING MODIFICATIONS

A. If during construction, Engineer directs control integrations programmer to make changes to the control programing which are not outlined above and Contractor feels additional programming time over and beyond the base bid controls specified above, Contractor shall submit a Change Order proposal for the programming time he/she feels is required to make the suggested modifications.

B. Contractor shall not make programming modifications which he/she feels is outside the scope of work unless Contractor's Change Order has been approved by Engineer/Owner. Work done prior to approval of such Change Order request will not be retroactively awarded to Contractor.

C. Contractor shall provide an additional 8 hours of programming time to occur in the field after equipment has been installed, over the base bid programming mount. The unused hours will be credited to Contractor Change Order request forms upon approval of the request by Owner/Engineer. Time not documented in such a manner will not be acknowledged as additional programming time needed and will be considered as base bid programming time.

3.9 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components.

B. Provide warning signs as required by the NEC and where noted in the specifications.

C. Label each enclosure-mounted control and pilot device.

D. Mark up a set of manufacturer's connection wiring diagrams with field-assigned wiring identifications and return to manufacturer for inclusion in Record Drawings.

**** END OF SECTION ****

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PARKS TECHNICAL SPECIFICATIONS

for

Alternate 5 – Arden Oaks Park ADA Trail Improvements

Alternate 6 - Arden Manor Park Basketball Improvements

City of Arden Hills, MN

Arden Hills, MN

SECTION 02 01 10 - EXISTING UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Provide removal of miscellaneous concrete and asphalt pavements, concrete curb and gutter, storm sewer piping and structures, fencing (including footings and gates), basketball goals, benches, trees and shrubs, stumps and roots, vegetation, and other miscellaneous existing site features which are in the path of proposed improvements.

B. Employ a utility locating company to locate all privately owned utilities.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. The unit price bid for removing pavement and miscellaneous structures will include all costs of labor, materials, equipment, and ultimate disposal required to complete the work, as specified.

2. Remove Bituminous Pavement – Work for this item shall include the removal and disposal of any and all of the associated items including but not limited to excavation required for placement of new bituminous trail and base material. Payment for this item will be made under Remove Bituminous Pavement and shall be measured by the SQUARE YARD (SQ YD) and shall be considered full compensation to furnish all labor, materials, equipment, and tools to complete the work as specified.

3. Remove Fence – Work for this item shall include the removal and disposal of any and all of the associated items including but not limited to removal of all foundations, posts, fence fabric, and hardware. Payment for this item will be made under Remove Fence (10’ Ht. Chain Link Fence and shall be measured by the LINEAR FOOT (LF) and shall be considered full compensation to furnish all labor, materials, equipment, and tools to complete the work as specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:

1. Compensation for removals shall be considered incidental unless a specific bid item is provided for on the proposal.

2. Saw cutting - bituminous and/or concrete, driveways, sidewalks, pavements, curb & gutter, and other impervious surfaces.

3. Removing storing and reinstalling mailboxes, street/traffic signs, or similar structures which must be moved to construct the project.

4. Off-site disposal of excess excavated material and debris.

5. Removal and off-site disposal of bituminous or concrete, unless designated for salvaging.

6. Removing, salvaging, and storing, or disposing of manhole and catch basin castings.

7. Loading, hauling, stockpiling, and placing as directed (i.e., leveling) designated salvage items to a location directed by the Owner.

8. Fees and permits for the disposal of materials.

9. Removal and disposal of existing sanitary sewer pipe, storm sewer pipe, watermain, and service pipes.

10. Bulkheading the ends of existing pipes designated by the Engineer to be abandoned in place.

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11. Protection from damage of structures or other surface improvements that are not to be removed, and subsequent repair and/or replacement if damaged by Contractor operations.

1.3 SITE CONDITIONS

A. Protection of Persons: Install barricades and post with warning lights.

B. Bench Marks and Monuments: Maintain bench marks and monuments.

C. Protection of Existing Property to Remain: Protect existing trees and vegetation, equipment, pavements, curbing, facilities, utilities, and structures which are in area where work will be performed and which are to remain. Repair or replace existing property which is to remain that is damaged by the work, to Owner's satisfaction, at no additional cost to the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 SITE REMOVALS

A. Site features that are to be removed or relocated are generally indicated on the Drawings. Remove and dispose of, off-site, all features and materials except for that which is permitted to remain upon determination being made by the Engineer, that their existence does not interfere with, endanger, or detract from the new construction in any way.

B. Visit the site prior to bidding; be familiar with actual conditions in the field. Extra compensation will not be allowed for conditions which could have been determined or anticipated by examination of the site, the Contract Documents, and the information available pertaining to existing soils, utilities, and other site characteristics.

C. All removal operations that may endanger new construction shall be completed prior to construction of affected work.

D. Comply with all instructions and ordinances of the State of Minnesota, and all counties and municipalities regarding disposal operations, signs, traffic intersections, danger signals, barricades, fire protection, and all safety laws, ordinances, and rulings.

E. All debris resulting from the removal and demolition operations shall be disposed of, off-site, subject to any specific regulations imposed by laws, ordinances, orders, or decrees.

F. Removal of Existing Pavements and Curbing:

1. Where a portion of an existing pavement, curb, walk, or similar structure is to be retained for use, that portion shall not be damaged during removal operations.

2. In removing pavements, curbs, and similar structures, where the cut will be exposed in the finished work, the structure shall, unless the removal is made to an existing joint and unless determining otherwise by the Engineer, be sawed along the removal lines with a concrete saw to a depth of not less than 1/3 the thickness of the concrete or asphalt before breaking off the concrete or asphalt. In such cases, the use of wedges, driven into the saw cut to break off the portion to be removed, will not be permitted. Elsewhere, the structure shall be cut and chipped to true lines and vertical faces.

3. All demo materials shall be removed from site unless noted otherwise.

4. Where removal of pavement will result in a finished edge or will be abut new pavement, sawcut the existing pavement edge immediately prior to paving, or at a time when damage to the sawcut edge will be minimized.

5. Pavement removals shall include underlying aggregate base and related materials.

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G. Removal of Existing Underground Storm Sewer, Sanitary Sewer, and Watermain and Related Piping and Materials:

1. Remove and dispose of, off-site, all underground utility structures and associated piping. Existing utility structures and piping, designated for removal, shall be removed entirely and shall not be reused. Where structures remain but existing piping is removed, remaining holes in the structures shall be filled with brick and mortar to seal the opening shut.

H. Removal of traffic signs and posts, fencing systems, bollards, flagpoles, playground equipment, benches, and similar:

1. Removal shall include complete removal of system materials and components, including posts, footings, and other features. Unless noted otherwise, materials scheduled for removal shall not be reused.

3.2 PROTECTION OF TREES AND PLANT LIFE

A. Protection of plant life to remain within the construction limits and adjacent thereto shall include the following:

1. Orange snow fence or orange silt fence shall be placed at drip line of trees to protect against root compaction.

2. No equipment shall be allowed to move under drip line areas, nor shall any materials be stored within a drip line.

3. No toxic materials shall be dumped near trees.

3.3 CLEARING AND GRUBBING OF TREES AND PLANT LIFE

A. Generally, clearing and grubbing shall be performed as necessary to construct the proposed improvements.

B. Clearing operations shall consist of cutting and removing vegetation.

C. Grubbing operations shall consist of removing and disposing of the roots and other remains. Root systems shall be completely removed.

D. Except in areas to be excavated, all depressions resulting from the grubbing operations shall be backfilled with soils as specified in Section 31 20 00 Earth Moving.

E. All brush, roots and other debris or by-products resulting from the clearing and grubbing operations shall be removed from the site. If any wood is run through a chipping machine, the wood chips shall be recovered and disposed of off-site. Burying or burning of wood chips or other vegetation remnants on-site will not be permitted.

******END OF SECTION******

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SECTION 02 32 19 - EXPLORATORY EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to conducting a subsurface investigation for all items and utilities encountered, as specified herein, and/or as specified by the Engineer.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. All subsurface investigation necessary to construct the project for items and utilities encountered shall be considered incidental for which no direct compensation will be made.

A. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated removal and excavation items. Such items of work include but are not limited to:

1. Exploratory excavation without prior authorization and approval by the Engineer.

2. Exploratory excavation to locate and connect to existing pipes unless the Engineer agrees that excavation beyond what could be considered reasonable is required.

3. Materials for re-grouting of inverts.

B. All costs of off-site disposal of excess excavated material and debris including but not limited to hauling, fees, and permits for such disposal.

1.3 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2123.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. No exception to this specification is made.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. The Contractor shall:

1. Perform underground utility exploration as directed by the Engineer which involves excavation to locate pipelines for location and elevation verification.

2. Clean debris and gravel which is present before the Project, out of existing manholes and catch basins along the Project and to regrout the inverts, as directed by the Engineer.

3. Other work associated with the Project, as directed by the Engineer.

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B. Where exploratory excavation is performed in a location that will not be disturbed later, the backfill will be placed and compacted to the density specified elsewhere in these Specifications for the type of utility located.

******END OF SECTION******

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SECTION 11 68 33 - ATHLETIC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Basketball Goals.

(a) Provide one pair.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and payment for athletic equipment shall include all equipment, materials, and labor to furnish and install athletic equipment complete. Footings and/or attachment hardware are incidental to the unit price:

1. Basketball goals: Per Goal

1.3 SUBMITTALS

A. Submit information and shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following product information and shop drawings:

1. Product Information:

(a) Product information shall include brochures or literature that adequately describe the products being used, and recommended installation and maintenance instructions. Submit for the following products:

(1) Basketball Goals

2. Shop Drawings:

(a) Shop Drawings shall include layout dimensions and plans. Provide shop drawings for the following items:

(1) Basketball hoop

3. Submit maintenance recommendations from the manufacturer for each product in this Specification.

4. Submit manufacturer's warranty information for each product in this Specification.

1.4 QUALITY ASSURANCE

A. Installation shall be in accordance with the requirements of current NFHS rules and regulations.

PART 2 - PRODUCTS

2.1 BASKETBALL GOALS

A. Height Adjustable Basketball Goals

1. Approved Products:

(a) Goalsetter MVP Height Adjustable Basketball System. Manufactured by Goalsetter Systems, P.O. Box 552, Pella, IA 50219 (Ph: 800-362-4625), distributed by Webber Recreational Design, Inc., 1442 Brooke Court, Hastings, MN 55033, (Ph: 651-438-3630).

(b) Or approved equal.

2. Provide Double Ring Static Rim.

3. Provide Acrylic Plus backboard.

4. Each Basketball Goal shall be equipped with a keyed pinlock to lock at any height.

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5. Include Goalsetter Competition Series Pole Padding or approved equal. Standard color will be selected by the Owner.
6. Provide concrete footing per manufacturer's recommendations.
7. Basketball Goals shall each come with a lifetime warranty.

B. Concrete for Footings: 3,000 psi air entrained concrete.

PART 3 - EXECUTION

3.1 BASKETBALL

A. Install in accordance with manufacturer's recommendations and instructions.

B. Install plumb.

C. Coordinate installation with concrete installation.

3.2 CLEANING AND PROTECTION

A. Clear site of all excess spillage of concrete, grout, scrap materials, and excavation materials.

******END OF SECTION******

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SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the excavation and embankment of the site improvements as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

A. Building Pad - The area under any proposed building, or an area delineated on the plans as the site for a future building.

B. Building Pad Hold-Down - The elevation that the proposed building pad is to be constructed to. This elevation does not represent the finished grade elevation of the proposed building.

C. Compacted Volume (CV) – The volume of material placed as determined by computing the difference between original and final cross-sections by the average end area method.

D. Excavated Volume (EV) – The volume of material excavated as determined by computing the difference between original and final cross-sections by the average end area method.

E. Excess Material - Material that is not needed to complete the earthwork balance.

F. Structural Improvements - For this specification, structural improvements will refer to any roadway, sidewalk, trail, building, sign, or other improvements requiring suitable soil to support the anticipated loadings.

G. Subcut - Excavation performed below the proposed subgrade or building pad hold-down elevation shown on the plans to remove unsuitable material.

H. Subgrade - The top surface of a roadbed upon which the pavement structure (including aggregate base and/or granular subbase) is to be constructed. This is also a general term denoting the soil foundation upon which a proposed improvement is to be placed.

I. Suitable Material - Sand, silty sand, or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.

J. Topsoil - Any soil, generally black, containing organic material.

K. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

1.3 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Excavation - Common:

(a) Measurement and payment for Common Excavation will be based upon the cubic yard (EV) (P).

(b) Common excavation shall be considered the volume of material excavated to construct the project including site grading, parking lot section, and basketball court section.

(c) Excavation for construction of aggregate base to the depths specified or shown on the plans under concrete curb and gutter, concrete sidewalk, bituminous walks, and concrete driveways and pavement are not included with the Common Excavation (P) quantity. Such excavation is considered incidental to the construction of the respective items.

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(d) Common excavation is computed to the face of any retaining walls. Excavation required for the construction of the wall will be incidental to the unit price bid for the Retaining Wall.

2. Select Granular Borrow

(a) Measurement and payment for select granular borrow will be based upon the cubic yard (P), to construct the basketball court sections.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the associated excavation items. Such items of work include but are not limited to:

1. Unless itemized in the Schedule of Prices, separating, salvaging, stockpiling, and spreading of topsoil will be included in the price bid for common excavation.

2. Unless itemized in the Schedule of Prices, subcutting the existing topsoil before placing embankment in all areas with proposed structural improvements will be included in the price bid for common excavation.

3. Salvaging and separately stockpiling suitable aggregate base material, as determined by the Engineer will be included in the price bid for common excavation.

4. Separating, salvaging, stockpiling, and placing suitable material for use in embankment areas will be included in the price bid for common excavation.

5. Obtaining suitable material from areas with no proposed structural improvements to provide enough suitable material for embankments being constructed under proposed structural improvements will be included in the price bid for common excavation.

6. Restoring the borrow site by grading the area to drain properly to slopes not-to-exceed 6:1 and by restoring the topsoil to a minimum thickness of 6.00-inches will be included in the contract unit price for common borrow.

7. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading, and/or other efforts necessary to repair the subgrade after satisfying the roll test and failing to protect the integrity of the subgrade will be included in the price bid for common excavation.

8. Over-excavation in cut areas to provide room for placement of topsoil will be included in the price bid for common excavation.

9. Earthwork balancing including adjustments for shrinkage loss, and excess materials resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures will be included in the unit price bid for common excavation.

10. The avoidance and protection of wetlands will be included in the price bid for common excavation.

11. Protecting existing improvements and previously accepted in-process improvements from damage will be included in the price bid for common excavation.

12. Test rolling will be included in the price bid for common excavation.

13. Gradation and compaction testing, and geotechnical inspection services to meet requirements of Source and Field Quality Control if required will be included in the price bid for common excavation.

14. Farming, disking, and/or drying suitable wet materials, will be included in the price bid for common excavation.

15. Excavation required for the construction of any retaining wall will be included in the unit price bid for the retaining wall.

16. Scarifying wet subgrade material, drying, regrading, and recompacting the subgrade.

17. Performing and passing a test roll to the satisfaction of the Engineer on both the roadway subgrade prior to placement of the aggregate base and on the aggregate base prior to paving.

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18. Maintaining positive site drainage during construction.

1.4 SPECIFICATION REFERENCES

A. The following referenced Specifications will apply to this Section:

1. MnDOT 2106.

2. MnDOT 2574.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All excess material will become the property of the Contractor and will be removed from the site and disposed of at a location secured by the Contractor.

B. Select Granular Borrow shall meet the requirements of MnDOT 3149.2.B.2 for Select Granular Material.

PART 3 - EXECUTION

3.1 GENERAL

A. Excavated topsoil and suitable material for reuse in the project will be segregated and stockpiled at a site selected by the Contractor.

B. Frozen material will not be allowed for roadway or building pad construction. The Engineer shall approve locations for placement of frozen material.

C. All excavations will be kept free of water during the placement of fill.

D. The Contractor shall utilize methods and equipment for excavating that will minimize the disturbance to the subgrade. The use of backhoes rather than scrapers or front-end loaders may be required to minimize repeated passes of equipment over wet subgrade soils.

E. At the end of each day, the Contractor shall eliminate surface indentations, including those caused by sheepsfoot rollers, tractor tires, and tracked equipment, and roll the surface with a steel wheel or rubber-tired roller.

F. Sufficient common excavation will be utilized by the Contractor to replace the soil shrinkage from excavation which occurs through the course of construction handling and compaction. The Contractor shall make their estimate of the amount of shrinkage that will occur.

G. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade will be scarified and dried over a reasonable period. When the material has reached acceptable moisture limits, the material will be returned and compacted into place to the proper elevation. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.

H. Material suitable for curb backfill will be segregated and stockpiled at a site selected by the Contractor. Following curb construction, the material will be placed behind the curb, allowing for a minimum of 6.0-inches of topsoil, unless otherwise indicated in the plans.

I. In areas where filling above the existing grade is necessary to establish the final designed elevation, the Contractor shall fully remove the topsoil and organic material to the level of stable underlying sand or clay before backfilling with suitable embankment material.

J. The Contractor shall make their determination as to whether the proposed grading has been completed according to the plans. When the Contractor determines that the grading has been completed, he will

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notify the Engineer. Neither the Owner nor the Engineer will provide any intermediate acceptance of the grading improvements until all of the gradings have been completed and all topsoil has been spread.

3.2 EXCAVATION AND EMBANKMENT IN AREAS WITH PROPOSED STRUCTURAL IMPROVEMENTS.

A. All vegetation, topsoil, organic, or other unsuitable materials will be excavated from the area below the structural improvement. Due to the variability of soils, the depth of the excavation in these areas is expected to vary significantly throughout the site. The excavated area will be inspected by the Geotechnical Engineer as specified in the field quality control.

B. Subcut excavations will be laterally oversized at a distance of 1.0-foot beyond the edges of the proposed structural improvement for each foot of excavation depth (1:1 oversizing). The extent of the structural improvement areas shown on the plans do not necessarily show this 1:1 oversizing.

C. Fill placed from the bottom of the subcut to the subgrade or building pad hold down elevation will be selected material from the excavation or borrow material. Such material will consist of suitable material as defined above. Clay fill shall be moisture-conditioned to within 2 percent above or below the optimum moisture content determined from the Standard Proctor compaction test.

D. The embankment material will be spread in 6.0 to 8.0-inch loose lifts.

E. In all roadway and pavement areas, the Contractor shall perform a roll test on the subgrade before placing any portion of the pavement structure. The roll test will be performed with a fully loaded tandem axle truck. Soils the rut or deflect 1.0-inch or more will be corrected by scarifying, drying, and recompacting the soils. Subgrade excavation will only be performed as directed by the Engineer.

F. Subgrade excavation will be performed only when the Engineer and the Contractor both agree that the in-place soil cannot be made suitable by scarifying, drying, and recompacting. Such excavation will be backfilled with suitable excess common excavation material, stabilizing aggregate, granular borrow, or select granular borrow, as directed by the Engineer. If the Contractor proceeds without approval from the Engineer, all work and material to restore the roadbed to the proper grade will be at the Contractor's expense.

3.3 EXCAVATION AND EMBANKMENT IN AREAS WITH NO PROPOSED STRUCTURAL IMPROVEMENTS

A. Topsoil or unsuitable material may be used to construct embankments in areas with no structural improvements.

3.4 COMPACTION

A. All embankment grading will be compacted using:

1. Under areas with proposed paved or structural improvements, Specified Density Method :

(a) 100 percent Standard Proctor dry density within 3.0-feet of the proposed sub-grade or building pad hold-down elevation.

(b) 95 percent of the maximum Standard Proctor dry density below 3.0-feet from the proposed sub-grade or building pad hold-down elevation.

2. Under areas with no proposed paved or structural improvements, Quality Compaction Method.

3.5 SOURCE QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

1. One (1) gradation test per every 500 tons or 275 cu yd (CV) of select granular borrow.

2. One (1) gradation test per every 500 tons or 275 cu yd (CV) of stabilizing aggregate.

B. All testing will be performed by an independent testing laboratory approved by the Engineer.

3.6 FIELD QUALITY CONTROL

A. The Owner may arrange for and pay all costs associated with having the following testing and inspections, with written certification, performed:

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1. Areas with Proposed Structural Improvements:

   (a) One compaction test (including Standard Proctor) per each 500 square yards per each 3.0-foot depth of embankment.

   (b) Building Pads shall have a minimum of one compaction test (including Standard Proctor) per each 3.0-foot depth of embankment for each pad.

   (c) Inspection following the removal of unsuitable material and before placement of embankment material to ensure that all topsoil and unsuitable material has been removed and that the exposed subgrade has sufficient bearing capacity for the anticipated structural improvement.

B. The Contractor shall notify the Engineer 24 hours prior to completing the removal of topsoil and unsuitable material in areas with proposed structural improvements to ensure that appropriate inspection may be performed.

C. All testing will be performed by an independent testing laboratory. All inspections will be performed under the direct supervision of a licensed Geotechnical Engineer who shall provide written certification of the results.

D. Samples for testing will be taken from material in place, in building sites, and/or paved areas. All sampling methods shall be approved by the Engineer.

E. The Contractor shall coordinate the site grading and inform the Engineer when the roadway subgrade is ready for test rolling, prior to installing any aggregate base. The Engineer may order some subgrade correction prior to allowing the installation of the aggregate base.

F. Should any of the specified tests or inspections fail, the Contractor may arrange and pay for additional tests or inspections as may be necessary to satisfy the Engineer that the specified requirements have been met.

*****END OF SECTION*****

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SECTION 31 23 13 - SUBGRADE PREPARATION

PART 4 - GENERAL

4.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performance of all work and services necessary or incidental to the subgrade preparation as indicated on the drawings or as specified herein.

4.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. No direct payment will be made for subgrade preparation. Costs will be included in the unit prices bid for the various excavation items.

2. No exception to the referenced specification is made.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the various excavation items. Such items of work include but are not limited to:

1. Drying and adding water to the subgrade.

2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading, and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.

4.3 SPECIFICATION REFERENCES

A. MnDOT 2112 will apply to this Section.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

4.4 SUBMITTALS

A. No submittals for this section.

PART 5 - PRODUCTS

5.1 MATERIALS

A. No exception to the referenced specification is made.

PART 6 - EXECUTION

6.1 CONSTRUCTION REQUIREMENTS

A. At the end of each day, and before the placement of aggregate base, the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cleats, and roll the surface with a steel wheel or rubber-tired roller.

B. The Contractor shall disc, scarify, shape and compact the street subgrade or existing base, adding water or drying as may be necessary to give uniform and desired density.

C. If the subgrade is unstable and the instability is due to excessive moisture, the subgrade will be scarified and dried over a reasonable period. When the material has reached acceptable moisture limits, the material will be returned to the roadbed and compacted into place to the proper elevation. The roadbed will once again be test rolled. If the material continues to be unstable, the Engineer may authorize the removal of the undesirable material as subgrade excavation.

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D. Once the subgrade has been test rolled and accepted by the Engineer, no traffic or construction equipment will be permitted to operate directly on the subgrade without the prior approval of the Engineer. All equipment will be restricted to operating only in areas where the aggregate base has been installed to its full design depth. If inclement weather occurs after a test roll, and before placement of the aggregate base or first course of bituminous, the test roll will be voided and a new test roll will be performed.

E. The subgrade will be compacted in accordance with the Quality Compaction Method.

6.2 FIELD QUALITY CONTROL

A. "Blue Top" stakes will be provided by the Contractor at 50 foot intervals to confirm that the subgrade is constructed to the required grades and elevations. Methods other than "Blue Top" staking may be allowed if approved by the Engineer.

B. The compacted subgrade will be test rolled using a fully loaded aggregate truck (tandem) in a pattern approved by the Engineer. The subgrade stability will be considered adequate when the surface shows less than 1.0 inch of yielding or rutting after one pass, or as otherwise approved by the Engineer.

******END OF SECTION******

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SECTION 31 23 33 - TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment, and performances of all work and services necessary or incidental to the maintenance of utility service, trench excavation, bedding, and backfill necessary for the construction of underground utilities and structures, as indicated on the drawings or as specified herein.

1.2 DEFINITIONS

A. Excess Material - Material that is not needed to complete the earthwork balance.

B. Suitable Material - Sand, silty sand, or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.

C. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

D. Flexible Pipe Materials – For this specification section, flexible pipe materials will include the following:

1. Polyvinyl chloride (PVC) pipe – solid wall and profile wall pipe.
2. Polypropylene profile wall pipe.
3. High-density polyethylene pipe – solid wall and profile wall pipe.
4. Corrugated steel or aluminum pipe.
5. Centrifugally cast glass-fiber-reinforced, polymer mortar (CCFRPM) pipe.

E. Rigid Pipe Materials – For this specification section, rigid pipe materials will include the following:

1. Reinforced concrete pipe.
2. Reinforced concrete box culverts.
3. Ductile iron pipe.

1.3 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items will be paid according to the referenced specification or as modified below:

1. Items specifically identified in the Schedule of Unit Prices will be compensated following the description of measurement and payment contained in the section applicable to the individual item. No direct compensation will be granted for compliance with the provisions contained herein.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. The costs will be included in the unit price bid for the individual pipeline items associated with the stated specific item or work effort. Such items of work include but are not limited to:

1. Interference with other above and underground structures and utilities.
2. The removal and restoration, or protection of existing structures and utilities encountered during construction and for which there is no bid item for removing and restoring or working around the utility.
3. Unless separately itemized in the Schedule of Unit Prices, any dewatering is necessary for construction.
4. Foundation materials placed instead of performing necessary dewatering.

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5. Bulkheading of existing pipes to be abandoned in place.
6. Granular foundation, granular bedding, and granular encasement materials.
7. Granular foundation materials used instead of bedding materials in the specified bedding zone, where specified.
8. Granular foundation materials used in unstable trench conditions.
9. The removal and disposal of native materials that are unsuitable for bedding and/or backfill.
10. Providing and maintaining utility service.
11. The replacement of all material displaced due to shrinkage or loss during the excavation and backfilling operations.
12. The removal of excess materials above the original topography resulting from the additional volume created from pipe bedding, utility pipe, and/or underground structures.
13. Delays due to other utility conflicts that result during construction.
14. Protecting existing improvements and previously accepted elements of this construction from damage.
15. Protecting the inverts of other utility pipes from the accumulation of debris and soil, the removal of blockages that threaten to damage property, and/or the cleaning of both the newly constructed lines and the existing lines of all debris and soil that accumulated during the construction.
16. If a separate bid item for bypass pumping is NOT included in the Schedule of Unit Prices, providing temporary bypass pumping/control of stormwater flows around the construction zone, will be included in the price bid for the associated items being installed.
17. The use of special construction techniques such as trench boxes, sheeting, shoring, etc., will be included in the price bid for the associated items being installed.
18. Compaction testing and compaction, if required, will be included in the price bid for the associated items being installed.

1.4 SPECIFICATION REFERENCES

A. CEAM 2600 will apply, except as modified herein.

B. MnDOT 2451 will apply, except as modified herein.

C. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.5 SUBMITTALS

A. Gradation Test Results for any granular borrow materials.

B. Two separate tests, as required in Source Quality Control provisions of individual sections contained herein, from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.

PART 2 - PRODUCTS

2.1 GRANULAR MATERIALS

A. Granular Bedding and Granular Encasement – No exception to the referenced specification is made.

B. Granular Backfill - No exception to the referenced specification is made.

PART 3 - EXECUTION

3.1 EXCAVATION AND PREPARATION OF TRENCH

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A. Interference and Protection of Underground Structures

1. If an existing utility is shown on the plans and there is no bid item for removing and restoring, or working around the utility, the Contractor shall be required to remove and restore, or protect the utility.

2. The inverts of existing sewers (storm & sanitary), culverts, subdrains, etc. will be protected during construction. The Contractor is responsible to inspect and clean, if necessary, all lines which have become compromised by the construction operations.

B. Excavation Limits and Requirements

1. The trench for all flexible pipe will be undercut 6.0-inches below the pipe barrel to permit the installation of granular bedding or foundation material.

2. The trench for all rigid pipe will be undercut 3.0-inches below the pipe barrel, or as shown in the bedding detail, to permit the installation of granular bedding or foundation material.

3. The Contractor shall install and operate a dewatering system to maintain all trenches free of water wherever necessary. The Contractor shall make their subsurface investigations and determine what dewatering methods to utilize to prevent such damage.

4. The Contractor shall be responsible for any damage to adjacent structures or buildings caused by the dewatering operations.

5. Use of granular foundation material in place of performing dewatering is permitted.

6. All excess excavated material will become the property of the Contractor and will be removed from the site and disposed of at a location secured by the Contractor.

3.2 INSTALLATION OF PIPE AND FITTINGS

A. The Contractor shall keep accurate records as to the location of the service connections, field tile, utility crossings, etc. either constructed or encountered during the construction Measurements to service lines will be taken from the two nearest permanent structures (i.e., hydrants, valves, manholes, buildings). Final payment for the project will not be made until the information is in the possession of the Owner.

B. When connection to an existing conduit is required at an existing or proposed manhole, the Contractor shall expose and verify the elevation of the existing conduit before laying any pipe toward, or away from, the connection point. If the elevation of the existing conduit does not match the elevation shown on the plans, the Contractor shall notify the Engineer, at which time the Engineer may adjust the proposed grades.

C. Sewer Pipe at Structures

1. The pipe end(s) will be extended inside the structure a maximum of 3.0-inches unless approved otherwise by the Engineer or shown on the plans.

D. Connection and Assembly of Joints

1. For sanitary sewer, watermain, forcemains, and culverts, all joints will be water-tight.

2. For storm sewers and subdrains, all joints will not permit the intrusion of soil or backfill materials.

(a) If a reinforced concrete pipe is used, the Contractor may at its discretion choose to wrap each joint with a geotextile filter fabric, as specified, rather than place mastic in the joint.

E. Bulkheading Open Pipe Ends

1. The Contractor shall furnish, install and maintain a temporary, water-tight plug adequately blocked in place to prevent flooding of the existing downstream sewer system. The plug will be placed at the beginning of the project or the end of each working day at the end of the day's operation.

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2. When flows are diverted from an existing sewer or tile to be abandoned in place, the Contractor will construct a water-tight plug on the open end of the abandoned pipe.

3. Permanent watertight plugs will be constructed with concrete grout with a thickness of not less than 1 pipe diameter.

3.3 BEDDING AND BACKFILLING OPERATIONS

A. Backfill material around all manholes, catch basins, valve boxes, curb boxes, and hydrants will be compacted with hand machines. The maximum lift thickness will be 6.0-inches.

B. Flexible Pipe Materials

1. Unless otherwise shown on the plans, the pipe will be bedded and backfilled with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser, from 6.0-inches below the bottom of the pipe to 12.0-inches above the top of the pipe the full width of the trench. The Contractor shall bed and backfill the pipe as shown on the plan details.

2. Where the trench foundation is unstable and not suitable for bedding, the trench will be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.

3. Unless otherwise shown on the plans, select native material will be used as a trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12.0-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard Proctor Density will be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.

C. Rigid Pipe Materials

1. Unless otherwise shown on the plans, in ordinary or stable trench conditions, the bottom of the trench will be first excavated to a depth of approximately 15 percent of the outside pipe diameter below the established grade for the bottom of the pipe. Then the bottom of the trench will be further excavated to allow for the placement of 6.0-inches of granular bedding for a width of at least 60 percent of the outside diameter of the pipe. A pipe will be placed on the bottom of the pre-shaped excavated trench. The bottom of the excavated trench will be shaped to fit the circumference of the pipe up to 0.15 of the outside diameter of the pipe. The Contractor shall encase the pipe from the 0.15 outside diameter to the 0.60 diameter height of the pipe with granular material compacted to 95 percent Standard Proctor Density or as recommended by the pipe manufacturer, whichever is denser.

2. Where the trench foundation is unstable and not suitable for bedding, the trench will be undercut until acceptable conditions are found. The Contractor shall then install compacted foundation material to meet the line and grade specified on the plan.

3. Unless otherwise shown on the plans, select native material may be used as trench backfill above the granular bedding up to the bottom of the subgrade except in those conditions where the top of the pipe is less than 12.0-inches from the bottom of the subgrade in which case granular material compacted to 100 percent Standard proctor Density will be used as trench backfill the full width of the trench to the bottom of the subgrade excavation zone.

D. Structures

1. All manholes, catch basins, valve boxes, water vaults, headwalls, and miscellaneous structures will be backfilled with granular backfill material and will be compacted with a hand-operated motorized compactor.

E. All trench backfill will be compacted in accordance with the Specified Density Method:

1. Under areas with proposed paved or structural improvements:

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(a) 100 percent Standard Proctor from the proposed pavement subgrade elevation down 3.0-feet.

(b) 95 percent Standard Proctor from the bottom of excavation up to 3.0-feet below the subgrade elevation

2. Under areas with no proposed paved or structural improvements:

(a) 95 percent Standard Proctor

3.4 SOURCE QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

(a) One gradation test per every 500 tons or 275 cu yd (CV) of granular material.

3.5 FIELD QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

1. One compaction test (including Standard Proctor) on subgrade per every 300 lineal feet of trench per 3.0-feet of depth

B. The Contractor shall cooperate fully with the individuals performing the tests.

C. Samples for testing will be taken from material in place, in the trench at locations approved by the Engineer. All sampling methods will be approved by the Engineer.

D. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Install and maintain all erosion and sedimentation control devices.
2. Additional erosion and sedimentation control devices as may be required by Local or State regulations.
3. Construction and continual maintenance of rock construction entrances as detailed on the Drawings and removal upon work completion. Maintenance shall continue until total project completion. Work includes removal of these temporary facilities and restoration back to existing conditions for areas outside the construction limits.
4. Sweeping of paved areas.
5. Temporary stabilization of disturbed areas and stockpiles.
6. Removal of all erosion and sedimentation devices, and restoration from removal of these devices.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment for erosion and sediment controls shall include all equipment, materials, and labor to furnish and install erosion and sediment controls:

1. Silt Fence: Per linear foot.
2. Inlet Protection Devices: Per structure.
3. Rock Construction Entrance: Per entrance.

B. All other Work and costs of this Section shall be incidental to the Project and included in the Total Base Bid.

1.3 SUBMITTALS

A. Submit information and shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following product information:

1. Silt Fence
2. Inlet Protection Devices
3. Rock Construction Entrance

C. Submit a proposed schedule for implementation of erosion and sedimentation control devices.

D. Submit maintenance Logs on a weekly basis.

1.4 QUALITY ASSURANCE

A. Construction activities shall not commence until all required permits are obtained.

B. Erosion and sedimentation control devices shall be inspected and approved by local authorities prior to commencement of construction operations.

C. Provide a knowledgeable and responsible person to implement and maintain inspection logs and provide inspections as required herein.

D. All erosion and sedimentation control devices shall remain in place until permanent stabilization has been accomplished including, but not limited to, 80% turf establishment and the first lift of pavement.

1.5 SITE CONDITIONS

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A. Protect adjacent properties and water resources from erosion and sedimentation damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Silt Fence

1. Fabric shall:

(a) be uniform in texture

(b) be uniform in appearance

(c) contain no defects, flaws, or tears affecting the physical properties

(d) contain UV inhibitors and stabilizers providing a minimum service life of at least 2 years during outdoor exposure

(e) meet the requirements indicated in the table below:

Silt Fence Type	**Width** ***in***	**Grab Tensile (Machine Direction)** ***lb****	**Apparent Opening Size** ‖	**UV Stability 500 H** ***% ‡***	**Minimum Flow Rates** ***gpm/sq ft***
Machine Sliced (MS), Hand Installed (HI) Woven Geotextile §	36	130	No. 30 Sieve	70	100
Pre-Assembled (PA) Woven Geotextile	36	130	No. 30 Sieve	70	100

Values in Table are Minimum Average Roll Values (MARV)
* ASTM 4632
‖ ASTM 4751 Maximum Average Roll Value
‡ ASTM 4355
§ Provide MS, HI Woven Geotextile with Monofilament in Both Directions. Do Not Make Substitutions.

2. Fasteners shall have a tensile strength of at least 50 lb.

(a) For MS and HI applications, provide plastic ties to attach geotextile materials to posts.

3. Posts

(a) MS and HI application steel posts shall meet the following:

(1) Type: T-post

(2) Weight: 0.95 lb/ft

(3) Length: ≥5.0 ft

(4) Embedment: ≥24 in

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(5) Post spacing: ≤6.0 ft

(b) PA application wood posts shall meet the following:

(1) Type: Hardwood

(2) Size: ≥2 in x 2 in

(3) Length: ≥4.0 ft

(4) Embedment: ≥ 18 in

(5) Post spacing: <5.0 ft

B. Inlet Protection Devices

1. Shall be sized specifically for each structure and casting.
2. Provide all materials as recommended by the manufacturer for complete installation.
3. Approved Products:

(a) Road Drain "Top Slab", Manufactured by Wimco

(b) Road Drain "Curb & Gutter", Manufactured by Wimco

(c) Infrasafe® "Sediment Control Barrier", Manufactured by Royal Environmental Systems, Inc.

(d) InfraSafe® "Debris Collection Device", Manufactured by Royal Environmental Systems, Inc.

(e) InfraSafe® "Culvert Inlet Protector", Manufactured by Royal Environmental Systems, Inc.

(f) Dandy Sack®, Manufactured by Dandy Products, Inc.

(g) Dandy Curb Sack®, Manufactured by Dandy Products, Inc.

(h) Or approved equal.

C. Rock Construction Entrances

1. Washed river rock, 2-3" in diameter. Geotextile fabric shall meet requirements of Mn/DOT 3733 Type V
2. Grizzly Trackout Control Device
3. Or approved equal

PART 3 - EXECUTION

3.1 PREPARATION

A. Review the Erosion and Sediment Control Plans.

B. Notify the Engineer of deficiencies or changes in the Erosion and Sediment Control Plans required by current site conditions. Revisions to the plans will be made as determined by the Engineer.

3.2 PHASING OF THE WORK

A. Schedule and conduct operations so as to minimize erosion of soils and to prevent sedimentation of Surface Waters of the State. Surface Waters include curb and gutter, pavements, storm sewer, swales, stormwater treatment areas, or other similar storm water conveyance means.

B. Construction of drainage facilities, turf establishment items, and other contract Work which will contribute to the control of erosion and sedimentation shall be carried out concurrently with earthwork operations or as soon thereafter as practicable.

3.3 LIMITATION OF WORK AREA

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A. The Engineer will have authority to limit the surface area of erodible soil that can be exposed to possible erosion at any one time, without having the permanent erosion control features completed and operative.

B. Incorporate the erosion control features into the Work at the earliest practicable time and provide all additional temporary control measures as may be needed to correct conditions developing during construction.

3.4 INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES

A. Silt Fence

1. Install per applicable portions of Mn/DOT Standard Specification 2573.3 B.

B. Inlet Protection Devices

1. Install per Mn/DOT Standard Specification 2573.3 M and in accordance with manufacturer's recommendations.

C. Rock Construction Entrance

1. Construct rock construction entrance drives where indicated on the Drawings and as detailed, or in accordance with manufacturer's recommendations.

3.5 STABILIZATION PRACTICES

A. Stabilize denuded areas and stockpiles within the following number of days of last construction activity in all areas:

1. All areas shall be stabilized within 7 days.

2. Temporary soil stockpiles shall be treated with appropriate erosion control measure, including silt fence and temporary seeding, when stockpiles are left inactive for periods longer than 7 days.

B. Temporary Stabilization:

1. Stockpiles and disturbed portions of the site where construction activity temporarily ceases for the time frames noted above shall be stabilized with a temporary seed and mulch according to the following:

(a) All areas of bare soil exposed to possible erosion shall be shaped to drain with minimum potential for erosion.

(b) The disturbed areas shall then be seeded with perennial ryegrass and annual wheat at a rate of 10 pounds per acre (0.25 lbs./1,000 sq. ft.) and 20 pounds per acre (0.50 lbs./1,000 sq. ft.) respectively, then and covered with hydromulch (Mn/DOT 3882, Type 5) at the rate of 1,500 pounds per acre.

3.6 MAINTENANCE

A. Maintenance of erosion and sedimentation control devices shall meet the minimum requirements of this specification.

B. Provide continual maintenance on all erosion and sedimentation control devices as identified herein. Repairs or replacements to all erosion and sedimentation control devices shall occur within 24 hours.

C. Maintain these devices throughout their temporary life and remove these devices when so approved by the Engineer.

D. Maintenance and removal costs shall be included in the bid. No additional costs will be permitted.

E. Silt Fence

1. Shall be cleaned when sediment reaches 1/3 the height of the fence.

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2. Silt fence which has washed out shall be reinforced with additional stakes and backed by snow fence to reduce the possibility of future washouts.

F. Inlet Protection Devices

1. Shall be cleaned when device becomes at most 1/3 full or as required to prevent flooding of adjacent areas.

G. Rock Construction Entrance

1. Maintain Rock Construction Entrances on a daily basis or when sediment is tracked on to pavement surfaces. Rock which has silted in shall be removed and replaced with clean river rock. Manufactured products shall be cleaned or replaced.

H. Paved Areas

1. At a minimum, provide daily sweeping of all paved surfaces. Provide additional sweeping as needed to remove excess sediment from paved surfaces.

3.7 REMOVAL AND RESTORATION

A. Control of drainage and erosion shall include restoration work in preventing siltation of public waters.

B. Restoration shall include cleanup, shaping, replacement of topsoil, and establishment of vegetative cover on all disturbed areas where water pollution potentials have been increased due to the construction operations.

C. Following final turf and vegetation establishment:

1. Remove any and all excess sediment from site prior to removal of devices.

2. All erosion and sedimentation control materials shall be completely removed and disposed of off-site.

3. All trenches and divots from anchors shall be backfilled and restored with vegetation.

4. Do not allow re-suspension of sediment or loss of trash or oil into the water during device removal.

3.8 COMPENSATION

A. All expenses related to complying with the provisions herein shall be borne by the Contractor with no additional compensation being permitted.

******END OF SECTION******

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SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to construct the aggregate base course as indicated on the drawings or as specified herein.

1.2 METHODS OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Aggregate Base Class 5 - The only aggregate base to be paid individually to construct an aggregate base section on this project is the aggregate base to construct the basketball court section for the project. This shall be by the Cubic Yard Planned Quantity (CU YD) (P). All other aggregate base shall be considered incidental to the respective bid items, which would include but is not limited to concrete walks and drives, concrete pavement, bituminous walks, maintenance strip, etc.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated aggregate items. Such items of work include but are not limited to:

1. Protecting existing improvements and previously accepted in-process improvements from damage.

2. Subgrade excavation, furnishing stabilizing aggregate, geotextile fabric installation, compaction, regrading and/or other efforts necessary to repair the subgrade after satisfying the rolling test and failing to protect the integrity of the subgrade.

3. The cost of all labor, equipment and materials necessary for meeting the testing requirements of field quality control, if required, include in price bid for Aggregate Base.

4. Furnishing and installing blue tops for gravel surface.

5. Test rolling of the compacted aggregate base using a fully loaded aggregate truck (tandem).

1.3 SPECIFICATION REFERENCES

A. MnDOT 2211 shall apply to the construction of aggregate base, except as modified herein.

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. Provide the following test results for each source of aggregate:

1. Two gradation tests

2. One percent crushing test (only if requested by Engineer).

3. One aggregate quality test (only if requested by Engineer).

PART 2 - PRODUCTS

2.1 MATERIALS

A. When the schedule of unit prices calls for 100 percent crushed aggregate base, the material to be used shall conform to the Specifications for Aggregate Base Class 5, modified so that the material consists of 100 percent crushed rock. The gradation shall also be modified so that the percent passing the No. 200 sieve shall be 5 to 10 percent.

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PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheeps foot rollers and tractor cletes, and roll the surface with a steel wheel or rubber tired roller.

B. The depth and class of aggregate base to be constructed shall be as shown on the plans. Aggregate base construction shall take place only after the street subgrade condition and grade has been examined by the Engineer.

C. All aggregate base shall be compacted to 100 percent Standard Proctor Density using the Specified Density Method.

D. Contractor shall test roll the aggregate base with a fully loaded tandem axle dump truck for review by the Engineer.

3.2 SOURCE QUALITY CONTROL

A. The Owner may arrange for having the following testing performed:

1. One gradation test for each 500 tons or 275 cubic yards (CV) of each class of aggregate base.

2. One percent crushing test.

3. One aggregate quality test.

B. Samples for testing shall be taken from material in stock at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

C. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

3.3 FIELD QUALITY CONTROL

A. "Blue top" stakes shall be provided by the Contractor at 50.0-foot intervals to confirm that the base is constructed to the required grades and elevations. Methods other than "blue top" staking may be allowed, if approved by the Engineer.

B. The Owner may arrange for having the following testing performed:

1. One compaction test (including Standard Proctor) for each 500 SY of each class of aggregate base.

C. All testing shall be performed by an independent testing laboratory approved by the Engineer.

D. The Contractor shall cooperate fully with the individuals performing the tests.

E. Samples for testing shall be taken from material in place, in the roadway at locations approved by the Engineer. All sampling methods shall be approved by the Engineer.

F. Should any of the specified tests fail, the Contractor may arrange and pay for additional tests as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 32 12 16.36 - ATHLETIC ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Constructing stabilized aggregate base on prepared subgrade or sand subbase in accordance with Mn/DOT 2211 using laser or GPS guided equipment.
2. Constructing stabilized aggregate base under concrete maintenance strips.
3. Constructing asphalt binder and wear courses in accordance with Mn/DOT 2360.
4. Schedule and coordinate testing of Asphalt Courses.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment:

1. Sport Court: Measurement and payment will be by Square Yard area of material placed and accepted for each mix type as specified.
2. Sport court bituminous material for tack coat: Measurement and payment will be by the Gallon (GAL) of material placed and accepted.

1.3 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following shop drawings:

1. Asphalt Mix Design:
   (a) Submit a report by an approved testing laboratory certifying that materials are in accordance with Specification requirements.
   (b) Submit a job mix formula for each pavement course and the mix temperature.

C. During paving:

1. Provide hot mix samples to the Independent Testing Lab (ITL) for determination of the actual asphalt mixture properties during production and for laboratory testing.

1.4 QUALITY ASSURANCE

A. Construction of asphalt paving, including stabilized aggregate base, shall be done by a responsible Contractor having necessary equipment, plant, and not less than 10 years-experience in performing Work similar to that included under this Contract.

B. Work shall be accomplished in accordance with American Sports Builders Association (ASBA) - Tennis Courts Manual, 9th Edition and Pickleball Courts Manual, 2nd Edition, and United States Tennis Association (USTA).

C. Use only materials which are furnished by a bulk asphalt pavement producer regularly engaged in production of hot-mix, hot-laid asphalt pavement. The plant shall be a Mn/DOT certified plant.

D. Testing and Inspection:

1. The Owner will employ and pay for the services of a testing and inspection service for quality control testing (Independent Testing Lab (ITL)).
2. Provide hot-mix asphalt samples, from behind the paver, to the ITL prior to compaction.

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3. The ITL will test in-place asphalt pavement courses for compliance with requirements for density and thickness.

   (a) The ITL will take twelve (12) - 4" diameter pavement specimens for each completed course, from locations as directed by ITL. For tennis court and pickleball projects, take cores at net post, center tie-down strap locations, or under nets. Provide specimens to the ITL.

   (b) Repair holes from test specimens as specified for patching defective work.

   (c) Testing required to validate or control the mix supplied is the Contractor's responsibility. Submit daily maximum theoretical specific gravity (G_{mm}) values to the ITL, for verifying in-place density, within four hours of production start.

   (d) Perform asphalt content, gradation, and bulk specific gravity (G_{mb}) testing on the first day of installation for each product used. Perform testing again a minimum of once every 100 tons of asphalt mix supplied, or every third day for low tonnages that, when added together, successively do not equal 100 tons. Acceptable average measures will be made by use of a correlated nuclear density gauge or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Perform additional testing on any given day once 100 tons of asphalt is placed on that day.

   (e) The average sub-lot (daily or 100 tons; whichever is less) in-place density measure for wear course mixtures shall average 92.0% of G_{mm}. Longitudinal joints will be measured directly upon the joint, centered upon by core or density gauge, and shall meet the density requirements. Binder and wear course longitudinal joint density measures shall achieve between 95% - 102% of maximum achievable density individually, with an average of 98% on any given day.

   (f) Process Control Voids and minus #200 gradation shall target mix design value within/ outside 1.0%, and VMA shall target the asphalt mix design +/- 0.3%.

E. Density Requirements:

1. The ITL will determine maximum specific gravity (Gmm) of asphalt materials in accordance with AASHTO T209, Mn/DOT modified procedure.

2. In-place density of pavement courses and joints shall average 92.0% of G_{mm}. Remove and replace pavement, at no additional cost to the Owner, where pavement courses or joints do not meet specified minimum.

F. Thickness:

1. Minimum design thicknesses are shown on the Drawings. In-place, compacted thicknesses will not be accepted if the variation from the design thickness is more than the following:

   (a) Wear Course: More than ½" below design thickness.

   (b) Non-wear Course: More than ½" below design thickness.

2. Single courses which do not meet the minimum design thickness or acceptable variation from design thickness listed herein shall be removed and replaced at no additional cost to the Owner.

3. The total thickness of the final, in-place asphalt pavement shall not be less than the total thickness of the design asphalt courses shown on the Drawings. In-place asphalt pavement which does not meet the minimum overall thickness referenced above shall be removed and replaced at no additional cost to the Owner.

G. Surface Smoothness:

1. Provide final surfaces of uniform texture, conforming to required grades and cross-sections.

2. Test finished surface of each asphalt pavement course for smoothness, using a 10' straight edge applied parallel to and at right angles of paved areas.

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3. Check paved surfaces at intervals directed by Engineer.

4. Tolerance:

(a) Surfaces will not be acceptable if exceeding the following:

(1) Non-wear Course: 1/4" in 10'

(2) Wear course: 1/8" in 10' when measured in any direction

H. Ponding:

1. Wear Course surfaces will not be acceptable if ponding water exceeds 1/8" as determined by the Engineer.

2. Remove and replace all unacceptable ponding pavement areas at no additional cost to the Owner.

3. Surface Acceptance – Flooding Test

(a) Flood the entire pavement surface as soon as possible after paving the wear course. Flooding test shall be accomplished prior to August 1 in the year the asphalt pavement is constructed. Flooding is defined as the entire surface is wet and water is running off the pavement surface in all locations. Wait one hour at a minimum 70° F before observing results. Tests will be considering failing if there is any remaining water that covers the thickness of an American nickel coin.

(b) Patch and level the failed areas in accordance with recommendations from the surfacing manufacturer, and this work shall be accomplished by the surfacing Contractor. Refer to Section 32 18 23.53.

(1) Costs for patching and leveling shall be paid for by the Asphalt Pavement Contractor.

(c) In areas where the depth of the failed test exceeds the ability for patching and leveling work by the surfacing Contractor, patch these areas in accordance with Paragraph 3.4 of this Specification.

1.5 SITE CONDITIONS

A. Weather Limitations:

1. Apply bituminous tack coat only when the ambient temperature in the shade is at least 50°F and when the temperature has not been below 35° F for 12 hours immediately prior to application.

2. Do not apply tack coat when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.

3. Construct asphalt pavement courses only when atmospheric temperature is above 40°F, when the underlying base is dry, and when weather is not rainy.

4. Paving shall not take place when, in the opinion of the Engineer or testing laboratory, the weather or surface conditions are considered unfavorable.

5. Comply with Mn/DOT 2360.3 A.4 for Weather Limitations and Paving Date. Do not pave after the Paving Date listed in the Mn/DOT specification.

B. Grade Control: Establish and maintain the required lines and grades for each course during construction operations.

C. Protect grass, vegetation, concrete work, building, and other work adjacent to paving, with building paper or other suitable material, so that stains of bitumen shall not reach these surfaces.

D. Coordination and Responsibility:

1. Coordinate installation of Stabilized Aggregate Base with concrete Contractor.

1.6 REQUIREMENTS

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A. Job-Mix Criteria:

1. Provide job-mix formulas for each required asphalt-aggregate mixture.
2. Establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt pavement is to be produced.
3. Comply with the mix requirements of the Minnesota Department of Transportation (Mn/DOT) standards.
4. Maintain material quantities within allowable tolerances of the governing standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stabilized Aggregate Base: Aggregate shall meet the requirements of the current Mn/DOT Spec 3138, Class 5, Table 3138-1 (100% crushed limestone).

B. Binder and Wear Course:

1. Mix Designs shall conform to Mn/DOT Section 2360.2, except as modified herein:
   (a) Sewage Sludge Ash (SSA) (2360.2A2j) is not allowed in binder or wear course pavements.
   (b) Recycled asphalt product (RAP) is not allowed in binder or wear course pavements.

C. Asphalt Binder Course:

1. Materials and methods of preparation and construction shall meet requirements of Mn/DOT Spec 2360.
   (a) SP NW B 3 30 C

D. Bituminous Tack Coat:

1. Tack coat shall be CSS-1H or CRS-2 cationic emulsified asphalt diluted 50/50 with clean water.
   (a) Tack coat shall meet requirements of Mn/DOT Spec 2357.

E. Asphalt Wear Course:

1. Materials and methods of preparation and construction shall meet requirements of Mn/DOT Spec 2360.
   (a) SP WE A 2 40 C
      (1) No RAP.
      (2) A minimum of 45% sand portion (minus No. 8 sieve).
      (3) Maximum particle size of ½" or less.
      (4) Crushed coarse and fine particles as follows.
         1. Coarse Aggregate fraction shall have a minimum of 85% crushed faces.
         2. Fine Aggregate Angularity (AASHTO T-304, Method A), shall be >= 40% with no more than 20% natural sand allowed.
      (5) No aggregates that rust or disintegrate including, but not limited to shale, iron pyrite, steel slag, wood particles, clay or dust balls, or other impurities.

PART 3 - EXECUTION

3.1 PREPARATION PRIOR TO PAVING

A. Stabilized Aggregate Base Installation:

1. In accordance with Mn/DOT 2211, construct aggregate base to the thickness shown on the Drawings.

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2. Uniformly grade all ruts and ridges prior to installation of Stabilized Aggregate Base to provide uniform material thickness.

3. Aggregate base shall be compacted to 100% Standard Proctor (ASTM D698).

B. Tack Coat:

1. Apply to contact surfaces of previously constructed asphalt pavement or concrete and similar surfaces.

2. Apply at rate of 0.05 to 0.15 gal. per sq. yd. of surface.

3. Apply tack coat by brush to contact surfaces of curbs, gutters, maintenance strips, and other structures projecting into or abutting asphalt pavement.

4. Allow surfaces to dry until material is at condition of tackiness and to receive pavement.

3.2 PAVING

A. Prepare the site to receive the subsequent improvements shown on Drawings and outlined herein.

1. Remove loose and foreign materials from the stabilized aggregate base surface immediately before paving.

2. Do not displace aggregate base material.

3. Construct asphalt binder and wear courses with self-propelled power operated paving equipment. The paver shall be equipped with a heated, adjustable screed.

4. Begin paving at the high elevation side of the area. After first strip has been placed and rolled, place succeeding strips, progressing down slope.

5. Complete binder course for the area before placing wear course.

6. Place mixture in as continuous an operation as practicable.

7. Hand Placing:

(a) Spread, tamp and finish mixture using hand tools in areas where machine spreading is not possible.

(b) Place mixture at a rate that will ensure handling and compaction before mixture becomes cooler than acceptable working temperature.

8. Joints:

(a) Gradually make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work.

(b) Construct joints to have same texture, density and smoothness as adjacent sections of asphalt pavement course.

(c) Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.

(d) Offset transverse joints in succeeding courses not less than five feet.

(e) Sawcut back edge of previously placed course to expose an even, vertical surface for full course thickness.

(f) Offset longitudinal joints in succeeding courses not less than 6".

(g) When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory section to expose an even, vertical surface for full course thickness.

B. Asphalt Binder Course:

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1. Construct the asphalt binder course with power operated paving equipment designed for paving. Inaccessible and small areas may be placed by hand. Place at a thickness so that when compacted it will be in accordance with indicated grade, cross-section, finish thickness, and density specified.
2. Apply tack coat to all vertical surfaces of existing concrete or asphalt which will be in contact with new pavement.
3. Construct an asphalt binder course over the previously placed stabilized aggregate base course. Thickness shall be as shown on the Drawings.
4. Compact binder course as outlined herein.

C. Asphalt Wear Course:

1. Construct an asphalt wear course with power operated paving equipment designed for paving. Inaccessible and small areas may be placed by hand. Place at a thickness so that when compacted it will be in accordance with indicated grade, cross-section, finish thickness, and density indicated.
2. Apply tack coat to all vertical surfaces of existing concrete or asphalt which will be in contact with new pavement. Apply tack coat to previously installed binder course.
3. Construct an asphalt wear course over the previously placed asphalt binder course or stabilized aggregate base course. Thickness shall be as shown on the Drawings.

D. Compact wear course as outlined herein.

3.3 COMPACTING THE MIX

A. General Requirements:

1. Breakdown and second rolling shall be accomplished by a self-propelled, steel-wheel type, tandem roller weight not less than eight tons and exerting a compression of not less than 250 pounds per inch on the rear rollers. During break-down rolling, vibratory rollers shall operate at 8 to 10 impacts per foot.
2. Provide sufficient number of rollers to obtain the minimum required pavement density.
3. Begin rolling operations as soon after pavement placement as practicable, when the mixture will bear weight of roller without excessive displacement.
4. Roller must be properly moistened, must operate continually and must not stand idle on newly placed mixture.
5. Do not permit heavy equipment, including rollers, to stand idle on finished surface before it has thoroughly cooled or set.
6. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
7. Start rolling longitudinally at extreme lower side of the area and proceed upslope. Roll to slightly different lengths on alternate roller runs.
8. Do not roll centers of crowned road or drive section first under any circumstances.

B. Breakdown Rolling (Binder and Wear Courses):

1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
2. Operate rollers as close as possible to paver without causing pavement displacement.
3. Check crown, grade, and smoothness after breakdown rolling.
4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.

C. Second Rolling (Binder and Wear Courses):

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1. Follow breakdown rolling as soon as possible, while mixture is hot and in condition for compaction.
2. Continue second rolling until mixture has been thoroughly compacted.

D. Finish Rolling (Wear Courses):

1. Do not use pneumatic tire rollers.
2. Perform finish rolling while mixture is still warm enough for removal of roller marks.
3. Continue rolling until roller marks are eliminated and course had attained specified density.
4. Depression or high areas which develop during rolling shall be corrected to produce a surface with no variations greater than 1/8-inch as measured by a ten-foot straight edge. Roller marks shall be rolled-out to provide smooth surface, however over compaction will require removal and replacement of the area.

3.4 PATCHING

A. Remove and replace defective/unacceptable areas.

B. Remove deficient areas for full depth of course.

C. Sawcut sides perpendicular and parallel to direction of traffic with edges vertical.

D. Apply tack coat to exposed surfaces before placing new asphalt pavement mixture.

E. Cut-out and fill with fresh, hot asphalt pavement.

F. Compact by rolling to specified surface density and smoothness.

G. Use infrared thermal patching equipment at all patching joints eliminate cold joints.

3.5 CLEANING

A. After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of Architect/Engineer.

3.6 PROTECTION

A. After final rolling, do not permit vehicular traffic on asphalt pavement until it has cooled and hardened and in no case sooner than 6 hours.

****END OF SECTION****

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SECTION 32 16 23.33 - ASPHALT WALKS AND TRAILS

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to the construction of bituminous walks and trails as indicated on the plans and/or as specified herein.

1.2 DEFINITIONS

A. Compacted Volume (CV) – The volume of material actually placed as determined by computing the difference between original and final cross-sections by the average end area method.

B. Excavated Volume (EV) – The volume of material actually excavated as determined by computing the difference between original and final cross-sections by the average end area method.

C. Excess Material - Material that is not needed to complete the earthwork balance.

D. Structural Improvements - For the purposes of this specification, structural improvements shall refer sidewalk, trail, or other improvements requiring suitable soil to support the anticipated loadings.

E. Subcut - Excavation performed below the proposed subgrade elevation shown on the plans for the purposes of removing unsuitable material.

F. Subgrade - The top surface of a trail bed upon which the pavement structure (including aggregate base and/or granular subbase) is to be constructed. This is also a general term denoting the soil foundation upon which a proposed improvement is to be placed.

G. Suitable Material - Sand, silty sand or low plasticity clay soils with no organic content. The Engineer shall make the final determination as to what material will be considered suitable.

H. Topsoil - Any soil, generally black in color, 100 percent passing the ¾-inch sieve, 3 percent to 15 percent containing organic material, and a pH of 6.0-7.8.

I. Unsuitable Material - Soil with organic content including topsoil, swamp deposits, peat, muck, or other material deemed by the Engineer to be unsuitable for fill or embankment construction.

1.3 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Bituminous Patch - Payment shall be at the unit price bid per square yard (SY) of bituminous trail patched as medium duty asphalt pavement as shown on the plans and details. The amount bid shall include all material and work required to mix and place the bituminous course specified and shall include all common excavation, and subgrade preparation.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated bituminous paving items. Such items of work include but are not limited to:

1. Equipment and materials necessary for meeting the testing requirements of Source Quality Control for the bituminous tack coat, if required, include in price bid for bituminous tack coat.

(a) The cost of all labor, equipment and materials necessary to comply with the testing requirements of the "Certified Plant" designation, if required, include in price bid for Plant-Mixed Bituminous Surfacing.

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(b) All costs of furnishing and applying bituminous tack coat material will be incidental with no direct compensation being made therefore.

(c) The cost of all labor, equipment and materials necessary for constructing clean, vertical, solid edge at the adjacent asphalt surface, include in the price bid for Plant-Mixed Bituminous surfacing.

1.4 SPECIFICATION REFERENCE

A. Reference the following sections of this Project Manual as appropriate:

1. Section 31 20 00 “Earth Moving”.
2. Section 31 23 13 “Subgrade Preparation”.
3. Section 32 11 23 “Aggregate Base Courses”.

B. Reference MnDOT Specifications shall apply:

1. MnDOT 2360, Plant Mixed Asphalt Pavement. A copy of MnDOT Standard Specification 2360 is available from the Engineer upon request.
2. MnDOT 2360, Plant Mixed Asphalt Pavement: The maximum payment factor for density is 100 percent.
3. MnDOT 2360, Plant Mixed Asphalt Pavement (pavement smoothness) is hereby DELETED.
4. MnDOT 2106 shall apply, except as modified herein.

C. Unless noted otherwise, the provisions in this Section are in addition to the referenced specification.

1.5 SUBMITTALS

A. Bituminous Mix Design.

B. Gradation Test Results from 2 separate tests from material stockpiles of aggregates to be used on this project. These tests may be run by the Contractor or its supplier during aggregate production.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bituminous materials are shown in the plans.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. Common Excavation

1. The Contractor shall grade the trail in the locations and to the elevations shown on the plans and typical sections, in accordance with Section 31 20 00 “Earth Moving” of this Project Manual.
2. Excavated topsoil and suitable material for reuse in the project shall be segregated and stockpiled at a site selected by the Contractor.
3. All excavations shall be kept free of water during the placement of fill.
4. At the end of each day the Contractor shall eliminate surface indentations, including those caused by sheepsfoot rollers and tractor cleats, and roll the surface with a steel wheel or rubber-tired roller.
5. Sufficient excavation shall be utilized by the Contractor to replace the soil shrinkage from excavation that occurs through the course of construction handling and compaction. The Contractor shall make his own estimate of the amount of shrinkage that will occur.
6. Topsoil

(a) Topsoil shall be separated, stockpiled and respread.

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(b) The Contractor shall salvage and stockpile all topsoil removed during the course of the construction. This topsoil shall be used where required for turf establishment as directed by the Engineer.

7. Material suitable for trail backfill shall be segregated and stockpiled at a site selected by the Contractor. Following trail construction, the material shall be placed adjacent to the trail, allowing for a minimum of 6.0-inches of topsoil.

8. In areas where filling above the existing grade is necessary to establish the final designed elevation, the Contractor shall fully remove the topsoil and organic material to the level of stable underlying sand or clay prior to backfilling with suitable embankment material.

9. All vegetation, topsoil, organic, or other unsuitable materials shall be excavated from the area below the structural improvement. Due to the variability of soils, the depth of the excavation in these areas is expected to vary significantly throughout the site.

10. Subgrade excavation shall be performed for the removal of any unstable soils which may be encountered. Such excavation shall be backfilled with suitable excess common excavation material or granular borrow. If the Contractor proceeds without approval from the Engineer or Owner, all work and material to restore the trail bed to the proper grade shall be at the Contractor's expense.

B. Subgrade Preparation

1. Trail subgrade preparation shall be completed in accordance with Section 31 23 13 "Subgrade Preparation" of this Project Manual.

C. Aggregate Base

1. Aggregate base for trail construction shall be furnished and installed in accordance with Section 32 11 23 "Aggregate Base Courses" of this Project Manual.

D. Bituminous Surfacing

1. The Contractor is required to use the self-propelled pneumatic tire roller as an intermediate roller on the wearing courses.

2. The bituminous surfacing shall be constructed with maximum deviation of plus or minus ¼-inch from the planned compacted thickness.

   The contact surfaces of all fixed structures, the edge of all in-place bituminous shall be given a uniform coating of Liquid Asphalt or Emulsified Asphalt before placing the adjoining mixture. The bituminous material shall be applied by methods that will ensure uniform coating and in no case shall the application be excessive.

3. Cut the adjacent asphalt surface prior to construction of the bituminous surface course to obtain a clean, vertical, solid edge.

4. MnDOT 2331 - Compaction of all bituminous mixtures shall be by the Ordinary Compaction Method.

3.2 SOURCE QUALITY CONTROL

A. The bituminous mix shall be designed using Contractor Trial Mix Designs. A current MnDOT mix design may be accepted provided it represents the aggregate source and bituminous plant being used for the project and is approved by the Engineer. No bituminous mixture shall be placed without an approved mix design.

B. Source quality control for aggregate base shall be in accordance with Section 32 11 23 "Aggregate Base Courses" of this Project Manual.

3.3 FIELD QUALITY CONTROL

A. Field quality control for subgrade preparation shall be in accordance with Section 31 23 13 "Subgrade Preparation" of this Project Manual.

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B. Field quality control for aggregate base shall be in accordance with Section 32 11 23 “Aggregate Base Courses” of this Project Manual.

C. Three-inch diameter core samples shall be taken by the Contractor to verify the thickness of the compacted finished bituminous structure. Sample locations shall be designated by the Engineer and made with a drilling device that produces clean sharp, vertical edges.

D. If any cores prove deficient, the Contractor may, at its own cost and expense, take additional core samples to further define the extent of the deficiency.

E. The Engineer shall calculate deficient pavement areas using the locations and thickness results of all core samples and prorating the thickness profile.

F. Testing:

Quantity Mixture Type	REQUIRED CONTRACTOR TESTING			OWNER ARRANGED INDEPENDENT ASSURANCE TESTING			
	VMA & Air Voids	Gradation	Spot Check	VMA & Air Voids	Gradation	Spot Check	Extraction
0-500 Ton	2	1	1	1	1		1
500-1000 Ton	3	1	1	1	1		1
1000+ Ton	4 First Day 1/1000 Ton Thereafter with Min. 2/day	2/Day	2/Day	1	1	1	1

1. Contractor shall send a copy of the testing results to the Engineer.

2. Should any of the specified tests fail, the Contractor shall notify the Engineer immediately and shall arrange and pay for additional test as may be necessary to satisfy the Engineer that the requirements have been met.

******END OF SECTION******

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SECTION 32 18 23.53 - ACRYLIC SPORT COURT SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, material, equipment, and accessories to complete the following Work:

1. Acrylic court finish system, consisting of a minimum of two acrylic filler coats and two acrylic color coats.

2. Permanent court lining and markings, including USTA regulation singles and doubles court striping.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Acrylic surfacing for the Sport Court (Basketball Court) will be measured by SQUARE YARD (SQ YD) acrylic surfacing complete and in place as specified.

B. The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated Acrylic surfacing items. Such items of work include but are not limited to:

1. Striping of court lines as identified on the plans and based on current guidelines from the National Federation of State High School Associations.

2. Maintaining the work, together with any other expenses incurred in completing the work that are not specifically included for payment under other Contract Items.

1.3 SUBMITTALS

A. Submit information and shop drawings in accordance with Section 01 33 00 - Submittals.

B. Submit the following product information and shop drawings:

1. Product data including manufacturer specifications for components, color chart, coating samples, textured colored samples, and installation instructions.

2. Technical Data Sheets (TDS).

1.4 QUALITY ASSURANCE

A. The surfacing system shall be completely furnished and installed by an authorized installer of material manufacturer. Installer shall have not less than 5 years' experience in the application of court finishing systems and shall have satisfactorily completed at least 5 similar installations using product which is being installed.

B. Surfacing shall conform to the guidelines of the American Sports Builders Association (ASBA).

C. All surface coatings products shall be supplied by a single manufacturer.

D. The installer shall be an authorized applicator of the specified system.

1.5 SITE CONDITIONS

A. Environmental Requirements: Follow manufacturer's recommendations and guidelines for disposal of unused materials.

PART 2 - PRODUCTS

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2.1 COURT FINISHING PRODUCTS

A. Approved manufacturers:

1. California Products Corporation, Andover, MA; "Plexipave Surfacing System with Flexible A/R Filler Plexichrome Finish Coat, and Plexicolor Acrylic Line Paint."

(a) Filler Coat: Flexible A/R.

(b) Color Coat: Plexipave

(c) Line Marking:

2. Advanced Polymer Technology Corp., Harmony PA; “Laykold Surfacing System”

(a) Filler Coat: Laykold NuSurf.

(b) Color Coat: Laykold ColorFlex.

(c) Line Marking:

(1) Primer: Laykold Line Primer.

(2) Lining: Laykold Textured White Line Paint.

3. Approved Equal

2.2 WATER

A. Water used in all mixtures shall be fresh and potable.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Prior to applying filler coat, the full fencing system shall be installed.

B. Allow asphalt surface to cure a minimum of 28 days before the filler coat surfacing is applied. The asphalt surface shall have cured through one winter season before the acrylic surfacing is applied.

C. Prior to August 1 in the year the asphalt pavement is constructed, the newly constructed asphalt shall be flooded by the Paving Contractor to verify surface level tolerance (refer to Specification Section 32 12 16 for flooding procedure). Court Surfacing contractor shall be present during flood check to verify surface and accept or reject the surface.

D. Pavement surface shall be brushed, blown and pressure washed to be free of dirt and foreign matter immediately prior to application of filler coat.

E. No part of the surfacing system shall be applied during a rainfall, or when rainfall is imminent.

F. Surface and air temperatures must be a minimum of 50°F and rising. A minimum temperature of 50°F must be maintained during the entire installation process to include 24-hours before and after the installation.

G. Do not apply coatings if humidity levels are outside Manufacturer’s requirements.

H. No coatings shall be applied if surface temperature exceeds 130°F.

3.2 APPLICATION OF FINISH SYSTEM

A. Application of filler coat, color coat and lines shall be accomplished to achieve International Tennis Foundation (ITF) Classified Court Pace 4 (Medium Fast).

B. Filler Coat:

1. Over the asphaltic surface course, apply two coats of filler with a 70 Durometer flexible rubber squeegee in accordance with manufacturer's directions and recommended rate of application.

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2. Each coat shall be completely dry before applying subsequent coats.

3. If asphaltic surface course is not covered to a uniform, even texture, free of porosity, apply an additional filler coat to attain uniformity.

4. Dilution rate shall not exceed that recommended by product manufacturer.

C. Color Coat:

1. Color shall be as indicated on the Drawings.

2. Prior to applying color coat, carefully inspect entire surface and remove ridges and loose or foreign particles.

3. Apply two color coats in accordance with manufacturer's directions and recommended rate of application.

4. The application shall be made lengthwise of the courts with a 50 Durometer flexible rubber squeegee and finished with a wide hair-type push broom, specifically manufactured for court surfacing material application.

5. The color shall be uniform throughout when viewed from a distance of 25 feet from any edge of the court at mid-day.

6. Dilution rate shall not exceed that recommended by product manufacturer.

D. Lines

1. Playing lines shall be 2" wide, accurately located and marked in accordance with rules of the U.S. Tennis Association.

2. Wait a minimum of 24 hours after final color coat before applying line paint.

3. Apply line primer in accordance with manufacturer's directions and recommended rate of application. Allow a minimum drying time of 1-hour.

4. Line paint shall be textured to match the texture of finish color coat, applied by brush (not sprayed) and shall be free of any fogging or over-spray. Apply 2 coats.

5. All measurements shall be to the outside edge of the lines except the center line and center mark which shall be to the center line of the court.

6. USTA tolerances shall apply.

7. Mask lines before painting. Remove masking tape immediately after lines are dry.

8. Protect lines until thoroughly dry.

3.3 CLEANING

A. Remove remnants of materials, containers, debris, and other construction materials and equipment used in the work.

3.4 PROTECTION

A. Do not allow surrounding sprinkler systems to spray water on the newly applied court surface for a period of one week after completion.

******END OF SECTION******

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SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Chain link fencing, including fasteners, fittings, and accessories.

(a) Black vinyl-coated chain link fencing where indicated.

2. Concrete footings for posts and related excavation.

3. Gates:

(a) Double swing gates with latching device.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. The fence shall be paid at the unit price bid per linear foot, furnished and installed complete including wire fabric, posts, bracing, fittings and any other materials or appurtenances required to complete the installation in accordance with the Plans and the requirements of this Specification.

2. Gates of each width and type will be paid at the unit price bid per each gate furnished and installed complete including wire fabric, posts, bracing, fittings and any other materials or appurtenances required to complete the installation in accordance with the Plans and the requirements of this Specification.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated fencing items. Such items of work include but are not limited to:

1. No exception to the referenced specification is made.

1.3 SUBMITTALS

A. Submit information and shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following product information and shop drawings:

1. Fence Shop Drawing; include the following information:

(a) Post sizes

(1) End, corner, and pull posts

(2) Line posts

(b) Post spacing

(c) Rail sizes

(d) Rail locations

(e) Footing depths and diameters

(f) Fence Height

(g) Fabric materials

(h) Fabric edge treatment

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(i) Finish information

2. Gate System Shop Drawing; include the following information:
   (a) Post Sizes
   (b) Gate perimeter posts and rails
   (c) Gate hardware
   (d) Latches
   (e) Gate keepers
3. Product Information:
   (a) Fence post foundation system
   (b) Privacy Slats

1.4 COORDINATION

A. Coordinate fencing installation with pavement construction when fencing lies within paved areas.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Posts, Rails, and Braces:
   1. General Requirements:
      (a) Posts and rails shall meet the minimum requirements:
         (1) Regular Grade Schedule 40 steel pipe, or PT-40, WT-40, or DQ-40 Heavy Industrial steel pipe.
         (2) Posts shall meet the requirements of ASTM F1043.
      (b) Posts, rails, and braces shall be hot dip galvanized, coated inside and out, meeting the requirements of ASTM F1083, 1.0 ounces zinc per square foot.
      (c) Posts, rails, and braces shall be black vinyl, fusion bonded PVC coating meeting the requirements of ASTM F668 Class 2b-PVC Thermal Fusing.
   2. Terminal Posts:
      (a) Are defined as end, corner, and pull posts.
      (b) Shall be of sufficient length to allow for posts to be set into concrete footing.
         (1) 4-inch outside diameter
            1. Schedule 40 pipe, with standard weight of 9.12 pounds per foot.
            2. PT-40, WT-40, or DQ-40 pipe, with standard weight of 6.56 pounds per foot.
   3. Line Posts:
      (a) Shall be of sufficient length to allow for posts to be set into concrete footing, or, where permitted on the Drawings, be air driven a minimum 72 inches.
         (1) 2 7/8-inch outside diameter
            1. Schedule 40 pipe, with standard weight of 5.80 pounds per foot.
            2. PT-40, WT-40, or DQ-40 pipe, with standard weight of 4.64 pounds per foot.
   4. Rails:

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(a) Applies to top, intermediate, and bottom rails.

(1) 1 5/8-inch outside diameter

1. Schedule 40 pipe, with standard weight of 2.27 pounds per foot.

2. PT-40, WT-40, or DQ-40 pipe, with standard weight of 1.84 pounds per foot.

(b) Rail ends shall be pressed steel per ASTM F626, for connection of rail and brace to terminal posts.

5. Gate Posts:

(a) Shall be of sufficient length to allow for posts to be set into concrete footing.

(b) Gate Leaves Over 9 Feet and Up To 13 Feet Wide:

(1) 6 5/8-inch outside diameter

1. Schedule 40 pipe, with standard weight of 18.99 pounds per foot.

6. Post caps:

(a) Posts shall have tops which exclude moisture.

(b) Formed steel or cast malleable iron weather tight closure cap for tubular posts. Provide a cap for each post.

(c) Provide tops to permit passage of top rail.

7. Bracing:

(a) Truss rods & tightener shall be steel rods with minimum diameter of 5/16" capable of withstanding a tension of minimum 2,000 lbs.

(b) Brace and tension (stretcher bar) bands shall be pressed steel, minimum 300 degree profile curvature for secure fence post attachment.

(c) Tension (stretcher) bars shall be one piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4". Provide tension (stretcher) bars where chain link fabric meets terminal posts.

(d) Nuts and bolts shall be galvanized.

B. Chain Link Fabric:

1. Fabric shall be woven from 9-gauge steel (coated size) wire in a 2-inch mesh. Fabric wire shall have a minimum tensile strength of 80,000 pounds per square inch. Fabric shall be 1-piece vertically for fences up to and including 12 feet high.

2. Both top and bottom selvage edges shall be knuckled.

3. Finish shall be either aluminum coated meeting the requirements of ASTM A491, 0.40 ounces aluminum per square foot, or galvanized meeting requirements of ASTM A392, Class 1 coating (1.2 ounces zinc per square foot).

4. Finish shall be black vinyl, fusion bonded PVC coating meeting the requirements of ASTM F668 Class 2b-PVC Thermal Fusing.

C. Fittings:

1. Shall be pressed steel or malleable iron.

2. Shall be hot-dip galvanized meeting the requirements of ASTM A153.

3. Shall be black vinyl, fusion bonded PVC coating meeting the requirements of ASTM F668 Class 2b-PVC Thermal Fusing.

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D. Swing Gates:

1. Gate Components:

(a) Gate perimeter frame:

(1) Shall be 1 7/8-inch outside diameter,

1. Schedule 40 pipe, with standard weight of 2.72 pounds per foot.

2. PT-40, WT-40, or DQ-40 pipe, with standard weight of 2.28 pounds per foot.

(2) Shall be hot-dip galvanized meeting the requirements of ASTM F1083.

(3) Shall be black vinyl, fusion bonded PVC coating meeting the requirements of ASTM F668 Class 2b-PVC Thermal Fusing.

(b) Fabric:

(1) Use same fabric specified for fence. Install fabric with stretcher bars at vertical edges and tie at top and bottom edges.

2. Gate Hardware:

(a) Shall be hot-dip galvanized meeting the requirements of ASTM A153.

(b) Shall be black vinyl, fusion bonded PVC coating meeting the requirements of ASTM F668 Class 2b-PVC Thermal Fusing.

(c) Hinges shall be pressed steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180-degree swing. Provide minimum of 1 pair of hinges for each leaf.

(d) Provide latching device for all gates. Latches shall be as detailed on the Drawings.

(e) Provide semi-automatic outer catches to secure gates in open position.

PART 3 - EXECUTION

3.1 CONDITION OF SITE

A. Do not begin work prior to completion of finish grading.

3.2 INSTALLATION

A. Post Installation

1. General Requirements:

(a) String-line posts in linear formation for horizontal alignment.

(b) Install posts plumb.

(c) Check each post for vertical and top alignment.

2. Concrete Footing Installation:

(a) Auger post footing holes only in firm, undisturbed, or compacted soil.

(b) Auger footing hole depth at least 6 inches deeper than post bottom.

(c) Place concrete around posts in a continuous pour and tamp for consolidation.

3. Air Driven Installation (only where permitted as noted on the Drawings):

(a) Set all corner, end, gate, and pull posts in concrete footings and not air driven.

(b) Install line posts by air-driving posts to a depth of at least 72 inches into firm, undisturbed, or compacted soil.

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(c) Where installed in bituminous pavement areas, core pavement to receive air-driven posts, drive post through cored pavement, and caulk annular space after setting post. Do not drive post directly through the pavement.

4. Post Caps

(a) Place post caps over post tops and ensure a secure fit.

B. Rail Installation

1. Top and bottom rails shall pass through the bases of extension arms. Provide extension arms on the top of each post to form a continuous brace from end to end of each stretch of fence.

2. Provide expansion rail couplings on top rails and securely fasten to gate and terminal posts by means of suitable hot-dip galvanized connections.

3. Install bottom rail not more than 2” above finish grade in grass areas.

4. Install bottom rail not more than 1” above finish grade in concrete and paved areas.

5. Install rails parallel to finish grade.

C. Gate Installation

(a) Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories.

(b) Assemble gate frames by welding fittings and rivets for rigid connections.

(c) Attach stretcher bars to gate frame at 15 inches on center maximum. Attach hardware with rivets or by other means which will provide security against removal or breakage.

(d) Gate leaves shall not drift on their own due to imbalance or being out of level.

D. Installation of Post Bracing Assembly

1. Required for fencing six feet and greater in height.

2. Brace terminal and gate posts with a brace rail and tension wire. Extend brace rail from each terminal or gate post to first adjacent line post. Securely fasten braces to posts with heavy pressed steel connections, then truss from line post back to terminal post with truss rod complete with tightening unit.

3. Install tension wires before stretching fabric.

E. Installation of Chain Link Fabric

1. Install fabric and anchor to framework so that fabric remains in tension after pulling force is released. Make attachment of fabric to terminal or gate posts with minimum 1/4-inch by 3/4-inch tension bar and 12 gauge by 1 inch wide clamps using minimum 3/8-inch diameter carriage bolts.

(a) For athletic facilities, install fabric on the play side of the fence posts.

2. Make attachment of fabric to line posts with 6-gauge wire clips spaced 12 inches on center.

3. Make attachment of fabric to rails with 9-gauge wires spaced 12 inches on center.

3.3 CLEANING AND PROTECTION

A. Remove from the site all excess soils from post hole excavation, spillage of concrete, cut wires, materials, and other related materials.

******END OF SECTION******

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SECTION 32 91 19.13 - TOPSOIL PLACEMENT AND GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. All labor, materials, equipment, and supervision required to furnish and install amended soil and topsoil to finished grade, as shown on the Plan Sheets.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Measurement and payment for stripping, stockpiling, and respreading of existing salvaged topsoil on site to the final grade will be based upon the cubic yard (P).

1.3 SPECIFICATION REFERENCE

A. MnDOT 3877 Topsoil Materials

B. Unless noted otherwise, the provisions in this section are in addition to the referenced specification.

1.4 SUBMITTALS

A. No submittals for this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Respread of existing topsoil salvaged from the site.

PART 3 - EXECUTION

3.1 SHRUB, TREE, AND PERENNIAL PLANT BED PREPARATION

A. Loosen surface of subgrade to minimum 2.0-inch depth to insure a positive bond between subgrade and topsoil.

B. Do not place finish topsoil until after clean-up and removal of construction debris, trash, surplus materials, and equipment from project site.

C. In perennial and shrub planting beds, place and spread topsoil to a uniform settled depth that is approximately 66.67 percent of the overall settled depth.

D. Where topsoil is spread, use a cultipacker, pulverizer, or similar tool to pulverize the soil and eliminate all lumps. Do not compact topsoil.

E. Provide settled depth of amended soil in all shrub and perennial plant beds as shown in the drawings. Provide backfill for tree root balls as shown on the plans.

F. Finish grade plant bed areas as shown on the Drawings.

3.2 TOPSOIL PLACEMENT AND FINISH GRADING FOR SOD

A. Topsoil shall be placed to a 6.0-inch minimum finished depth in all areas to be sodded.

B. Prepare soil for planting so that only light raking, or scarifying will be required.

C. Round finished surfaces at abrupt changes in slope.

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D. Should spot elevations for finished grades conflict with finished contours, the spot elevations shall govern.

E. Finished grades shall be to top of sod.

F. Finished grades to uniform levels or slopes between points where levels are given or between such points and existing grades.

G. Positively drain all sod and planting areas to designated surface water collection points, streets, and/or waterways.

H. Protect paving, sidewalks, utilities, and plants during finish grading; repair or replace any items damaged by construction operations at no cost to Owner. Equipment that may leave black tire marks should not be driven on sidewalk or paver areas, or marks must be removed, without damage to walks or pavers, prior to project acceptance.

I. After placement, maintain surfaces to indicated finished grades; deposit additional topsoil or amended soil to repair settlement or erosion up to the date of final acceptance. Scarify surfaces upon which additional topsoil is to be deposited.

3.3 BORROW TOPSOIL IN ABOVE-GRADE PLANTERS

A. Place according to manufacturer's recommendations.

3.4 MAINTENANCE

A. Protection of graded areas:

1. Protect newly graded areas from traffic and erosion.

2. Keep free of trash and debris.

3. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

4. Keep public streets clean from soil, soil tracking, and debris at all times.

B. Reconditioning Compacted Areas: Where completed graded areas are disturbed by subsequent construction operations, erosion or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction at no cost to the Owner.

C. Settling: Where settling is measurable or observable during general project warranty period, add topsoil or amended soil, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work and eliminate evidence of restoration at no cost to the Owner.

3.5 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Remove waste materials, including unacceptable excavated material, trash, and debris from the job site.

3.6 PROTECTION OF SIDEWALK

A. Equipment that may leave black tire marks shall not be driven on sidewalk or special paver areas, or marks must be removed without damage to walks prior to acceptance.

******END OF SECTION******

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SECTION 32 92 23 - SODDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Removing temporary vegetation, weeds, root masses, rocks, and other extraneous matter from topsoil prior to sod-bed preparation.
2. Scarifying, loosening, and related sod-bed preparation of all sodded areas.
3. Soil preparation for the sod-bed, including tilling, raking, Fine Grading, and bringing soil to a smooth and uniform grade.
4. Fertilizing prior to laying sod.
5. Sodding and turfgrass establishment.
6. Establish and maintain turfgrass beginning immediately after sodding and continuing through the turfgrass establishment period as specified.
7. Protect sodded areas from weeds, disease, insects, geese, erosion, vandalism and trespassers.
8. Restoration of existing lawn areas which are damaged by work being performed under the Contract. Restoration shall include proper preparation of underlying soils and providing new sod.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. Payment at the unit price for “Sodding Type Lawn” shall be by the square yard of sod as measured in place. Measurement and payment shall be full compensation for all materials, delivery, ground preparation, placement, rolling, staking, specified maintenance, coordination and associated work complete and in place.
2. The City will pay up to 60% of the contract unit price for each sodded area during the warranty period.
3. The City will pay up to 95% of the contract unit price for each sodded area that has been accepted by the engineer.

B. The furnishing and installing specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. The costs shall be included in the unit price bid for the associated seeding and sodding items. Such items of work include but are not limited to:

1. Application of fertilizer on all areas to be sodded shall be included in the price bid for sodding.
2. Maintenance of newly sodded and seeded areas, as specified, include in the unit price for the associated items.
3. Stapling of sod on sloped areas, include in the unit price bid for sodding.

1.3 SUBMITTALS

A. Submit information in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following product information:

1. Fertilizer

1.4 QUALITY ASSURANCE

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A. Perform work only during periods when beneficial results are likely to be obtained. During periods of excessive drought, excessive moisture or freezing conditions, stop work and resume operations only when desired results are attainable.

B. Contractors Qualifications:

1. Sod-bed preparation, sodding, turfgrass establishment, and turfgrass maintenance shall be performed by a single firm which specializes in sodding work. The firm shall have not less than three years' experience in sod-bed preparation, Fine Grading, sodding, turfgrass establishment, and turfgrass maintenance.

C. Turf establishment is required.

1.5 DELIVERY, STORAGE AND HANDLING

A. Time delivery of sod to ensure that sod will be placed within 24 hours after stripping. Protect sod against drying and breaking of rolled strips.

B. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

PART 2 - PRODUCTS

2.1 SOD

A. Class of Sod: Sod shall be nursery grown, cultured sod planted on cultivated agricultural land and grown specifically for sod purposes. Sod shall have been mowed regularly and carefully and otherwise maintained from planting to harvest to maintain reasonable quality and uniformity.

B. Composition: Sod shall be composed of not less than 60 percent Kentucky Bluegrass.

C. Mowing Height: Before stripping, sod shall be mowed uniformly at a height of 1 inch to 2 ½ inches.

D. Thatch: Sod shall be relatively free of thatch, up to ½-inch allowable (uncompressed).

E. Diseases, Nematodes, and Insects: Sod shall be reasonably free of diseases, nematodes, and soil-borne insects.

F. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds.

2.2 FERTILIZER:

A. Commercial grade, uniform in composition, free-flowing material suitable for application with standard equipment.

B. Deliver fertilizer in original, unopened containers, bearing manufacturer's guarantee, analysis, name, and trademark.

C. Formulation:

1. 17-3-17 (17 percent Nitrogen, 3 percent Phosphate, 17 percent Potash).

2. Fertilizer shall be formulated with a slow release sulphur coated Nitrogen and a slow release sulphur coated Potassium.

PART 3 - EXECUTION

3.1 SODDING SCHEDULE

A. Sod all areas in accordance with the scheduling / phasing indicated in the Contract Documents.

3.2 TURFGRASS ESTABLISHMENT PERIOD

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A. Maintenance, including watering, mowing, weeding, repairing, and other operations, shall continue until the latter of the following:

1. A minimum of 1 growing month from the time sod is installed.
2. Until Project Substantial Completion.
3. Turfgrass establishment, as determined by the Engineer / Landscape Architect.
   (a) Turfgrass establishment is defined as sod has taken root and 100 percent of individual sod pieces cannot be lifted by hand from the ground.

B. It may be necessary to continue maintenance into future growing seasons if the turfgrass is not established by the maintenance date specified above. Continue with specified maintenance until turfgrass is established.

3.3 TILLING AND SOD-BED PREPARATION

A. Topsoil spreading, rough grading, and finish grading for areas to receive sod is specified in Section 31 00 00 Earthwork.

B. Remove temporary vegetation and weeds. Apply Roundup® or similar herbicide to temporary seeding, weeds, and other unwanted vegetation. Remove dead plant material, including root masses, prior to fine grading.

C. Cultivate soils to a depth of at least 6 inches to bring soil to a uniformly friable condition.

D. Apply fertilizer to topsoil. Uniformly blend fertilizer into soil as specified under Fertilizing.

E. After tilling, bring area to a smooth, even and well drained surface without undulations and irregularities.

3.4 FERTILIZING

A. Fertilizer application:

B. During Tilling and Fine Grading, apply fertilizer at a rate of 250 lbs. per acre.

1. Till fertilizer and topsoil to a minimum depth of 4 inches. Till using a disk, rototiller, Harley Rake, or other similar equipment when topsoil contains sufficient moisture and is easily worked. Exercise care when soil is moist.

C. Subsequent Fertilizer applications:

1. Following the above fertilizer applications, apply Nitrogen Sourced Fertilizer to turfgrass areas until project completion.
   (a) Adjust fertilizer application rates throughout the growing season. Apply Nitrogen based fertilizers according to the following:
      (1) March – April: 0-½ lbs. per 1,000 ft^2
      (2) May – June: ¾-1 lbs. per 1,000 ft^2
      (3) July: No application of fertilizer
      (4) August: ½-¾ lbs. per 1,000 ft^2
      (5) September: 1 lbs. per 1,000 ft^2
      (6) October – November: 1¼-1½ lbs. per 1,000 ft^2

3.5 FINE GRADING

A. Fine Grading shall be accomplished using a land plane, planer bar, drag, or similar light weight equipment designed to smooth the surface and provide a uniform, non-rolling and non-undulating grade.

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B. Fine Grading for general turfgrass areas:

1. Fine Grading will be considered acceptable based on the following:

(a) Uniform surface

(b) No rills, ridges, tire depressions, windrows, or other irregularities that will affect mowing operations, including bouncing mowers, scalping turfgrass, and similar.

(c) Based on visual observation.

C. Fine Grade tolerance: 0.06' (3/4 inch) variation from finish grades.

D. Fine Grading must be reviewed by the Engineer / Landscape Architect prior to sodding. Failure to notify the Engineer / Landscape Architect to review Fine Grading will require redoing Fine Grading of deficient areas and resodding at the Contractor's expense.

E. Immediately prior to sodding, clear surface of soil clumps, brick, block, rocks, and stones larger than 1 inch in diameter. Remove all debris, trash, roots, vegetation clumps, branches, brush, wire, grade stakes, and other deleterious materials.

3.6 SODDING

A. Before laying sod, correct soft spots and inequalities and remove foreign materials. Sod shall be laid with no voids and shall be well tamped or rolled and thoroughly watered. At completion of Work, sod shall be true and set at finish grade, firm and even at all points.

B. Where new sod meets existing sod, cut a clean, sharp edge to allow for a consistent, uniform, and straight joint between new sod and existing turfgrass. Jagged or uneven joints will not be accepted. Remove topsoil at the joint between new sod and existing turfgrass, as required, to allow new sod surface to be flush with existing turfgrass surface.

3.7 MAINTENANCE AND ESTABLISHMENT OF TURFGRASS

A. General Requirements:

1. Begin maintenance immediately after sodding.

2. Maintain turfgrass by watering, fertilizing, mowing, weeding, repairing, and other operations, including rolling, regrading, and resodding.

3. Establish a healthy, thick turfgrass, free of dead or yellow sod strips, eroded areas, bare areas, or gaps between sod panels.

4. Maintenance shall be accomplished until the latter of the time frames noted in Paragraph 3.2 "Turfgrass Establishment Period" of this Section.

B. Watering:

1. Maintain a watering schedule that will keep the soil saturated until sod has taken root.

2. Immediately after sod has been laid, thoroughly soak sod and, thereafter, at least once per day, except when adequate rain may fall to make watering unnecessary.

3. Keep sod adequately watered until maintenance dates noted herein. Dry or dead sod will not be accepted.

C. Procurement of water will be the responsibility of this Contract. Where no permanent irrigation system exists, construct temporary above ground irrigation systems, consisting of piping, heads, valves, etc., as required to adequately water sodded areas. All costs associated with watering, including temporary irrigation systems, shall be included in the Bid.

D. Fertilization:

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1. Continue to fertilize turfgrass areas as specified herein under Paragraph 3.4 C “Subsequent Fertilizer applications”.

E. Mowing:

1. Mowing shall be accomplished by the Contractor.
2. Frequent mowing is critical to turfgrass development.
3. Mow to minimize weed growth and prevent weeds from shadowing desired turfgrass. Mow weeds frequently to prevent weeds from going to seed. Under no circumstances shall weeds go to seed.
4. Make weekly inspections to ensure proper mowing is being accomplished.
5. Mow using a mower with sharp blades.
6. Do not remove more than 1/3 of the turfgrass blade height. Never remove more than one inch from the grass blade during each mowing.
7. It is anticipated that mowing will be necessary every 5 to 6 days.
8. Cutting Height:
   (a) Accomplish the first mowing after the ground is no longer saturated and is stable enough to support the mower.
   (b) Mow to a height of 2 ½ inches.
   (c) Do not allow turfgrass to go into the winter dormant stage with a height greater than 2 inches.

F. Weeding:

1. Spray weeds and undesirable vegetation with an appropriate herbicide. After killing, rake and remove weed remnants. Take care that turfgrass is well established before spraying chemicals.

G. Repairs:

1. Repair turfgrass areas that become eroded, gullied, or damaged, including damage due to vandalism or neglect. Repair yellowed or browned turfgrass areas. Reestablish approved conditions prior to sodding. Resod as originally specified and establish turfgrass. All repair costs will be at the Contractor’s expense.

3.8 TURFGRASS ACCEPTANCE

A. Continue Maintenance And Establishment Of Turfgrass until acceptable conditions are obtained.

B. Unacceptable Conditions:

1. Erosion or eroded areas will not be accepted.
2. Rills and ridges will not be accepted.
3. Areas that include barnyard grass, crabgrass, quack grass, and similar undesirable grasses will not be accepted.
4. Areas that include broadleaf weeds will not be accepted.
5. Gaps in sod panels will not be accepted.
6. Dead sod will not be accepted.

C. Acceptance:

1. Turfgrass will be reviewed by the Engineer / Landscape Architect only after the minimum time frames specified herein in Paragraph 3.2.

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2. The Engineer / Landscape Architect will visually observe the condition of the sod and turfgrass and determine if the sod is acceptable or not, based on the following:

   (a) Sod strips that can be lifted by hand indicates the sod has not taken root. The Engineer / Landscape Architect will lift individual sod strips by hand to test for acceptance. Sod that can be lifted will mean the entire sodded area is not accepted.

   (b) Sod strips shall be dark green in color at the time of acceptance, with no yellow or brown coloration.

   (c) Turfgrass shall have no gaps between individual sod strips measuring 1" or greater.

3.9 FAILURE OF TURFGRASS ESTABLISHMENT

A. In the event an acceptable turfgrass is not established, treat, repair, and replace damaged work.

B. All costs related to Failure of Turfgrass Establishment will be at the Contractor's expense.

3.10 CLEANING

A. At completion of work, clean up and remove from site surplus materials, roots, stones, and debris and leave area in a clean, neat condition.

B. Remove promptly soil and other extraneous material brought onto paved areas by work operations. Keep paved areas clean at all times.

C. Restore ground areas disturbed as a result of sodding operations to their original condition or to desired new appearance.

3.11 PROTECTION

A. Protect turfgrass from damage due to landscape operations, operations by other contractors, weeds, disease, insects, erosion, vandalism, and trespassers.

B. Protection shall be accomplished until the latter of the time frames noted in Paragraph 3.2 "Turfgrass Establishment Period" of this Section.

C. Protect turfgrass from geese. Determine the means to accomplish.

3.12 EROSION CONTROL DEVICE REMOVAL

A. Remove erosion control devices, including, but not limited to, silt fence, sediment control logs, etc., after turfgrass is established and there is no risk of erosion.

B. Backfill and regrade trenches from erosion control devices. Sod and establish turfgrass in these areas.

******END OF SECTION******

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SECTION 33 40 00 - STORMWATER UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes labor, materials, equipment, and accessories to provide the following:

1. Surveying for storm sewer systems.
2. Storm sewer system as indicated on Drawings.
3. Excavation, backfill, and compaction related to storm sewer and drainage structure installation.
4. Pipe, backfill materials, and structures for complete drainage system.
5. Protection of the completed system against sedimentation during subsequent construction activities and through turf establishment as noted herein.
6. Furnishing, installing, maintaining, and removing inlet protection devices at storm sewer inlets.
7. Cast-in-place concrete associated with the system.
8. Precast Concrete Storm Sewer Structures (manholes, catch basins, outlet control structures), concrete flared end sections, and related frames, castings, grates, lids, covers, trash racks, rip rap, fabrics, and other materials.
9. PVC structures and related frames, castings, grades, lids, and covers.
10. Cast openings in concrete structures to receive subsurface drains and drain tile.
11. Flexible Joints at pipe connections to concrete structures per Mn Plumbing Code.
12. Subsurface drains and connection to the storm sewer system.
13. Adjusting all structure castings and grates to finish grade.
14. Provide Record Drawings.

1.2 METHOD OF MEASUREMENT AND PAYMENT

A. Measurement and compensation for the following items shall be paid according to the referenced specification or as modified below:

1. 6” Perforated PVC Storm Pipe (Draintile)
   (a) No exception to the referenced specification is made.
2. 12” RCP Storm Pipe
   (a) No exception to the referenced specification is made.
3. Structures, Manholes, Catch Basins
   (a) Payment for all structures, manholes and catch basins shall be at the unit price bid per EACH structure. The amount bid includes all work and material required to complete the structure. Furnishing and installing casting assemblies shall included in the amount bid for each structure, for which no additional payment will be made.
4. Casting Assemblies
   (a) Casting assemblies shall be considered incidental to each structure.
5. Sewer Pipe
   (a) No exception to the referenced specification is made.

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6. Construct Draintile Cleanout

(a) Inspection tee assemblies shall be measured per EACH type and style indicated, complete in place and paid at the price unit bid.

1.3 APPLICABLE DOCUMENTS

A. All work shall comply with the requirements of the Department of Labor and Industry and the rules and regulations identified in the Minnesota Plumbing Code.

1.4 SITE CONDITIONS

A. Maintain benchmarks, monuments, and other reference points. If disturbed or destroyed, have replaced or relocated by a registered land surveyor at the Contractor's expense.

1.5 SUBMITTALS

A. Submit information and shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

B. Submit the following product information and shop drawings:

1. Product Information:

(a) Pipe

(b) Flexible Joints

(c) Subsurface drains

(d) Geotextile Fabrics

(e) Castings, Lids, and Grates

(f) Adjusting Rings

2. Shop Drawings:

(a) Structures

C. Submit the following Test Results:

1. Air pressure

2. Deflection

D. Submit Project Record Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade, and other details indicated in the Contract.

B. All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Plans.

2.2 PIPE

A. Storm Sewer Pipe:

1. RCP (Reinforced Concrete Pipe):

(a) ASTM C76 "Reinforced Concrete Culvert, Storm Drain and Sewer Pipe", subject to the following supplementary provisions:

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(1) The pipe shall be provided with bell-and-spigot joints as designed and manufactured that the spigot and rubber-O-ring gasket will readily enter the bell of the pipe in accordance with ASTM C361.

2.3 SUBSURFACE DRAIN ASSEMBLY:

A. Where perforated pipe is specified in the plans, pipe (subsoil drains) shall be perforated PVC Pipe, SDR-35 perforated sewer pipe, or approved equal. Pipe shall not be directly wrapped in geotextile fabric.

B. Bedding Rock:

1. Unless otherwise specified in the plans, Mn / DOT 3149 H (Coarse Filter Aggregate).

C. Geotextile Fabric:

1. Geotextile fabric shall be a non-woven fabric with the following minimum properties:

(a) Grab Tensile Strength, ASTM D-4632: Not less than 200 lbs.

(b) CBR Puncture, ASTM D6241: Not less than 500 lbs.

(c) Trapezoidal Tear Strength, ASTM D-4533: Not less than 80 lbs.

(d) UV Resistance at 500 hours, ASTM D-4355: Not less than 70%

(e) Permittivity, ASTM D-4491: Not less than 1.4 sec-1.

(f) Water Flow Rate, ASTM D-4491: Not less than 95 gal/min/ft2.

2. Approved products:

(a) Geotex® 801

(b) Mirafi® 180N

(c) Or approved equal.

2.4 FLEXIBLE JOINTS AT CONCRETE STRUCTURE CONNECTIONS:

A. In accordance with Minnesota Plumbing Code, provide Flexible Joints at all pipe connections to all concrete structures.

B. Acceptable manufacturers / products:

1. Fernco, “Concrete Manhole Adaptors” or “Large-Diameter Waterstops”

2. Press-Seal, Waterstop Grouting Rings”

3. Or approved equal.

2.5 PRECAST CONCRETE STORM SEWER STRUCTURES:

A. Precast concrete riser sections and appurtenant units (grade rings, top and base slabs, special sections, etc.) used in the construction of storm sewer structures shall conform with the requirements of ASTM C 478, Mn/DOT 2506 and the following supplementary provisions:

1. The precast sections and appurtenant units shall conform to all requirements as shown on the Drawings.

2. Joints of storm sewer structure riser sections shall be tongue and groove with rubber "O" ring or profile gaskets.

3. Air entrained concrete shall be used in the production of all units. Air content shall be maintained within the range of five (5) to seven (7) percent (%).

B. Provide cast openings in storm sewer structures to receive subsurface drains and drain tile.

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2.6 CASTINGS FOR CONCRETE STRUCTURES:

A. Cast iron. Metal used in casting manufacturing shall be ASTM-A-48, Class 35B gray iron or ASTM A536 grade 80-55-06 for ductile iron.

B. Shall be smooth and well cleaned by shotblasting.

C. Castings shall not be painted.

D. The standard manhole casting shall have two concealed pick holes. Castings shall be stamped "STORM SEWER".

E. Round covers and grates shall fit closely in the frame and, when placed and rotated in the frame, shall fit the frame solidly so that there will be no rocking from pressure on any point of the cover.

F. Approved Manufacturers:

1. Neenah Foundry, 2121 Brooks Avenue, Neenah, WI 54956, Phone: (920) 725-7000.

(a) Available locally through Ess Brothers, Loretto, MN, phone (800) 478-2027.

(b) Available locally through Neenah Foundry, Shakopee, MN, phone (952) 445-5335

2. Or approved equal.

2.7 STRUCTURE STEPS FOR CONCRETE STRUCTURES:

A. Copolymer polypropylene meeting with the requirements of ASTM 2146, Type II, Grade 49108, reinforced with a deformed 3/8 inch diameter reinforcing bar which conforms to the requirements of ASTM A-615, Grade 60.

2.8 ADJUSTING RINGS FOR CONCRETE STRUCTURES:

A. Precast concrete adjusting rings.

1. Joints between structure, rings, and casting shall be sealed with grout.

2.9 CONCRETE FLARED END SECTIONS:

A. Precast Concrete as detailed on Drawings.

B. Provide all miscellaneous materials (trash rack, pipe ties, bolts, etc.) for complete installation.

C. Riprap:

1. As specified in Section 31 37 00 Riprap.

D. Geotextile Fabric:

1. Geotextile fabric shall meet requirements of Mn/DOT 3733 Type V.

PART 3 - EXECUTION

3.1 CONSTRUCTION STAKING AND FIELD ENGINEERING

A. Refer to Section 01 71 23 Field Engineering for requirements.

3.2 INSPECTION AND RESPONSIBILITY OF MATERIALS

A. Inspect all materials for damage. Promptly remove all damaged material from the site.

3.3 TRENCH EXCAVATION, BACKFILL, COMPACTION, AND DEWATERING

A. Work shall be in accordance with the provisions of Section 31 23 33 Trenching and Backfilling.

3.4 INSTALLATION OF STORM SEWER SYSTEM

A. Dewatering:

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1. Provide dewatering, temporary diversion berms, and drainage swales to divert water away from excavations. Provide dewatering of trench excavations.
2. Drain discharge water to natural drainage channels or to storm sewers. Remove sediment and suspended materials from discharged water as specified in Section 31 00 00 Earthwork under Dewatering.
3. No pipe or fittings shall be laid in water or when trench conditions are unsuitable for work.
4. Provide labor and materials necessary to control erosion at outfall and downstream of dewatering pipe.
5. Comply with dewatering requirements identified in Section 31 00 00 Earthwork.

B. Trenching:

1. Excavate to depth and width necessary for utility construction. Excavation width shall not exceed the outside diameter of pipe plus 24 inches.
2. Place excavated material on one side of trench, unless conditions are prohibitive. Excavated material shall be so placed as not to obstruct any site drainage pattern.
3. Excavate trench in advance of utility installation, but do not excavate trenches beyond the installation limits for the day.
4. Slope and brace sides of trenches so that workers can work safely and efficiently.

C. Installing Piping and Appurtenances:

1. The primary line and grade shall be established by a registered Land Surveyor employed by the Contractor. No deviation from the required line or grade will be allowed except with the consent of the Engineer.
2. PVC Pipe installation:
   (a) Install PVC Pipe on a continuous, well compacted, granular bed in accordance with ASTM D2321.
   (b) PVC pipe joints:
      (1) After the inside and outside of joint surfaces are cleaned and free from dirt, moisture, oil, burs, and other foreign material, solvent weld joints in accordance with ASTM D2564.
      (2) Apply primer and glue to inside and outside of joint surfaces.
      (3) Construct joints using primer and solvent weld in accordance with ASTM D2855.
3. Provide and use the proper implements, tools, and facilities for the safe and convenient prosecution of work.
4. Carefully unload and distribute materials to prevent damage, to minimize handling, and to not hamper construction activities. Do not throw, drop, or dump materials.
5. Before being lowered into laying position, thoroughly inspect each pipe section and appurtenant units to detect damage, foreign matter needing removal, or unsound conditions that may need corrective action or be cause for rejection.
6. Immediately before placement, inspect joint surfaces of each pipe section and fitting for the presence of foreign matter, coating blisters, rough edges, or projections. Clean, trim, or repair any imperfections as needed. Wipe the outside of the spigot and the inside of the bell clean and dry. Pipe ends shall be kept clean until joints are made.
7. Where pipe cutting is required, cut pipe square and deburr pipe ends.

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8. Carefully lower pipe into trench to prevent damage to pipe and protective coatings and linings. Do not throw, drop, or dump materials into trench.
9. Lay all pipes using laser equipment to set pipe grade and alignment. Laser equipment shall digitally display slope to the nearest 1/100%. Check the grades at a frequency not to exceed 100 feet. Provide competent workers to operate the laser equipment.
10. Provide, without additional compensation, suitable temporary channels for water that flows along or across site and is restricted by work.
11. Place excavated material on one side of trench. Place excavated material so as not to obstruct any site drainage pattern.
12. Whenever existing utility structures, branch connections, conduits, ducts, pipes, or structures present obstructions to the grade and alignment of the pipe, they shall be permanently supported, removed, relocated, or reconstructed.
13. Excavate to proper elevation and shape foundation to fit lower 1/4 of outside circumference of pipe. Dig bell holes at ends of each length of pipe to permit proper jointing. Excavation for structures shall have 1-foot minimum clearance on all sides.
14. At the time of pipe placement, the bedding conditions shall be such as to provide uniform and continuous support for the pipe between bell holes. Excavate bell holes as necessary to make the joint connections, but they shall be no larger than would be adequate.
15. Lay bell and spigot pipe with the bell ends facing upgrade. Pipe laying shall start on the downgrade end and proceed upgrade. As each length of bell and spigot pipe is placed in laying position, center the spigot end in the bell and force the pipe home and bring to correct line and grade. Secure the pipe in place with approved backfill material, and thoroughly compact backfill by tamping around the pipe to a height of at least 12 inches above the top of pipe. Use hand operated mechanical tamping devices for compacting around the pipe. Keep joint areas exposed. Prevent soil from entering the joint space until the joint seal is complete. Backfill in the bell area shall be left loose.
16. Connect new pipe to existing pipe, or connect new pipe to structures in accordance with the requirements of the Minnesota Plumbing Code. Where necessary to make satisfactory closure or produce the required curvature, grade, or alignment, deflections at joints shall not exceed that which will assure tight joints and comply with any limitations recommended by the pipe manufacturer.
17. Make connection to an existing storm sewer manhole, where an opening for the proposed sewer pipe does not exist, as follows:
    (a) Core drill an opening of the correct size and elevation for the proposed storm sewer pipe.
    (b) Set the connecting pipe through the full thickness of the wall flush with the inner face of the wall.
    (c) Connect to the structure with a flexible joint.
    (d) Ensure the flow lines inside the manhole are constructed in a manner to provide steady flow from all inlet pipes towards the outlet pipe. Reconstruct the structure invert as required. Grout the flow line and the core drilled hole smooth.
    (e) Install a plug in the connecting pipe once the connection is complete and construction has advanced to the next manhole to prevent rainwater or sediment from entering the existing system. Remove all plugs once all proposed sewer pipes on the project have been installed, tested, inspected, and approved.
18. Securely close all pipe openings at the suspension of work at any time, and place suitable stoppers to prevent earth or any substance from entering the pipe. If water is present in the trench, the stoppers shall remain in place until the trench is completely dry.

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19. If unstable soil or soil not suitable for bedding of pipe or for trench backfill is encountered, notify Engineer before proceeding with pipe installation. Remove and replace unsuitable or unstable material with pipe stabilization material as specified in Section 31 23 33 Trenching and Backfilling.

20. Material for stabilization and bedding shall be as specified in Section 31 23 33 Trenching and Backfilling. Type of material to be used shall be approved by the Testing Laboratory representative. Use stabilization material for pipe bedding and trench backfill wherever peat, clay or other unsuitable bearing material is encountered. Place material to a depth as determined by the Testing Laboratory representative, with a minimum depth of 6 inches below bottom of pipe and extending at least 1 foot beyond sides of pipe and 1 foot above pipe.

D. Backfilling Procedures:

1. Backfill trenches to original ground surface outside of proposed grading limits or to finish grade. Place backfill as soon as practical after pipe installation.

2. Place pipe bedding material in trench simultaneously on both sides of pipe for full width of trench and to a minimum height of 12 inches above top of pipe. Shovel place and hand tamp backfill material to fill spaces under and adjacent to pipe completely. Place pipe bedding material from the bottom of trench to 12 inches above top of pipe by either hand or mechanical methods in 2 lifts. The first lift shall be from trench bottom to pipe springline. Compact the first lift by hand or walk behind type vibrating compactor. Compact the second lift with a walk behind type vibrating compactor making a minimum of 2 passes.

3. Succeeding layers of backfill from 12 inches above pipe to surface may contain coarse materials, but shall be free from rocks larger than 6 inches, frozen materials, concrete, blacktop, wood, roots, stumps, sod, rubbish, and other similar articles whose presence in backfill, in Engineer's opinion, would cause excessive settlement of trench or damage to pipe.

4. If the native trench material is unsuitable for any portion of trench backfill, it will be considered surplus material and shall be disposed of off-site, unless otherwise approved by the Engineer. Make a reasonable attempt during the excavation operations to segregate unsuitable materials encountered from suitable materials. Furnish and install additional suitable material needed for backfilling. Backfill shall be sand-gravel or binder stone material as described in Section 31 23 33 Trenching and Backfilling.

E. Compact trench backfill in accordance with density requirements established in Section 31 00 00 Earthwork.

3.5 SUBSURFACE DRAIN INSTALLATION

A. Trenching:

1. Provide dewatering, temporary diversion berms, and drainage swales to divert water away from excavations. Provide dewatering of trench excavations.

2. Drain discharge water to natural drainage channels or to storm sewers. Remove sediment and suspended materials from discharged water as specified herein under Dewatering.

3. Excavate to depth and width necessary for drain tile assembly construction. Excavation width shall not exceed 36 inches.

4. Place excavated material on one side of trench, unless conditions are prohibitive. Excavated material shall be so placed as not to obstruct any site drainage pattern.

5. Excavate trench in advance of drain tile installation, but do not excavate trenches beyond the installation limits for the day.

6. Slope and brace sides of trenches so that workers can work safely and efficiently.

B. Installing the Drain Tile Assembly:

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1. Carefully unload and distribute materials to prevent damage, to minimize handling, and to not hamper construction activities. Do not throw, drop, or dump materials.
2. Install geotextile fabric in trench bottom providing adequate slack to prevent tearing when subsequent materials are installed. Overlap seams a minimum of 24 inches.
3. Install pea rock bedding in bottom of trench to hold geotextile in place and provide bedding for drain tile.
4. Before being lowered into laying position, thoroughly inspect each pipe section to detect damage, foreign matter needing removal, or unsound conditions that may need corrective action or be cause for rejection.
5. Immediately before placement, inspect joint surfaces of each pipe section and fitting for the presence of foreign matter, coating blisters, rough edges or projections. Clean, trim, or repair any imperfections as needed. Wipe the outside of the spigot and the inside of the bell clean and dry. Pipe ends shall be kept clean until joints are made.
6. Where pipe cutting is required, cut pipe square and deburr pipe ends.
7. No pipe or fittings shall be laid in water or when trench conditions are unsuitable for work.
8. Carefully lower drain tile into trench and prevent damage to pipe and its protective coatings and linings. Do not throw, drop, or dump materials into trench.
9. Install drain tile carefully to line and grade, with uniform bearing throughout the length of each pipe section installed.
10. Install drain tile with perforations down.
11. Lay bell and spigot pipe with the bell ends facing upgrade. Pipe laying shall start on the downgrade end and proceed upgrade. As each length of bell and spigot pipe is placed in laying position, center the spigot end in the bell and force the pipe home and bring to correct line and grade. Secure pipe in place with pea rock. Keep joint areas exposed. Prevent soil from entering the joint space until the joint seal is complete.
12. Construct junctions and turns with wyes or bends fabricated from the same material as the drain tile. Plug dead end runs of drain tile.
13. Connect drain tile to concrete storm sewer structure. Core drill existing concrete structures for connection.
14. Place remaining pea rock. Wrap top of the pea rock and pipe assembly with geotextile fabric. Overlap seams a minimum 24 inches.
15. The full drain tile assembly, including pipe, fabric, and pea rock, shall be free of silt and debris accumulation and other obstructions that may affect system performance.

C. Trench Backfilling above Drain Tile Assembly:

1. Proceed with backfilling without delay as the installation is made.
2. Succeeding layers of backfill from above the Drain Tile assembly to subgrade shall meet the specifications noted within this Section.

3.6 CONCRETE STRUCTURE INSTALLATION

A. Construct storm sewer structures as noted on the Drawings. Provide erosion control as detailed on the Drawings.

B. Unless otherwise specified or approved, construct structures on a precast or cast in place concrete base. Barrel riser sections and cone sections shall be constructed of precast concrete. All sections shall be properly fitted and sealed to form a completely watertight structure. Fabricate structures to provide a

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twelve inch tall or sixteen inch tall barrel section immediately below the cone or top slab whenever possible.

C. Place at least two and not more than five adjusting rings immediately below the casting assembly. Adjust barrel and cone height to accommodate the adjusting rings. Wrap adjusting rings and casting flange with a Type 2 Geotextile fabric meeting MnDOT 3733.

1. The rings shall provide a minimum adjustment of 4” using 2” rings and maximum adjustment of 12" with a 6" thick ring used for adjustments of 8" or greater.

2. Provide grout along the outside of the ring assembly.

D. Unless otherwise specified or approved, storm sewer structures shall have an inside barrel diameter at the bottom of forty-eight inches minimum and the inside diameter at the top of the cone section and all adjusting rings shall be of the same size and shape as the casting frame. Refer to the Drawings for casting assemblies.

E. Shape the soil for proper elevation and allow the structure to be vertically plumb. Install the structure base on undisturbed or firmly compacted foundation material.

F. Set the bottom riser section in fresh concrete or mortar. All other riser section joints shall be tongue and groove design. Seal all tongue and groove joints with rubber gaskets. The concrete base under an outside drop connection shall be monolithic with the storm sewer structure base.

G. Wherever special designs so require or permit, a precast concrete base may be used or the structure may be constructed with solid sewer brick or block units or with cast in place concrete. Any combination of cast in place concrete and brick or block mortar construction will be allowed and may be required where it is impossible to complete the construction with standard precast storm sewer structure sections.

H. Completely fill all storm sewer structure doghouses with mortar, concrete masonry, or concrete to completely seal the pipes into the structure wall. Provide flexible joints in accordance Minnesota Plumbing Code requirements. Shape the structure invert, (the inside bottom of each storm sewer structure) with fresh concrete to form free flow invert troughs from pipe to pipe.

I. Provide, maintain, and remove Inlet Protection Devices. Provide continual maintenance of Inlet Protection Devices throughout the duration of the project. Remove Inlet Protection Devices once upslope areas are fully stabilized and there is no risk of erosion from the construction site.

3.7 CASTINGS AND GRATES

A. Securely fasten casting and grates to adjoining structures to prevent removal.

3.8 ADJUSTING

A. Correct imperfections and irregularities in work at no additional expense to the Owner.

3.9 CASTING ADJUSTMENTS

A. All castings within the construction limits shall be adjusted to a height between ¼ inch to ½ inch below the final pavement course or landscape / grass elevation. This allowable tolerance shall be uniform around the periphery of each casting. Adjust all castings which do not meet this tolerance at no additional cost to the Owner.

B. Adjust castings using only concrete or metal shims for final adjustment and leveling. Set all castings on a full mortar bed.

C. Temporarily fasten a template of plywood to the top of each casting during paving and rolling of the final asphalt pavement course to ensure the specified tolerances are met.

D. Include costs for casting adjustments in the bid. No additional costs for casting adjustments will be permitted.

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3.10 STORM SEWER TESTING

A. In accordance with the Minnesota Plumbing Code, test all portions of storm sewer systems located within ten feet of buried water lines or within 10 feet of buildings.

B. Test concrete structures and concrete sewer lines by using negative pressure in accordance with ASTM Standards C1214-92 and C1244-93.

C. Test PVC piping and PVC structures using a low pressure air test.

1. Perform tests with equipment similar to Air-Loc equipment manufactured by Cherne Industrial, Inc., Hopkins, Minnesota.

2. Perform the air test when the sewer is clean. Plug each end of the system to be tested with pneumatic balls. Introduce low pressure air into the plugged line until the internal air pressure reaches 5.0 psi greater than the average back pressure of any ground water pressure that may submerge the pipe. Allow at least two minutes for the air temperature inside the pressurized pipe to stabilize before starting the timer and taking readings.

3. Minnesota Plumbing Code requires the pressure to remain constant for at least 15 minutes without adding more air. The air test will be considered acceptable upon completion of this test.

D. Deflection Test

1. Measure the deflection of PVC sewer pipe after placement of backfill material in the trench. Test pipe deflection at least 30 days, but not later than 1 year, following backfilling and compaction of the pipe trench. The Owner reserves the right to measure deflection of PVC sewer pipe at any time during the warranty period. Deflections greater than 5% of the inside pipe diameter will be considered failure and correction by reconstruction will be required.

E. Visual Inspection

1. Sewer pipes shall be straight and uniform in alignment and grade. Pipe shall be free of dirt, mortar and other debris.

F. Test Failure and Remedy

1. In the event of test failure on any test section, correct the failures. Continue testing until all tests pass. Correct detected leakage to meet the requirements. All repair work shall be subject to approval of the Engineer. Introduction of sealant substances will not be permitted.

2. Unsatisfactory repairs or test results will result in removal and placement as the Engineer considers necessary. All repair and replacement work will be at the Contractor's expense.

3. Remove and replace any cracked or broken pipe. Leave the sewer system clean and free from any obstructions or debris.

3.11 CLEANING AND PROTECTION

A. Protect complete sewer system from damage, debris and sedimentation until final acceptance.

B. Clean sewer lines prior to testing and as needed prior to final acceptance of the project. Sewer system shall be free of silt, debris, and other obstructions at time of final acceptance.

C. Pipe and structures shall be free of dirt, mortar, and other debris.

D. Maintain pavement subgrades until final pavement preparation commences. Maintain subgrade until the start of surface construction or restoration work. Provide and shape additional materials as needed to compensate for trench settlement.

E. Cleaning the Site:

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1. Remove excess earth, excess construction materials, construction equipment, and construction debris which is related to this work from site at completion of work.
2. Remove and dispose of all debris, waste materials, and other remains or consequences of construction, prior to final acceptance of all work. Remove all excess materials and scrap materials from the construction site.

******END OF SECTION******

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APPENDIX A

GEOTECHNICAL/PAVEMENT EVALUATION REPORT

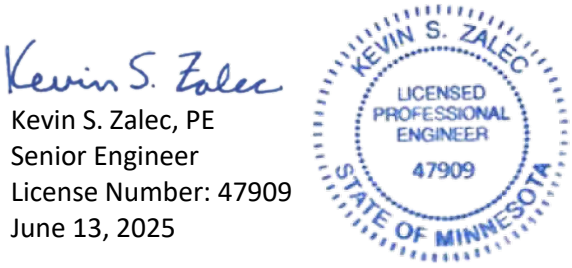
Geotechnical/Pavement Evaluation Report

2026 PMP Street and Utility Improvements
Various Streets
Arden Hills, Minnesota

Prepared for

City of Arden Hills

Professional Certification:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.



Kevin S. Zalec, PE
Senior Engineer
License Number: 47909
June 13, 2025

BRAUN INTERTEC
The Science You Build On.

Project B2502087

Braun Intertec Corporation

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11001 Hampshire Avenue S
Minneapolis, MN 55438

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Web: braunintertec.com

June 13, 2025 Project B2502087

David Swearingen, PE
City of Arden Hills
1245 West Highway 96
Arden Hills, MN 55112

Re: Geotechnical/Pavement Evaluation
2026 PMP Street and Utility Improvements
Various Streets
Arden Hills, Minnesota

Dear Mr. Swearingen:

We are pleased to present this Geotechnical/Pavement Evaluation Report for the 2026 Pavement Management project for the street and utility improvements in Arden Hills, Minnesota.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Zach Semlak at 651.788.5071 (zsemlak@braunintertec.com) or Kevin Zalec at 952.995.2223 (kzalec@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Zachary T. Semlak, EIT
Staff Engineer

Kevin S. Zalec, PE
Senior Engineer

c: Mr. Lucas Miller, City of Arden Hills
Brad Fisher, PE, Bolton & Menk, Inc.

AA/EOE

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Appendix

Soil Boring Location Sketch
Log of Boring Sheets ST-1 through ST-19 (19 pages)
Descriptive Terminology of Soil
Photographic Log of Pavement Cores (11 pages)
Table – Summary Statistic of Bituminous and Aggregate Layer thicknesses
Ground Penetrating Radar Data (Graphical Plots) (8 pages)
MnPAVE-Flexible Results

A. Introduction

A.1. Project Description

This Geotechnical/Pavement Evaluation Report addresses the proposed design and rehabilitation of the Arden Hills 2026 pavement management project (PMP) in Arden Hills, Minnesota. The 2026 PMP project areas are depicted in Figure 1.

Figure 1. Project Rehabilitation Areas

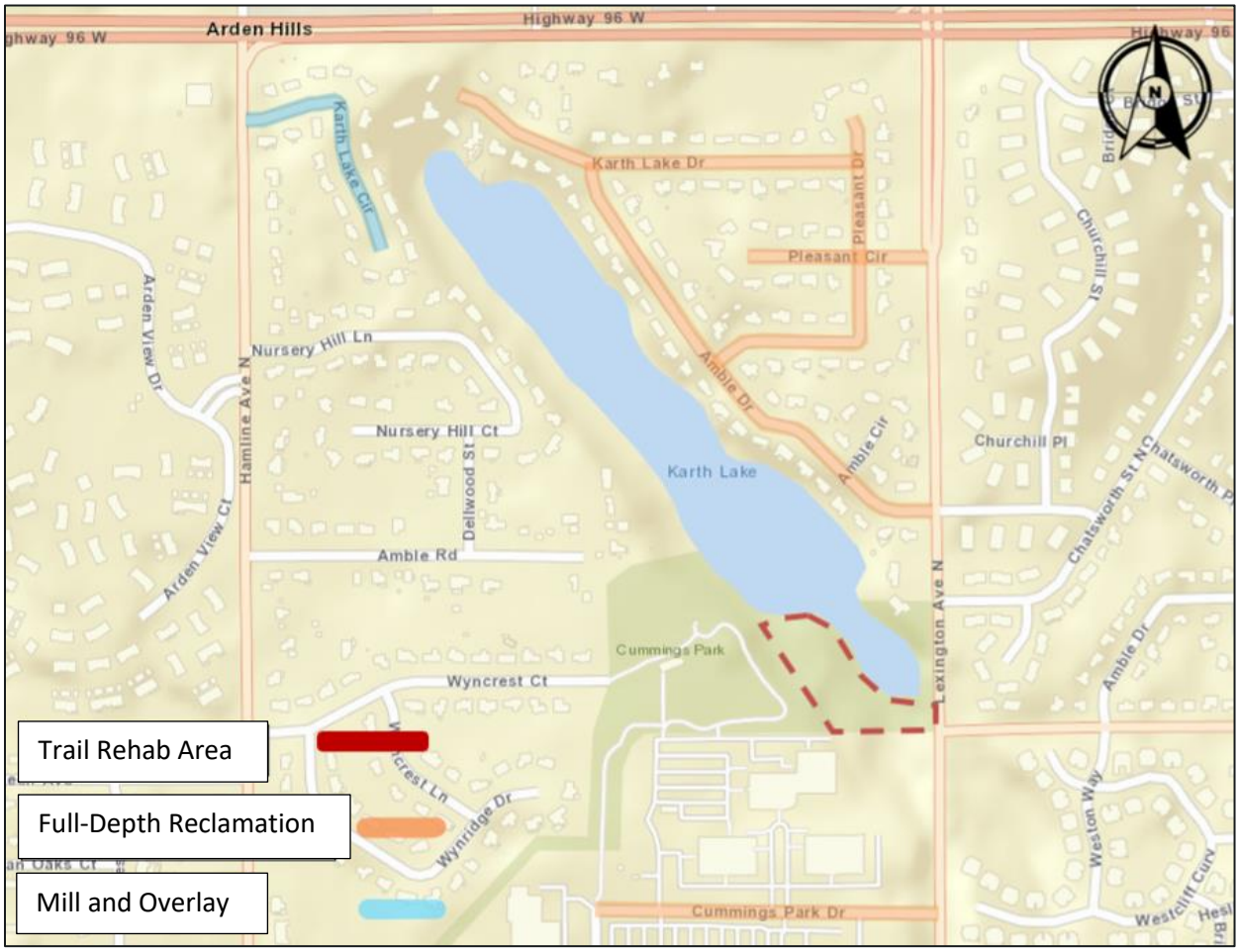


Figure annotated and extracted from Enterprise MnDOT Mapping Application (EMMA).

We understand that proposed rehabilitation is anticipated to include new bituminous pavements through milling and overlaying or through reclaiming existing bituminous and apparent aggregate base material, then overlaying new bituminous. We also understand that the trail on the south side of Karth Lake will be rehabilitated. Additional site work may include spot curb and gutter repairs as well as spot utility repairs where the City of Arden Hills (City) has deemed necessary.

Table 1 provides additional project specific details related to the 2026 PMP project.

Table 1. Project Description for 2026 Street Rehabilitation

Project Component	Description	Source
Pavement type	Bituminous	City / Bolton & Menk, Inc. (BMI)
Pavement rehabilitation method	▪ Mill and Overlay (M&O) ▪ Full-Depth Reclamation (FDR)	City / BMI
Pavement loads*	**Karth Lake Neighborhood:** Less than 150,000 Bituminous ESALs (BESALs)	Assumed
	Cummings Park Drive: Less than 250,000 BESALs	Assumed based on on-site observations at time of drilling and based on vehicle traffic being mainly Boston Scientific employees (passenger car vehicles driving through the road corridor).
Utilities	Spot utility repairs, up to 10 feet below grade	Assumed
Cummings Park Trail	FDR where bituminous and aggregate exist. Where aggregate exists only, tolerancing and paving over.	BMI
Grade changes	Street grades will be within 1 foot of existing.	Assumed

*Equivalent 18,000-lb single axle loads based on 20-year design.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.2. Site Conditions

Currently, the project site exists as a residential neighborhood and a business entrance (Cummings Park Drive). The area is bounded by County Road 96 West to the north, Hamline Avenue North to the west, Boston Scientific to the south and Lexington Avenue North to the east.

Current grades range from elevations of about 954.8 feet at Boring ST-14 to about 1007.4 feet at Boring ST-18. The project area generally contains hummocky topography, and regionally slopes downward from the northeast to the southwest near Karth Lake.

A.3. Purpose

The purpose of our geotechnical/pavement evaluation was to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of street rehabilitation using an assumed R-value, associated utility improvements, and trail improvements.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Email request with map regarding proposed scope of work from Bolton & Menk, Inc., received on February 12, 2025.
- Geologic map titled M-178, Surficial Geology of the Twin Cities Metropolitan Area, Minnesota prepared by the Minnesota Geological Survey, dated 2007.
- Traffic data available via the Minnesota Department of Transportation (MnDOT) Traffic Mapping Application, http://www.dot.state.mn.us/traffic/data/tma.html.
- Enterprise MnDOT Mapping Application (EMMA), https://dotapp9.dot.state.mn.us/emma/.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our Proposal for a Geotechnical/Pavement Evaluation (QTB210666) dated February 21, 2025 and authorized on March 10, 2025. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and coordinating the clearing of our exploration locations for underground utilities. We selected and staked the new exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings and pavement cores.

- Performing 19 standard penetration test (SPT) borings, denoted as ST-1 to ST-19, to nominal depths of 10 feet below existing grade.

- Performing 4 hand auger borings (HABs) through trail areas, denoted as T-1 to T-4, to nominal depths of 2 to 4 feet below existing grade.

- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.

- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, utilities, stormwater improvements and pavements.

We performed this geotechnical evaluation concurrently with Sediment (Dredge) Sampling, which we submitted separately. The project team should review the Sediment Sampling report for work specific to Karth Lake.

B. Results

B.1. Geologic Overview

The general geologic profile of the project area represented in Figure 2 below generally consists of Moderate- and high-relief glacial till deposits, such as silty sands, and clays forming hummocky, irregular topography (map unit's 'Qnh' and 'Qnm').

Figure 2. Surficial Geology Map of the Project Area

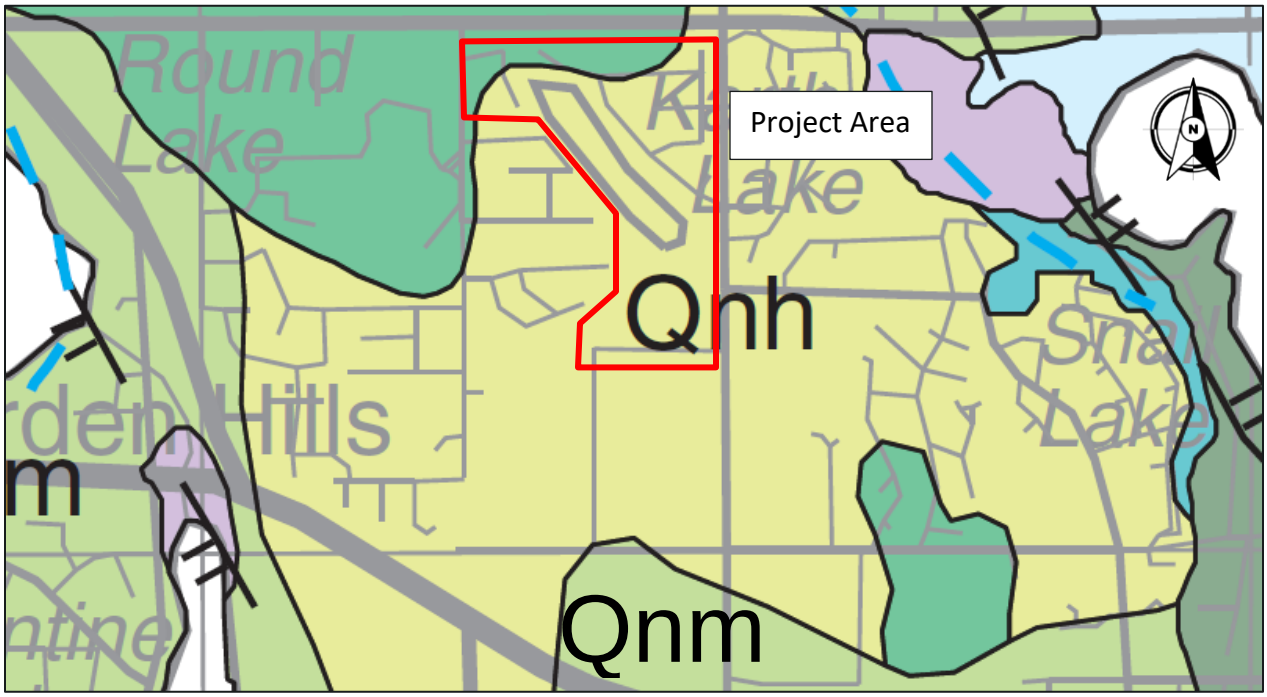


Figure extracted from Map M-178, Surficial Geology of the Twin Cities Metropolitan Area.

We based the geologic origins used in this report on the soil types, laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain.

B.2. Ground Penetrating Radar (GPR)

GPR was used to approximate pavement layer thicknesses along the road sections for the 2026 pavement management project (PMP). The data was collected at a nominal 1-foot interval. Where “ground truth” data (pavement cores) were performed, the interpreted layers from the GPR scan were compared directly to the measured thicknesses from the cores to improve the overall accuracy of the GPR analysis.

The tables shown in the Appendix show summary statistics of the bituminous pavement layer thicknesses. The Graphical Results of the GPR can be found in the Appendix as well. We can provide complete results electronically at your request.

A second layer (probable aggregate base) was not always visible in the scans, i.e., it was difficult to identify as a distinct layer due to ambient interference with the GPR signal. A lack of a visible second layer in the

GPR scan does not imply an absence of one within the pavement section. Refer to our pavement core and hand auger boring results for approximate aggregate base depths in these locations.

B.3. Pavement Core Results

We performed pavement coring and hand auger borings at 23 locations along the various roads, as shown in the sketch in the Appendix. HABs were also performed through the aggregate base layer and into the shallow subgrade in core locations.

The pavement cores and HABs were used to measure pavement layer thicknesses for the bituminous and aggregate base layers, to assess bituminous conditions, and determine the shallow subgrade soil type. The results are presented below.

We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification.

Table 2. Summary of Pavement Section Thicknesses by Boring/Core Location

Street	Boring/Core Locations	Bituminous Thickness (in.)	Aggregate Base Thickness (in.)	Overall Pavement Thickness (in.)
Karth Lake Circle	ST-1	5 1/2	5	10 1/2
	ST-2	3 3/4	4	7 3/4
	ST-3	9 1/4	3	12 1/4
Karth Lake Drive	ST-4	6 1/2	6	12 1/2
	ST-5	5	8	13
	ST-6	9	8	6 1/4
Pleasant Drive	ST-7	8 1/2	5	13 1/2
	ST-8	5 1/2	2	7 1/2
	ST-9	4 3/4	14	18 3/4
Pleasant Circle	ST-10	7	3	10
	ST-11	8	4	12
Amble Drive	ST-12	3 1/2	7	10 1/2
	ST-13	3 3/4	12	15 ¾
	ST-14	3 3/4	9 1/2	13 1/4
	ST-15	6 1/2	1	7 1/2
	ST-16	5 1/2	7	12 1/2

Street	Boring/Core Locations	Bituminous Thickness (in.)	Aggregate Base Thickness (in.)	Overall Pavement Thickness (in.)
Cummings Park Drive	ST-17	5 1/4	13	18 1/4
	ST-18	4 1/4	11	15 1/4
	ST-19	4 1/4	8	12 1/4
Karth Lake Trail*	T-1	1 3/4	2	3 3/4
	T-2	Not Encountered	2	2
	T-3	2 1/4	2	4 1/4
	T-4	1 1/4	2	3 1/4

*Pavement cores performed in bituminous trail (Karth Lake Trail).

B.4. Boring Results

Table 3 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 3.

Table 3. Subsurface Profile Summary

Strata	Soil Type - ASTM Classification	Range of N-Values	Commentary and Details
Pavement section	---	---	▪ Reference Table 2 above for pavement section thicknesses.
Fill	SP-SM, SM, SC, CL	Weight of Hammer (WOH) to 25	▪ Extended to depths of about 2 to 11 feet (boring termination depth) below existing grade. ▪ Highly variable, soils intermixed. ▪ Slightly organic layers encountered within Borings ST-1 and ST-14. ▪ Moisture condition generally moist.
Glacial deposits	SM, SC, CL, ML	7 to 50	▪ Variable amounts of gravel; has the potential to contain cobbles and boulders. ▪ Generally consists of CL. ▪ SC encountered below the fill within Boring ST-2. ▪ ML encountered below the fill within Boring ST-6. ▪ SM encountered below the fill within Boring ST-8. ▪ Moisture condition generally moist.

For simplicity in this report, we define fill to mean existing, uncontrolled or undocumented.

B.5. Groundwater

We did not observe groundwater while performing our borings. Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes, in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers. Project planning should anticipate seasonal and annual fluctuations of groundwater.

B.6. Laboratory Test Results

We performed various laboratory tests on select soil samples to aid us in our evaluation. The Log of Boring sheets attached in the Appendix presents the results. Table 4 provides the range of results for the moisture contents, percent passing the #200 sieve, organic contents and Atterberg limits.

Table 4. Laboratory Classification Test Results

Laboratory Test	Range of Results	Comments
Moisture content (MC) tests, % (per ASTM D2216)	Cohesionless soils: 2 to 15 Cohesive soils: 11 to 26	Coarse-grained soils were typically dry to near the soil's probable optimum moisture content. Fine-grained soils were generally moist but anticipated to be at- to slightly-above the probable optimum moisture content.
Organic content (OC) tests, % (per ASTM D2974)	2	Considered slightly organic as classified by MnDOT definitions.
Percent of particles passing the #200 Sieve, % (per ASTM D1140)	2 to 17	USCS Classifications: SP, SP-SM, SM
Atterberg Limits (AL), % (per ASTM D4318)	Liquid Limit (LL) – 22 Plastic Limit (PL) – 17 Plasticity Index (PI) – 5	USCS Classification: CL-ML

C. Recommendations

C.1. Design and Construction Discussion

The recommendations provided herein are based on the information provided to us at the time of this report. As the project progresses through final design or elements of the project are adjusted, we should revisit our recommendations.

References to the MnDOT Specification in this report are to Minnesota Department of Transportation (MnDOT) Standard Specification for Construction, 2025 edition.

C.1.a. Rehabilitation Methods

Based on our understanding that the 2026 PMP will utilize either mill and overlay or full depth reclamation (FDR), Table 5 presents our recommended pavement rehabilitation method for each of the identified roads.

Table 5. Proposed Rehabilitation Approach

Rehabilitation Method	Location
Mill-and-Overlay	▪ Karth Lake Circle
Full-Depth Reclamation (FDR)	▪ Karth Lake Drive ▪ Amble Drive ▪ Amble Circle ▪ Pleasant Drive ▪ Pleasant Circle ▪ Cummings Park Drive

We understand that the recommended rehabilitation methods presented in Table 5 matches the planned rehabilitation methods the City was proposing.

C.1.b. Karth Lake Park Trail

We understand that Karth Lake Park Trail is also being considered for FDR as part of this rehabilitation project. With the encountered thin trail pavement section, we anticipate it will likely be difficult to perform an FDR and recommend stripping the bituminous, adding aggregate base and repaving on this project.

Refer to Section C.5 for additional recommendations on Karth Lake Trail.

C.1.c. Reuse of Pavement Materials

From a materials perspective, milling or reclamation of the bituminous pavement materials for reuse as recycled aggregate base or as a component to new pavements is acceptable assuming the produced products meet the applicable project specifications, and these practices are acceptable to the City. Prior to reuse, the project should implement thorough quality control practices, including frequent sieve analyses, asphalt contents and other tests, to achieve desirable characteristics for any reclaimed material processed on site.

C.1.d. Reuse of On-Site Soils

Based on the completed laboratory testing program, the existing non-organic soils (both the naturally deposited soils and fill soils) on-site are generally considered suitable for reuse as engineered fill soil following moisture conditioning and compaction as outlined in this report. If encountered, organic fill soils are not considered suitable for reuse as engineered fill. Any materials to be used as engineered fill should be tested and approved by the engineer prior to placement.

C.1.e. Groundwater

Water was not encountered in any of the borings completed for this project. Groundwater may fluctuate in response to both seasonal and annual rainfall events. Surface runoff can collect in open excavation if left open during wet weather. If encountered, the water should be removed from excavations during construction and prior to placement of any utility structures.

C.1.f. Construction Disturbance

The existing soils encountered on-site, including clay-based soils, are highly susceptible to loss of strength when subjected to additional moisture or disturbance. The contractor should take precautions to limit the disturbance of these soils to the extent practical within the utility trench excavations. If disturbed, there is the potential that an additional subcut of these soils to depths of 2 to 3 feet may be necessary to re-establish a stable base for placement of engineered fill. In addition, a layer of stabilizing aggregate may be necessary to provide a stable working surface for construction.

C.2. Site Grading and Subgrade Preparation

We understand that as part of the 2026 pavement management project, there may be spot utility repairs in areas where FDR is to occur. The following sections under Section C.2 provide general site grading and subgrade preparation recommendations.

C.2.a. Utility Subgrade Stabilization

We anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

Where soft/loose or organic soils are encountered below utility inverts, we recommend subcutting a minimum of 1-foot and replacing with crushed rock to help provide a stable working platform.

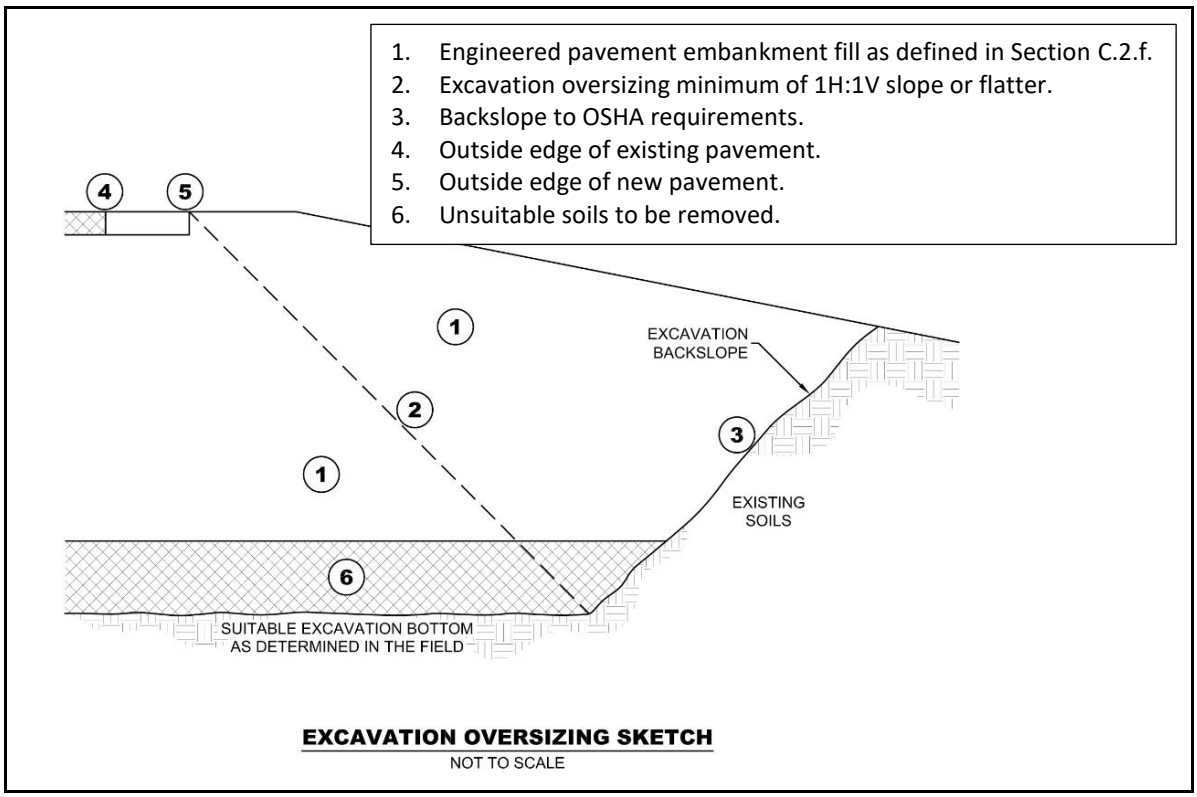
C.2.b. Corrosion Potential

Based on our experience, the soils encountered by the borings are moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.2.c. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 3 for an illustration of excavation oversizing.

Figure 3. Generalized Illustration of Oversizing



C.2.d. Excavated Slopes

Based on the borings, we anticipate most of the on-site soils in excavations will consist of fill sands and clays. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 1/2H:1V. Slopes constructed in this manner may still exhibit surface sloughing.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.e. Excavation Dewatering

We recommend removing groundwater that collects within excavations from rainfall events and/or surface runoff. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as clays. Where granular soils are encountered at invert elevations, the design team may want to consider additional means and methods for removing groundwater, as sumps and pumps have the potential to loosen the granular soils at excavated bottoms.

C.2.f. Engineered Fill Materials and Compaction

Most on-site soils appear suitable for reuse as engineered fill within pavement subgrades and utility trenches, although some moisture conditioning may be required (drying or wetting of materials). If encountered, topsoil and soils with organic contents of greater than 5 percent by weight should not be reused as pavement subgrade or utility trench backfill anywhere on the project. Organic soils can be stockpiled for use as a component in topsoil dressing, side slopes or in other areas where loads are not supported. Any materials to be reused as engineered fill should be tested and approved by the engineer prior to reuse.

We recommend that subgrade fill materials and compaction are in accordance with the MnDOT specifications presented in Table 6.

Table 6. Engineered Fill Materials and Compaction Specifications

Material	Material Specification	Compaction Specification
Embankment fill, Utility trench backfill	Common Embankment MnDOT 2106.2.B.1	MnDOT 2106.3.G.1
Pavement subbase	Select Granular Material MnDOT 3149.2.B	MnDOT 2106.3.G.3
Below landscaped surfaces, where subsidence is not a concern	Non-Structural Grading Material MnDOT 2106.1.A.8	MnDOT 2106.3.G.2

We recommend spreading engineered fill in loose lifts of approximately 8 to 12 inches thick for granular soils and for cohesive soils, we recommend spreading in loose lifts of approximately 6 to 8 inches thick.

We recommend performing moisture and density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

C.3. Full-Depth Reclamation

We understand that the FDR is proposed for the areas presented in Table 5. For the proposed FDR on the residential streets, for reuse of pavement materials by reclamation, we recommend a 10-inch FDR for most of the project streets. Due to the thinner pavement section and clayey subgrade, we recommend the FDR depth be reduced to 8 inches on Karth Lake Circle, Amble Circle, and Pleasant Circle between Lexington Avenue and Pleasant Drive. To place the full aggregate base section in these areas, an additional removal of 2 inches of subgrade material may be needed. Based on the measurements from the borings and pavement cores, this generally will avoid subgrade soils. If there are areas where subgrade may be penetrated due to a thinner pavement section, we recommend reducing the mill depth to the top of subgrade and excavating to the design depth of the pavement section.

We recommend implementing through quality control practices, including frequent sieve analyses, to achieve a desirable gradation of the reclaimed material. The gradation requirements of MnDOT Specification 2215 (Reclamation) or Specification 3138 (Aggregate for Surface and Base Courses) can be used for the aggregate base; the latter specification's controls on gradation and asphalt content are stricter and will generally be more difficult to meet. We suggest the contractor assume some contingency for importing clean, crushed rock that can be blended with the reclaimed material to improve the uniformity of the resulting gradation prior to reuse as an aggregate base.

For the Karth Lake Trail, we understand the intent was to reclaim the trail and repave. Understanding the trail had limited pavement and aggregate base present, we recommend stripping the pavement adding additional aggregate to the existing apparent aggregate base and then placing new pavement for the trail. See section C.5 for recommendations with regards to the trail.

C.3.a. Full-Depth Reclamation Preparation

We recommend the following steps for pavement reclamation preparation, understanding the new pavements will match existing grades.

1. Reclaim the pavement as recommended under Section C.3., stockpile and/or redistribute excess reclaim material as necessary to construct the new pavement sections.

2. Once the roadway section is cut to grade, have a geotechnical engineer or their representative observe the top of reclaim material (and/or subgrade if material below reclaim becomes exposed or wet) to evaluate if additional improvements are necessary.

C.3.b. Full-Depth Reclamation Design Section

For the FDR process, the pavement should generally follow Table 7.

Table 7. Proposed Bituminous Pavement Section

Material	Thickness (inches)	Material	Material Specification
Bituminous wear course	1 1/2	SPWEA340C	MnDOT 2360
Bituminous wear course	2 1/2	SPWEB330C	MnDOT 2360
Aggregate base	6	Reclaim*	MnDOT 2215
Aggregate base	Varies	---	Residual aggregate base
Approved subgrade	---	---	---

*Where reclaim is removed for spot utility repair, material specification will generally follow MnDOT 2211, class 5 material.

C.3.c. Bituminous Pavement Materials and Compaction

We recommend that the bituminous wear and non-wear courses meet the requirements of Specifications 2360.

We recommend compacting the aggregate base to meet the requirements of MnDOT Specification 2211.3.D.2.c (Penetration Index Method for the dynamic cone penetrometer [DCP]). We recommend compacting bituminous pavements to at least 92 percent of their maximum theoretical (Rice) density.

C.3.d. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

Many conditions affect the overall performance of pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.3.e. Miscellaneous Bituminous Recommendations

When placing new pavement next to in-place pavement, we recommend providing a full-depth sawcut to ensure a uniform joint.

We recommend tack coat between all bituminous layers and prior to placing any bituminous mixtures on existing pavement in accordance with MnDOT Specification 2357.

C.4. Mill-and-Overlay

We recommend milling the pavements for Karth Lake Circle in accordance with MnDOT Specification 2232. The mill depth will vary based on conditions encountered but should be a minimum depth of 2 1/2 inches. Following the milling, place a 2 1/2-inch bituminous overlay meeting bituminous wear course mix SPWEA340B (MnDOT Material Specification 2360). Pavement depth can vary between the boring and core locations. The contractor may need to adjust the mill depth to account for unexpected conditions such as areas of thin pavement.

The surface condition prior to milling can indicate where deeper repairs to the milled surface may be necessary to improve the life of the overlay. This includes distresses such as severe longitudinal and transverse cracking, alligator/fatigue cracking of any severity, potholes, edge cracking, and similar failures. MnDOT defines these distresses in their surface rating procedure as follows:

- High-severity transverse cracking: Any crack running transverse to the centerline of the roadway with significant adjacent random cracking (12 inches or more apart), have large areas of spalling, missing material and/or potholes.

- High-severity longitudinal cracking: Any crack running parallel to the centerline of the roadway with significant adjacent random cracking (12 inches or more apart), large areas of spalling, missing material and/or potholes.

- Alligator cracking: A series of interconnected cracks forming many-sided, sharp-angled pieces, 6 inches or less in size, typically located in the wheel paths and under concentrated traffic loads.

We recommend an experienced engineer walk the milled surface to delineate areas for these repairs based on conditions exposed by the milling process. We recommend performing the full-depth mill to at least 1 foot beyond the edge of the visible distresses where present.

C.5. Karth Lake Park Trail

We understand that Karth Lake Park Trail is not anticipated to touch the subgrade and will be limited to removal of existing bituminous pavement, placing additional aggregate base down and then repaving. The following subsections provide general recommendations for this work.

C.5.a. Base Grade Proofroll

After preparing the aggregate base, we recommend proofrolling the aggregate base with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. If the aggregate base proofroll shows signs of distress, possible options could be to correct the subgrade which could include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. If subgrade corrections occur, we recommend performing a second proofroll after the aggregate base material is in place (where aggregate base was removed), and prior to placing bituminous pavement.

C.5.b. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar _ soils anticipated at the pavement subgrade elevation, we recommend pavement design assume an R-value of _. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value. Table X provides recommended pavement sections, based on the soils support and traffic loads.

Table 8. Proposed Bituminous Trail Pavement Section – Karth Lake Trail

Material	Thickness (inches)	Material	Material Specification
Bituminous wear course	1 1/2	SPWEA240C	MnDOT 2360
Bituminous wear course	2	SPWEB230C	MnDOT 2360
Aggregate base	6*	Class 5 or 6	MnDOT 2211
Approved subgrade	---	---	---

*Could potentially incorporate residual apparent aggregate base on-site from existing section, depending on site observations.

For recommendations on bituminous pavement materials, compaction, performance and maintenance, and miscellaneous bituminous recommendations, please refer to sections C.3.c., C.3.d. and C.3.e, respectively.

D. Procedures

D.1. Ground Penetrating Radar

D.1.a. Data Collection

GPR data was collected in May of 2025. GPR collection occurred at posted speed limits and data was recorded continuously along the pavement to a depth of up to 2 feet. Analysis of this data provides a continuous estimate of layer thickness for identifiable layers.

Scans of the pavement were collected according to GSSI, Inc. (manufacturer) SIR-30 processor settings at a specified interval of approximately one scan per lineal foot in the outer wheel path. A calibration file, required for data post-processing, was collected at the onset of testing. The RoadScan system from GSSI, Inc. allows for the entry of user marks to note events. This capability was used to mark and tie in core locations. Distance along the pavement is measured using a Distance Measuring Instrument (DMI).

D.1.b. GPR Analysis

Data collected by the GPR unit was returned to our office and analyzed to estimate the pavement thickness. Pavement layer interpretation was accomplished using RADAN 7.0, a software package included with the GSSI RoadScan system. The software includes tools to aid in delineating pavement layer transitions and automatically calculates their depths from the pavement surface using the calibration file(s) collected prior to or following testing.

Where “ground-truth” data (cores and hand augers) were performed, the interpreted layers from the GPR scan were compared directly to the measured thicknesses from the borings to validate the accuracy of the GPR analysis.

D.2. Pavement Coring and Hand Auger Borings

We performed pavement cores and hand auger borings in April of 2025. Exploration locations were selected based on GPR results. The coring was performed with a 6-inch diameter diamond-toothed core barrel fitted on a mechanically operated rotary drill. From the top of the apparent aggregate base layer, we extended a manually operated hand auger through the base layer and into the subgrade layer. Upon completion of the pavement cores and hand augers, we then performed our penetration test borings.

The cores were measured to obtain approximate bituminous thicknesses, and their material conditions were noted based on visual observation. A sample of underlying base material was obtained at each of the exploration locations and was sent to our laboratory for review by a geotechnical engineer.

D.3. Penetration Test Borings

We drilled the penetration test borings with a GeoProbe-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples continuously to a depth of 6 feet below existing grade, then at 2 1/2-foot intervals in general accordance to ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

D.4. Exploration Logs

D.4.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.4.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.5. Material Classification and Testing

D.5.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.5.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM procedures.

D.6. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or allowed them to remain open for an extended period of observation, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

200' 0 400'

SCALE: 1"= 400'

F:\2025\B2502087\CAD\B2502087.dwg,Overall,4/22/2025 2:54:25 PM

BRAUN INTERTEC
The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:	B2502087
Drawing No:	B2502087
Drawn By:	JAG
Date Drawn:	3/25/25
Checked By:	ZTS
Last Modified:	4/22/25

Project Information

City of Areden Hills
2026 PMP Street and Utility Improvements

Bounded by Highway 96, Lexington Avenue N., Cummings Park Drive and Hamline Avenue

Arden Hills, Minnesota

Soil Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-1**
LOCATION: Estimated
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204792 EASTING: 558427
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 965.0 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
964.1		PAVEMENT, 5 1/2 inches of bituminous over 5 inches of apparent aggregate base					
0.9		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown, moist		2-4 (4) 12"			
				3-8-6-9 (14) 19"		17	
			5	3-5-7-10 (12) 20"			
958.0							
7.0		FILL: LEAN CLAY (CL), trace Gravel, trace roots, slightly organic, bluish gray to brown, moist		2-5-7 (12) 14"		21	OC=2%
			10	3-4-8 (12) 17"			
954.0							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-2**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204660.4 EASTING: 558700.9
START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 967.0 ft
DRILLER: M. Barber
LOGGED BY: Z. Semlak
RIG: GP-1
METHOD: 3 1/4" HSA
SURFACING: Bituminous
WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
966.4		PAVEMENT, 3 3/4 inches of bituminous over 4 inches of apparent aggregate base					
0.6		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown, moist	AU			11	
		Light brown to reddish brown at 2 feet		2-2-3-5 (5) 18"			
963.0							
4.0		CLAYEY SAND (SC), trace Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)		2-7-8-10 (15) 24"		15	LL=30, PL=16, PI=14
			5	5-9-14 (23) 16"			
			10	6-8-13 (21) 18"			
956.0							
11.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			15				
			20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-3**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204314.2 EASTING: 558858.4
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 968.7 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
967.7		PAVEMENT, 9 1/4 inches of bituminous over 3 inches of apparent aggregate base					
1.0		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown to dark brown, moist *Reddish brown to brown at 2 feet*		1-3 (3) 10"		13	
				1-3-5-7 (8) 15"			
5				4-5-6-7 (11) 10"		13	
				1-2-4 (6) 13"			
10				1-2-3 (5) 9"			
957.7							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
15							
20							
25							
30							

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Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-4**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204899.6 EASTING: 559146.8
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 957.6 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
956.6		PAVEMENT, 6 1/2 inches of bituminous over 6 inches of apparent aggregate base		4-7 (7) 12"			
1.0		FILL: CLAYEY SAND (SC), trace Gravel, with Silty Sand seams, brown, moist					
955.6		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, with SANDY LEAN CLAY layers, brown, moist		6-5-7-7 (12) 15"		7	
2.0		*SILTY SAND layers at 4 feet*	5	7-8-9-9 (17) 14"			
951.6		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, with Sandy Lean Clay seams, brown, moist		9-7-9 (16) 12"		7	
6.0		*Sandy Lean Clay seams from 6 to 9 1/2 feet*	10	7-8-9 (17) 14"			
946.6							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-5**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204648.4 EASTING: 559669.9
START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 963.7 ft
DRILLER: M. Barber
LOGGED BY: Z. Semlak
RIG: GP-1
METHOD: 3 1/4" HSA
SURFACING: Bituminous
WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
962.1		PAVEMENT, 11 inches of bituminous over 8 inches of apparent aggregate base		2-2 (2) 12"		4	
1.6		FILL: SILTY SAND (SM), fine-grained, trace Gravel, dark brown, moist		0-0-1-2 (1) 10"			
961.7		FILL: SANDY LEAN CLAY (CL), brown, moist		0-1-4-3 (5) 12"		18	
2.0		SANDY LEAN CLAY (CL), brown, moist, medium to very stiff (GLACIAL TILL)		1-2-4 (6) 11"			
959.7				2-6-10 (16) 14"			
4.0							
952.7							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.

5
10
15
20
25
30

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-6**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204647.8 EASTING: 560226.8
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 946.8 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
945.4		PAVEMENT, 9 inches of bituminous over 8 inches of apparent aggregate base		6-9 (9) 12"		4	
1.4		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist		3-4-8-10 (12) 16"			
			5	5-5-6-7 (11) 18"			
939.8							
7.0		FILL: POORLY GRADED SAND (SP), fine to medium-grained, with Gravel, brown, moist		6-6-8 (14) 14"		1	P200=3%
936.8							
10.0		SANDY LEAN CLAY (CL), brown, moist, very stiff (GLACIAL TILL)	10	10-13-16 (29) 12"		17	LL=21, PL=15, PI=6
935.8							Water not observed while drilling.
11.0		END OF BORING Boring then backfilled with auger cuttings					
			15				
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2502087
Geotechnical Evaluation
City of Arden Hills 2026 Improvements
Hamline Avenue and Amble Road
Arden Hills, Minnesota

BORING: **ST-7**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204735.4 EASTING: 560671.3
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 946.4 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
945.4		PAVEMENT, 8 1/2 inches of bituminous over 5 inches of apparent aggregate base					
1.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		3-5 (5) 12"			
944.4		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist		13-14-11-9 (25) 18"		6	P200=5%
2.0		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		4-7-6-8 (13) 18"		5	
942.4				7-8-6 (14) 4"			
4.0		SANDY LEAN CLAY (CL), brown, moist, medium (GLACIAL TILL)		2-3-4 (7) 16"			
936.9							
9.5		END OF BORING					Water not observed while drilling.
935.4		Boring then backfilled with auger cuttings					
11.0							

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BORING: **ST-8**
LOCATION: Estimated
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204130 EASTING: 560693
START DATE: 04/01/25 END DATE: 04/01/25
DRILLER: M. Barber LOGGED BY: Z. Semlak
SURFACE ELEVATION: 950.7 ft RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
950.1		PAVEMENT, 5 1/2 inches of bituminous over 2 inches of apparent aggregate base		AU			
0.6		FILL: SILTY SAND (SM), fine-grained, with Clay seams, brown, moist		2-4-11-16 (15) 20"		5	
948.7		SILTY SAND (SM), fine to medium-grained, trace Gravel, reddish brown, moist, medium dense to dense (GLACIAL TILL)		14-15-32-25 (47) 24"		5	P200=24%
2.0			5				
				36-20-30 (50) 16"			
			10	13-10-15 (25) 18"			
939.7							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-9**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 203960.5 EASTING: 560277.7
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 956.5 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
954.9		PAVEMENT, 4 3/4 inches of bituminous over 14 inches of apparent aggregate base		7-9 (9) 12"		8	
1.6 954.5		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace Gravel, brown, moist		2-3-4-5 (7) 14"			
2.0		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown, moist *Bluish gray to brown and slightly organic seams at 4 feet*	5	1-3-5-7 (8) 14"		15	
949.5 7.0		FILL: LEAN CLAY (CL), slightly organic, with Silty Sand seams, dark brown to gray, moist		2-7-8 (15) 4"			
947.0 9.5		FILL: LEAN CLAY (CL), trace Gravel, gray to bluish gray, moist, iron oxide staining	10	1-2-3 (5) 8"			
945.5 11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-10**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204293.1 EASTING: 560825.3
START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 952.8 ft
DRILLER: M. Barber LOGGED BY: Z. Semlak
RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
952.0		PAVEMENT, 7 inches of bituminous over 3 inches of apparent aggregate base					
0.8		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown to dark brown, moist		4-6 (6) 10" 2-3-5-8 (8) 14"		14	
948.8							
4.0		SILTY SAND (SM), fine-grained, trace Gravel, with Clayey Sand seams, brown to reddish brown, moist, dense to very dense (GLACIAL TILL)	5	12-22-23-50/ 5" (45) 9" 43-29-34 (63) 15"			
943.4							
9.5		SANDY LEAN CLAY (CL), trace Gravel, brown to reddish brown, dry, hard (GLACIAL TILL)	10	46-34-31 (65) 16"			
941.8							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-11**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204294.4 EASTING: 560305.6
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/01/25 END DATE: 04/01/25
SURFACE ELEVATION: 953.1 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear/Rain

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
952.1		PAVEMENT, 8 inches of bituminous over 4 inches of apparent aggregate base					
1.0		FILL: CLAYEY SAND (SC), trace Gravel, reddish brown, moist		14-9 (9) 10"		9	
				6-8-9-14/6" (17) 19"		9	
			5	13-14-13-11 (27) 18"		10	P200=45%
				1-2-3 (5) 14"			
		Silty Sand seams at 9 1/2 feet	10	1-1-3 (4) 11"			
942.1							
11.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			15				
			20				
			25				
			30				

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BORING: **ST-12**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 204376.1 EASTING: 559774.4
START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 961.2 ft
DRILLER: M. Barber LOGGED BY: Z. Semlak
RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
960.4		PAVEMENT, 3 1/2 inches of bituminous over 7 inches of apparent aggregate base					
0.9		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, with Clayey Sand seams, dark brown, moist		8-7 (7) 12"		11	
959.2		FILL: LEAN CLAY (CL), trace Gravel, reddish brown, moist		2-3-5-6 (8) 18"			
2.0		LEAN CLAY (CL), with Sand, trace Gravel, reddish brown, moist, stiff (GLACIAL TILL)		4-5-8-10 (13) 18"		17	
957.2				3-5-7 (12) 18"			
4.0				4-6-8 (14) 18"			
950.2		END OF BORING					Water not observed while drilling.
11.0		Boring then backfilled with auger cuttings					

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BORING: **ST-13**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 203954.9 EASTING: 560059.7
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 957.0 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
955.7		PAVEMENT, 3 3/4 inches of bituminous over 12 inches of apparent aggregate base		4-4 (4) 12"		14	
1.3		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, moist		2-3-7-9 (10) 24"		11	P200=47%
955.0 2.0		FILL: CLAYEY SAND (SC), trace Gravel, slightly organic, with Silty Sand seams, dark brown, moist		4-7-11-16 (18) 24"			
952.0 5.0		LEAN CLAY (CL), with Sand, trace Gravel, reddish brown, moist to dry, very stiff (GLACIAL TILL)	5	4-13-17 (30) 18"		18	
			10	5-10-14 (24) 18"			
946.0 11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-14**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 203637.6 EASTING: 560427.2
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 954.8 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
953.8		PAVEMENT, 3 3/4 inches of bituminous over 9 1/2 inches of apparent aggregate base					
1.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist to wet		5-4 (4) 12"			
952.8		FILL: LEAN CLAY (CL), trace Gravel, slightly organic, bluish gray to gray, moist		1-2-3-4 (5) 10"		18	
2.0		*Slightly organic from 4 to 6 feet*					
		Brown with mottled gray at 4 feet	5	1-1-2-4 (3) 14"		24	OC=2%
947.8							
7.0		SANDY LEAN CLAY (CL), trace Gravel, light brown, moist, stiff to very stiff (GLACIAL TILL)		2-6-8 (14) 18"			
		Reddish brown at 10 feet	10	3-8-13 (21) 18"			
943.8							
11.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			15				
			20				
			25				
			30				

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BORING: **ST-15**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 203634.6 EASTING: 560741.0
DRILLER: M. Barber LOGGED BY: Z. Semlak START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 957.4 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
956.8		PAVEMENT, 6 1/2 inches of bituminous over 1 inches of apparent aggregate base					
0.6		FILL: SANDY LEAN CLAY (CL), trace Gravel, reddish brown, moist		2-2 (2) 12"		16	
				0-0-0-0 WOH/ 13"			
952.4							
5.0		SANDY LEAN CLAY (CL), trace Gravel, reddish brown, moist, medium to very stiff (GLACIAL TILL)	5	1-1-5-8 (6) 24"		16	
				3-6-8 (14) 18"			
			10	4-9-13 (22) 18"			
946.4							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-16**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 203337.0 EASTING: 560784.2
START DATE: 04/02/25 END DATE: 04/02/25
SURFACE ELEVATION: 957.0 ft
RIG: GP-1
METHOD: 3 1/4" HSA
SURFACING: Bituminous
WEATHER: Clear
DRILLER: M. Barber
LOGGED BY: Z. Semlak

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
956.0		PAVEMENT, 5 1/2 inches of bituminous over 7 inches of apparent aggregate base		AU			
1.0		FILL: SILTY SAND (SM), fine to coarse-grained, with Clayey Sand seams, dark brown, moist		1-2-3-5 (5) 16"		10	
955.0 2.0		FILL: SANDY LEAN CLAY (CL), with POORLY GRADED SAND WITH SILT layers, gray to brown, moist		4-7-9-11 (16) 19"			
953.0 4.0		LEAN CLAY (CL), with Sand, trace Gravel, reddish brown, moist, very stiff (GLACIAL TILL)	5				
				3-6-11 (17) 18"		16	
			10	5-9-13 (22) 18"			
946.0 11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-17**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 201795.7 EASTING: 559657.6
DRILLER: J. Vloo LOGGED BY: Z. Semlak START DATE: 04/03/25 END DATE: 04/03/25
SURFACE ELEVATION: 1002.1 ft RIG: 7519 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1000.6		PAVEMENT, 5 1/4 inches of bituminous over 13 inches of apparent aggregate base		8-11 (11) 12"			
1.5		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Silt lenses, brown, moist		10-8-6-7 (14) 14"		10	
998.1							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		8-7-6 (13) 16"			
			5	6-5-6 (11) 16"		16	
			10	4-5-7 (12) 16"			
991.1							
11.0		END OF BORING Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				
			30				

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BORING: **ST-18**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 201788.2 EASTING: 560271.1
DRILLER: J. Vloo LOGGED BY: Z. Semlak START DATE: 04/03/25 END DATE: 04/03/25
SURFACE ELEVATION: 1007.4 ft RIG: 7519 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1006.1		PAVEMENT, 4 1/4 inches of bituminous over 11 inches of apparent aggregate base					
1.3		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist		4-3 (3) 12"		11	
1005.4		SANDY LEAN CLAY (CL), trace Gravel, brown to reddish brown, moist, medium to very stiff (GLACIAL TILL)		3-2-2-5 (4) 14"			
2.0				5-6-8-8 (14) 14"		15	
				5-7-10 (17) 16"			
		Reddish brown at 9 1/2 feet		10-7-10 (17) 14"			
996.4							
11.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					

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BORING: **ST-19**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Ramsey (US Feet)
NORTHING: 201810.6 EASTING: 560737.5
DRILLER: J. Vloo LOGGED BY: Z. Semlak START DATE: 04/03/25 END DATE: 04/03/25
SURFACE ELEVATION: 1000.5 ft RIG: 7519 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
999.5		PAVEMENT, 4 1/4 inches of bituminous over 8 inches of apparent aggregate base					
1.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, dry		7-7 (7) 12"		4	P200=6%
		Clay lenses at 3 feet		8-9-8-10 (17) 16"			
996.5							
4.0		SANDY LEAN CLAY (CL), brown, moist, stiff to very stiff (GLACIAL TILL)		11-9-8-6 (17) 14"		19	
			5	7-6-7 (13) 14"			
			10	6-10-9 (19) 16"			
989.5							
11.0		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			15				
			20				
			25				
			30				

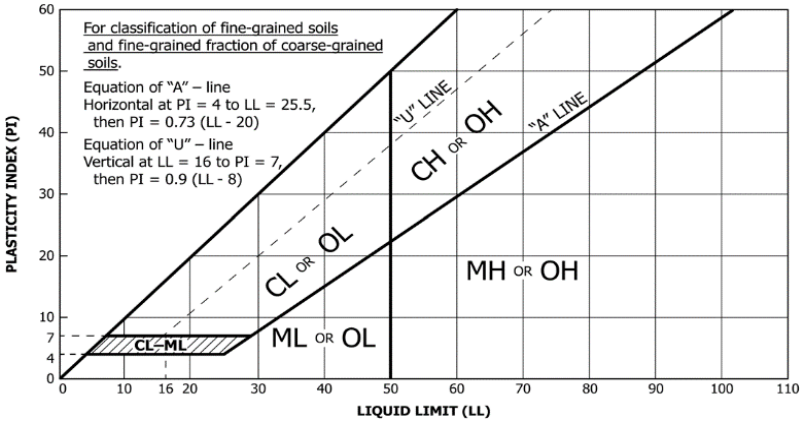
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Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3$[D]	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3$[D]	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried < 0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried < 0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

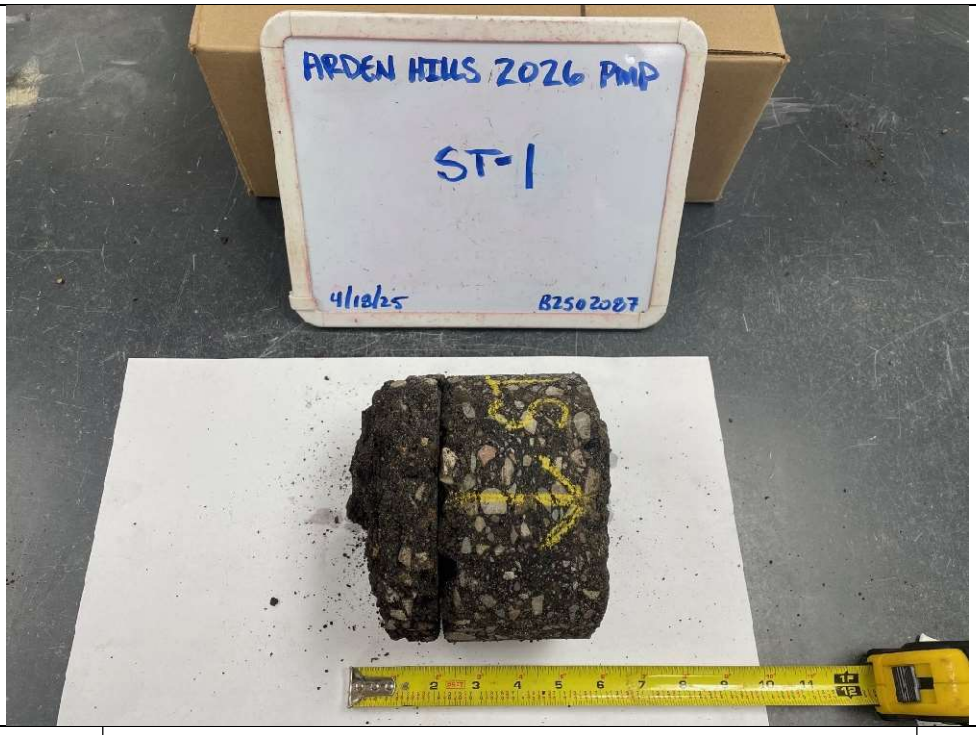
WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (⧩).

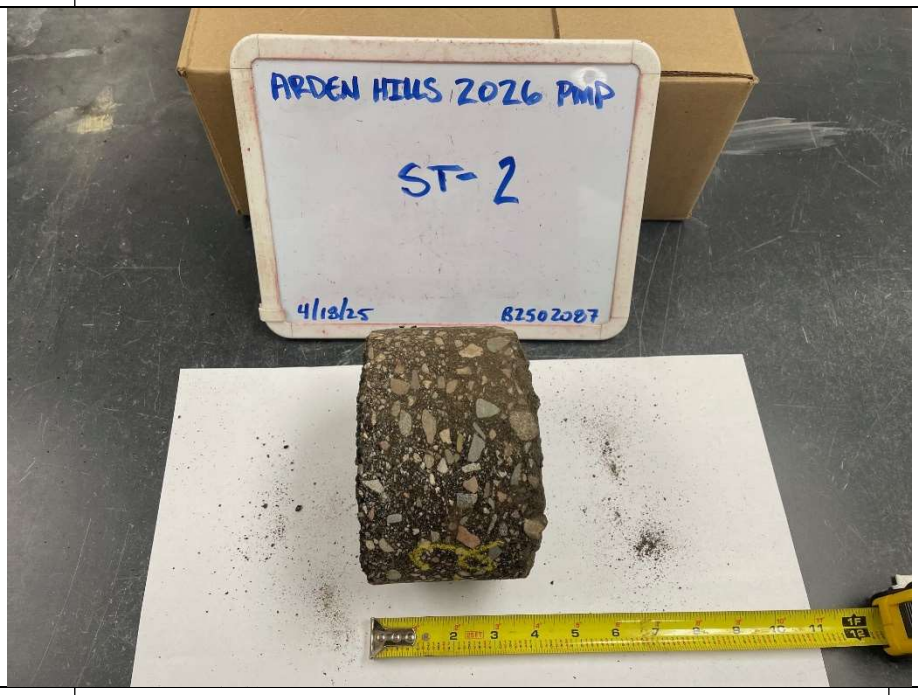
Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer

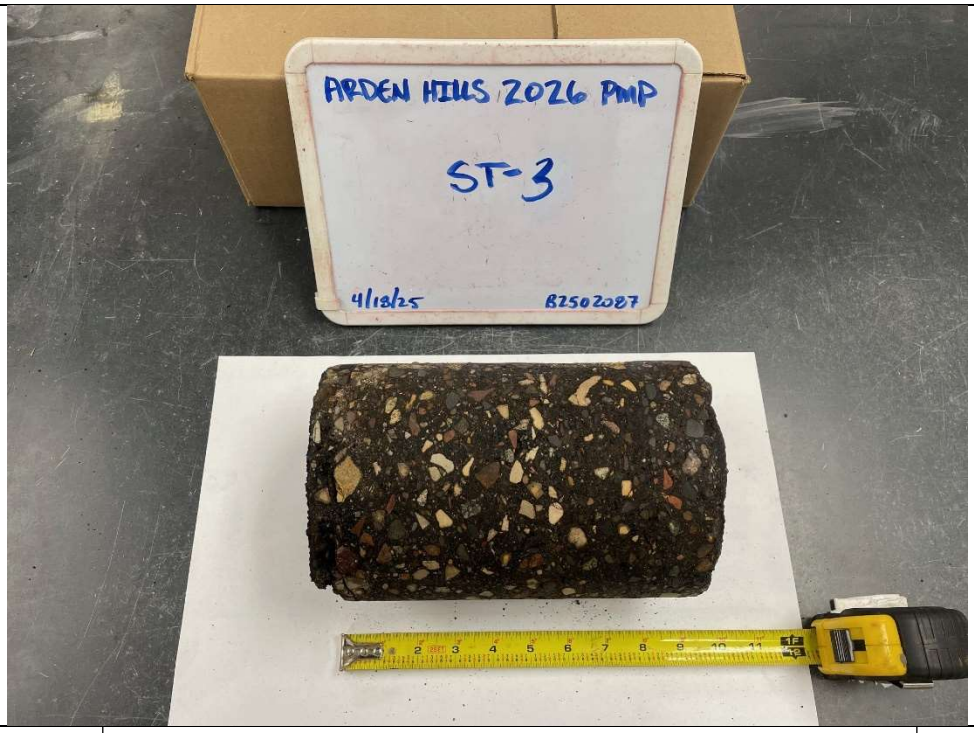
5/2021



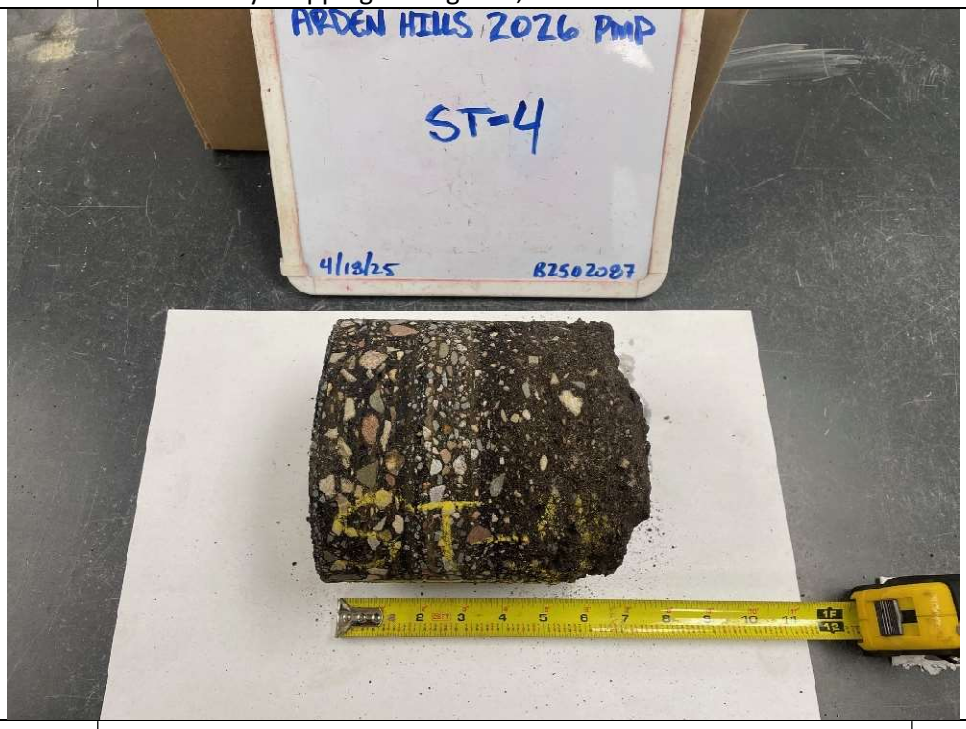
Core #:	ST-1			Project: B2502087
Pavement thickness	5 1/2 inches	Agg base thickness:	5 inches	BRAUN INTERTEC
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Upper 2” high deterioration; Debonded at 2”; Low severity stripping in bottom 3 1/2 inches.			



Core #:	ST-2			Project: B2502087
Pavement thickness	3 3/4 inches	Agg base thickness:	4 inches	BRAUN INTERTEC
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Good condition. Surface has chip seal.			



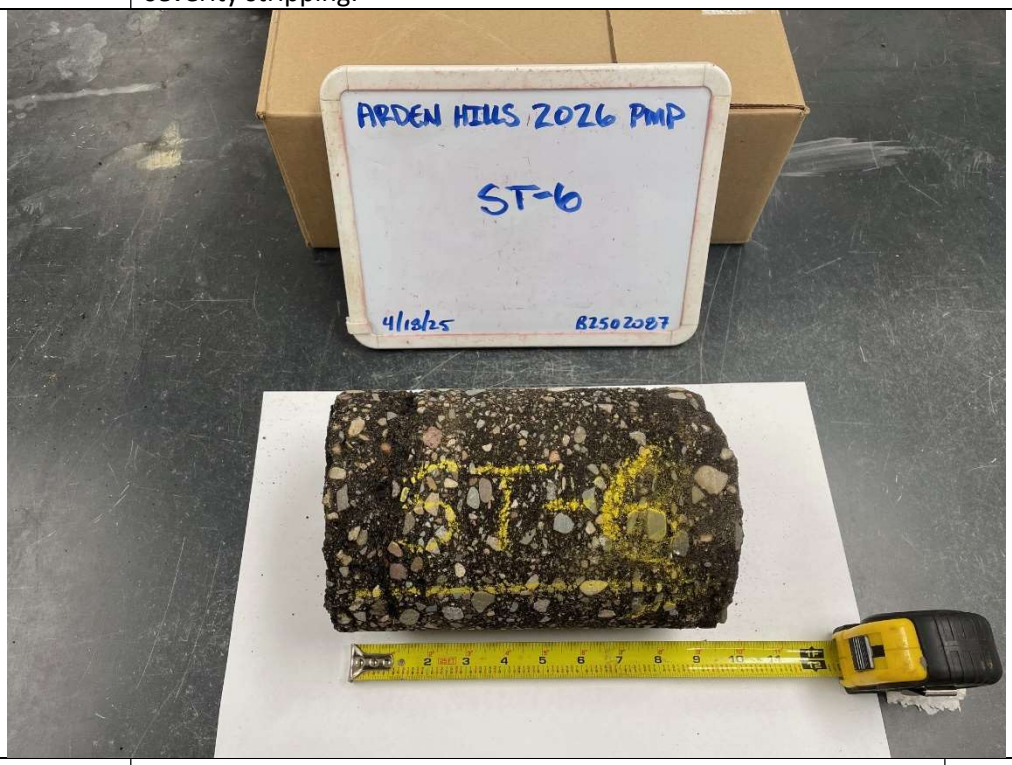
Core #:	ST-3			Project: B2502087
Pavement thickness	9 1/4 inches	Agg base thickness:	3 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Low severity stripping throughout; Surface distress.			



Core #:	ST-4			Project: B2502087
Pavement thickness	6-1/2 inches	Agg base thickness:	6 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	September 16, 2024			
Notes:	Low to high severity stripping throughout.			



Core #:	ST-5		Project: B2502087
Pavement thickness	11 inches	Agg base thickness:	8 inches
Project Name:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	**Pavement core crumbled at the bottom. Hole measured to 11”. Upper 4 1/4", low severity stripping.		



Core #:	ST-6		Project: B2502087
Pavement thickness	9 inches	Agg base thickness:	8 inches
Location:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Moderate severity throughout; Deterioration about 1 1/2 inches.		



Core #:	ST-7			Project: B2502087
Pavement thickness	8 1/2 inches	Agg base thickness:	5 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Upper 4 1/2 inches, good condition; Bottom 4 inches, low to moderate severity stripping.			



Core #:	ST-8			Project: B2502087
Pavement thickness	5 1/2 inches	Agg base thickness:	2 inches	
Location:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Debonded at 2 1/4 inches; Upper 2 1/4 inches high deterioration; Bottom 3 1/4 inches, low severity stripping.			



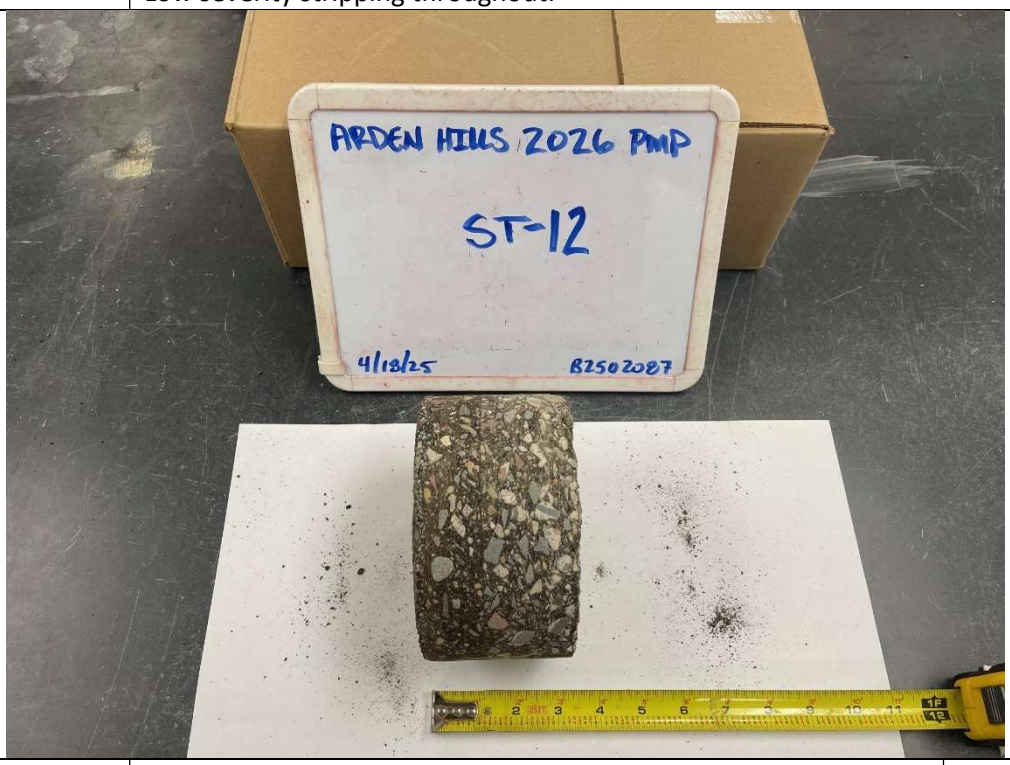
Core #:	ST-9			Project: B2502087
Pavement thickness	4 3/4 inches	Agg base thickness:	14 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Surface distress; Good core condition;			



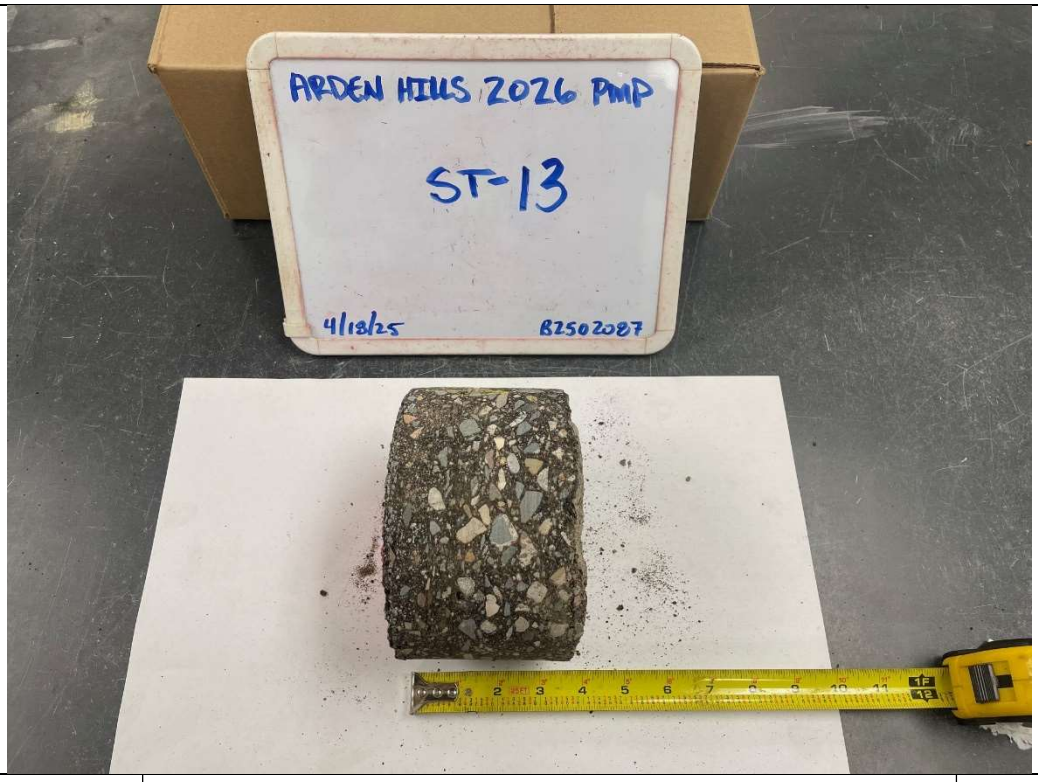
Core #:	ST-10			Project: B2502087
Pavement thickness	7 inches	Agg base thickness:	3 inches	
Location:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Good condition.			



Core #:	ST-11			Project: B2502087
Pavement thickness	8 inches	Agg base thickness:	4 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Low severity stripping throughout.			



Core #:	ST-12			Project: B2502087
Pavement thickness	3 1/2 inches	Agg base thickness:	7 inches	
Location:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Good condition.			



Core #:	ST-13		Project: B2502087
Pavement thickness	3 3/4 inches	Agg base thickness:	12 inches
Project Name:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



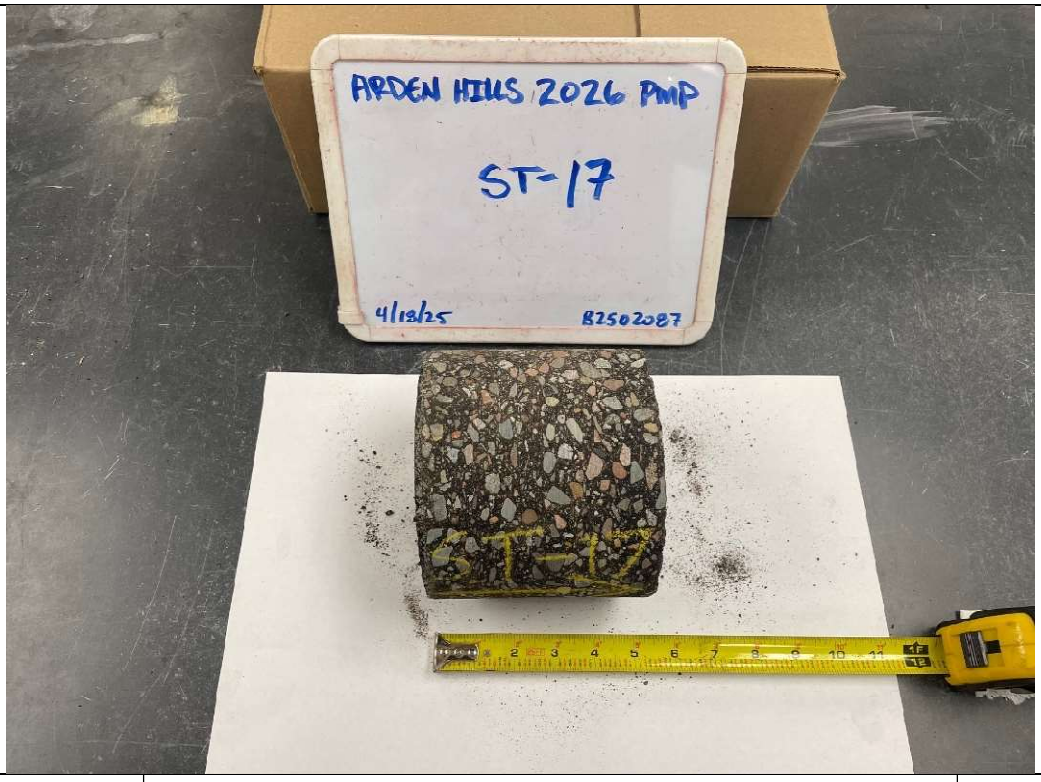
Core #:	ST-14		Project: B2502087
Pavement thickness	3 3/4 inches	Agg base thickness:	9 inches
Location:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



Core #:	ST-15			Project: B2502087
Pavement thickness	6 1/2 inches	Agg base thickness:	1 inches	
Project Name:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Upper 3 1/2 inches, good condition; Surface deterioration; Debonded at 3 1/2 inches; Bottom 3 inches, high deterioration.			



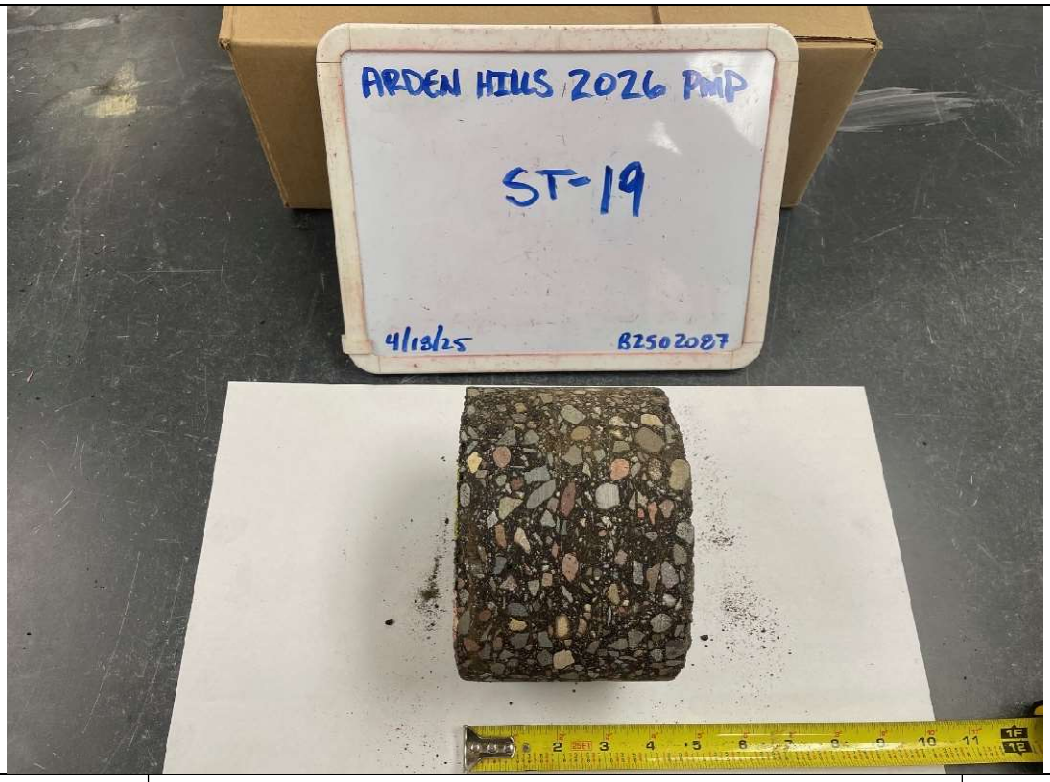
Core #:	ST-16			Project: B2502087
Pavement thickness	5 1/2 inches	Agg base thickness:	7 inches	
Location:	Arden Hills 2026 PMP			
Date:	April 1, 2025			
Notes:	Upper 3 inches, high deterioration; Bottom 2 1/2 inches, low severity stripping.			



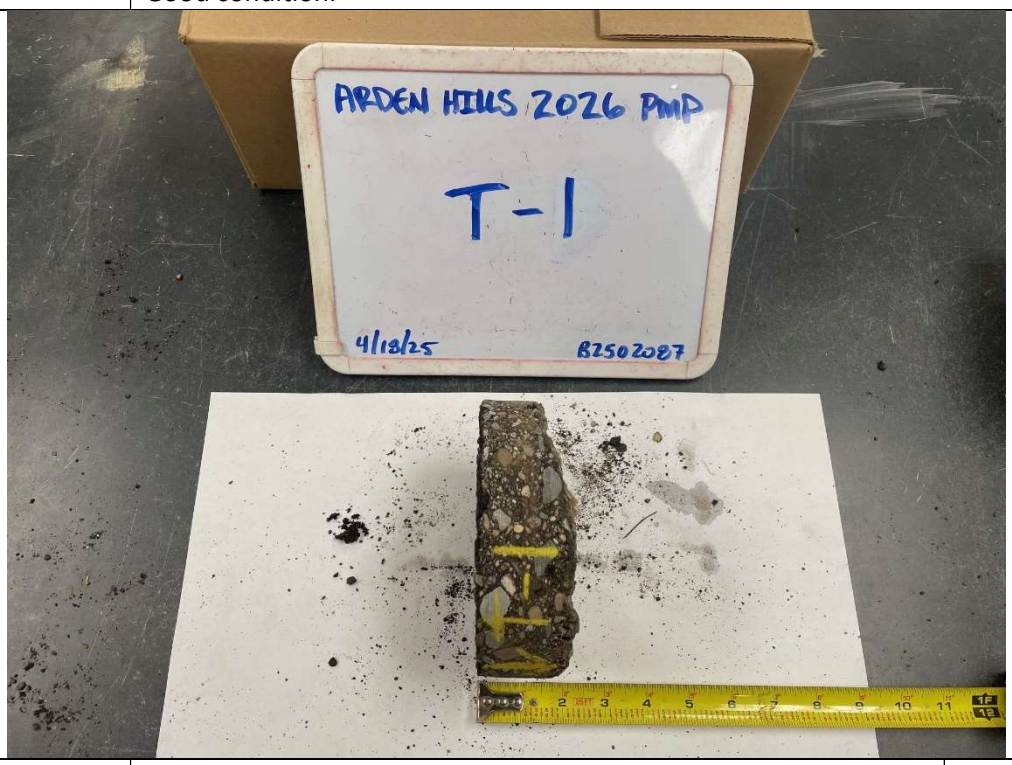
Core #:	ST-17		Project: B2502087
Pavement thickness	5 1/4 inches	Agg base thickness:	7 inches
Project Name:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



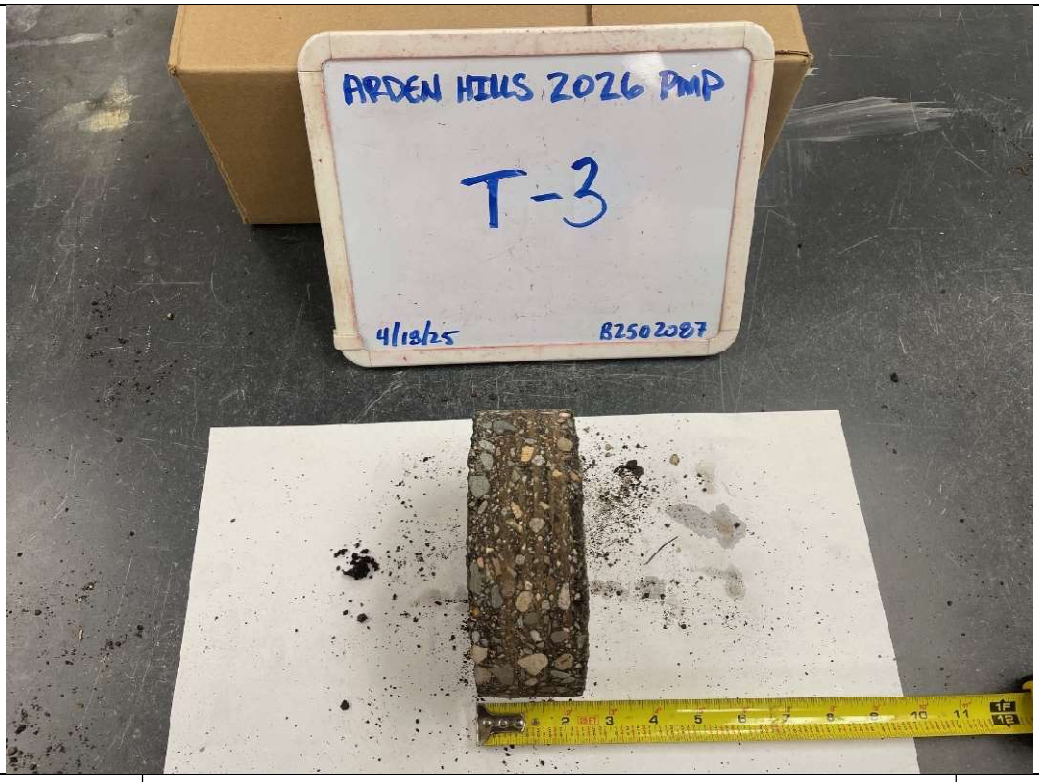
Core #:	ST-18		Project: B2502087
Pavement thickness	4 1/4 inches	Agg base thickness:	11 inches
Location:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



Core #:	ST-19		Project: B2502087
Pavement thickness	4 1/4 inches	Agg base thickness:	8 inches
Project Name:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



Core #:	T-1		Project: B2502087
Pavement thickness	1 3/4 inches	Agg base thickness:	2 inches
Location:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



Core #:	T-3		Project: B2502087
Pavement thickness	2 1/4 inches	Agg base thickness:	2 inches
Project Name:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Good condition.		



Core #:	T-4		Project: B2502087
Pavement thickness	1 1/4 inches	Agg base thickness:	2 inches
Location:	Arden Hills 2026 PMP		
Date:	April 1, 2025		
Notes:	Low severity stripping.		

Bituminous GPR Results - Arden Hills 2026 PMP

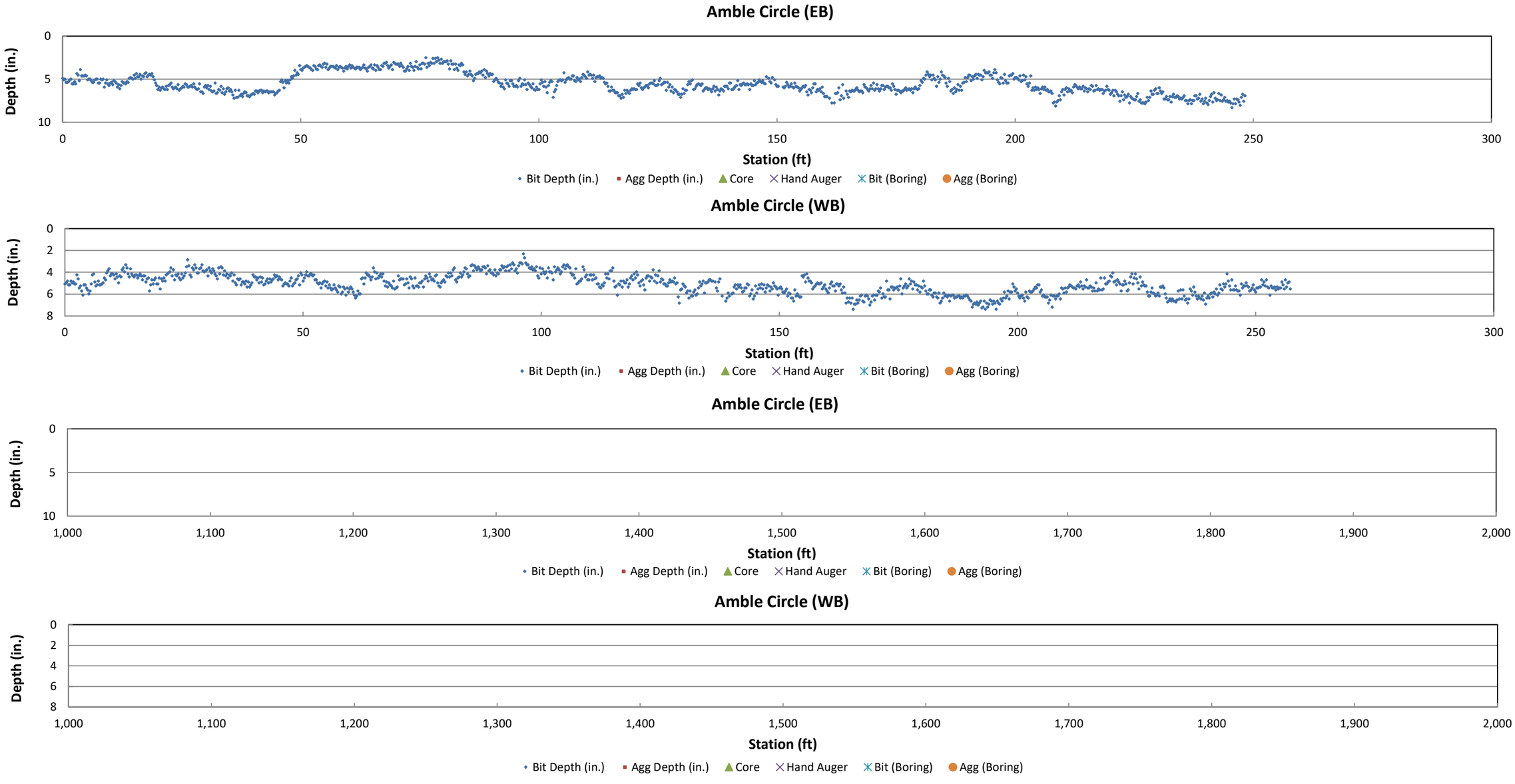
Segment	Bituminous (inches)				
	Average	Standard Deviation	Minimum*	Maximum	10th Percentile
Amble Circle (EB)	5.5	2.5	8.3	3.7	1.2
Amble Circle (WB)	5.1	2.3	7.4	3.9	0.9
Amble Drive (EB)	4.7	0.7	1.3	7.8	3.8
Amble Drive (WB)	4.9	0.7	2.9	7.8	4.1
Cummings Park Dr (WB)	5.8	0.8	2.2	8.9	5.0
Cummings Park Dr (EB)	5.8	0.6	3.4	8.3	5.1
Karth Lake Circle (EB/SB)	6.4	1.1	1.7	9.3	5.1
Karth Lake Circle (NB/WB)	7.3	2.7	3.3	14.3	4.9
Karth Lake Drive (EB)	7.6	2.0	2.8	12.4	4.5
Karth Lake Drive (WB)	---	---	---	---	---
Pleasant Circle (WB)	9.4	0.8	6.9	12.4	8.4
Pleasant Circle (EB)	7.3	1.3	4.0	11.1	5.5
Pleasant Drive (EB)	5.5	0.4	4.0	7.3	5.0
Pleasant Drive (WB)	5.4	0.4	3.8	7.5	4.9
Pleasant Drive (NB)	7.0	1.8	4.0	12.4	5.2
Pleasant Drive (SB)	7.3	1.9	4.1	12.4	5.2

GPR Results: Amble Circle - Amble Drive to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Amble Circle**
From	**Amble Drive**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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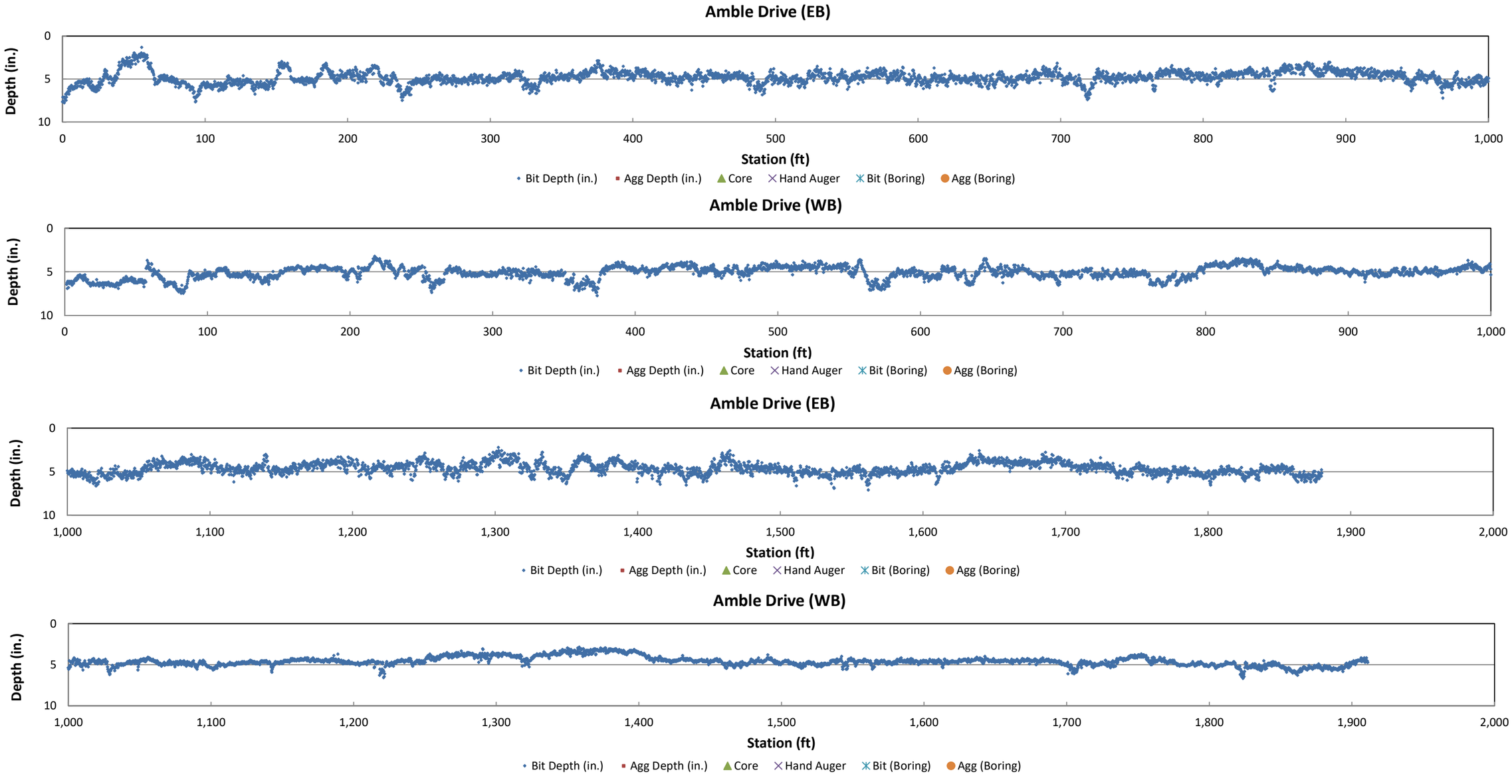


GPR Results: Amble Drive - Karth Lake Drive to Lexington Avenue North

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Amble Drive**
From	**Karth Lake Drive**
To	**Lexington Avenue North**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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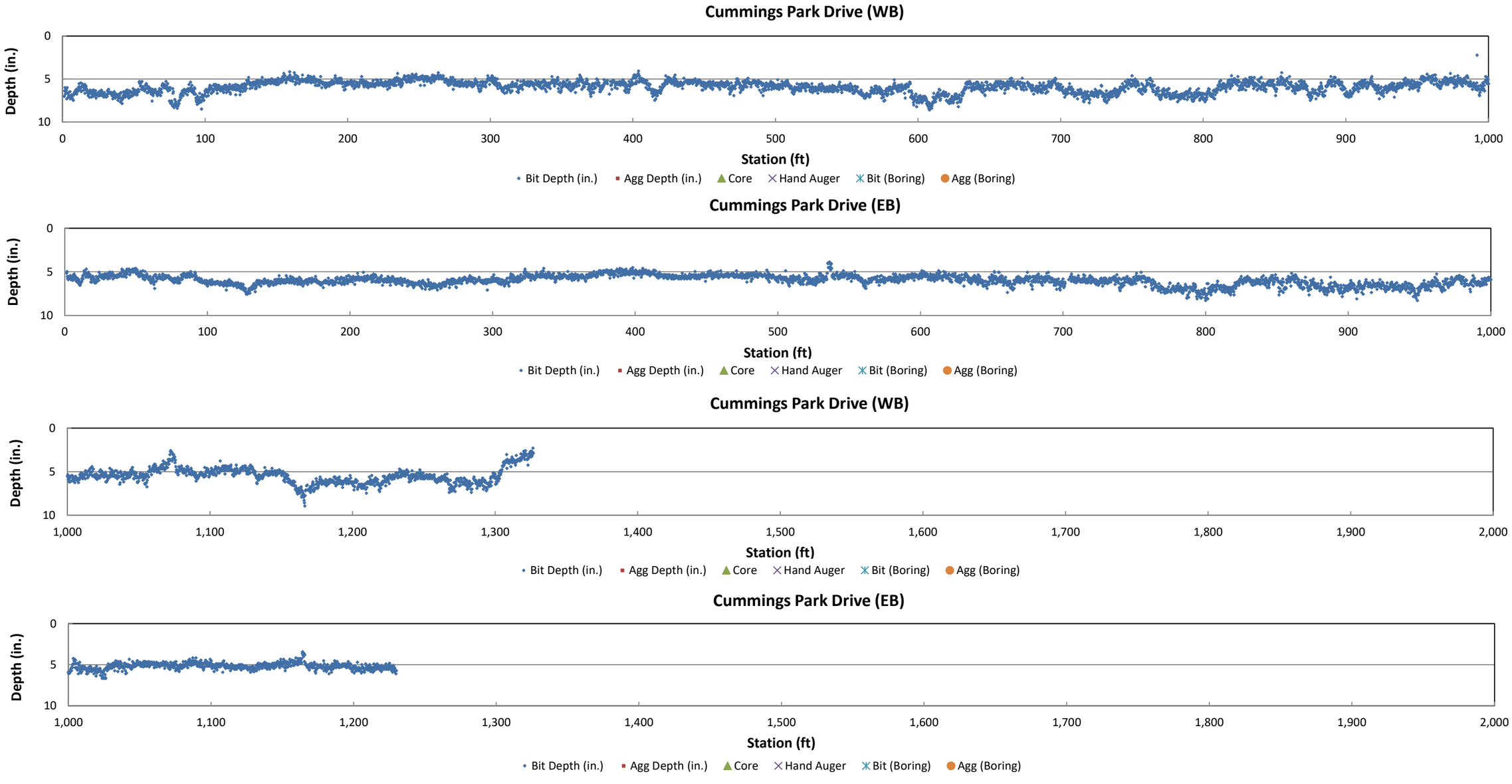


GPR Results: Cummings Park Drive - Lexington Avenue North to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Cummings Park Drive**
From	**Lexington Avenue North**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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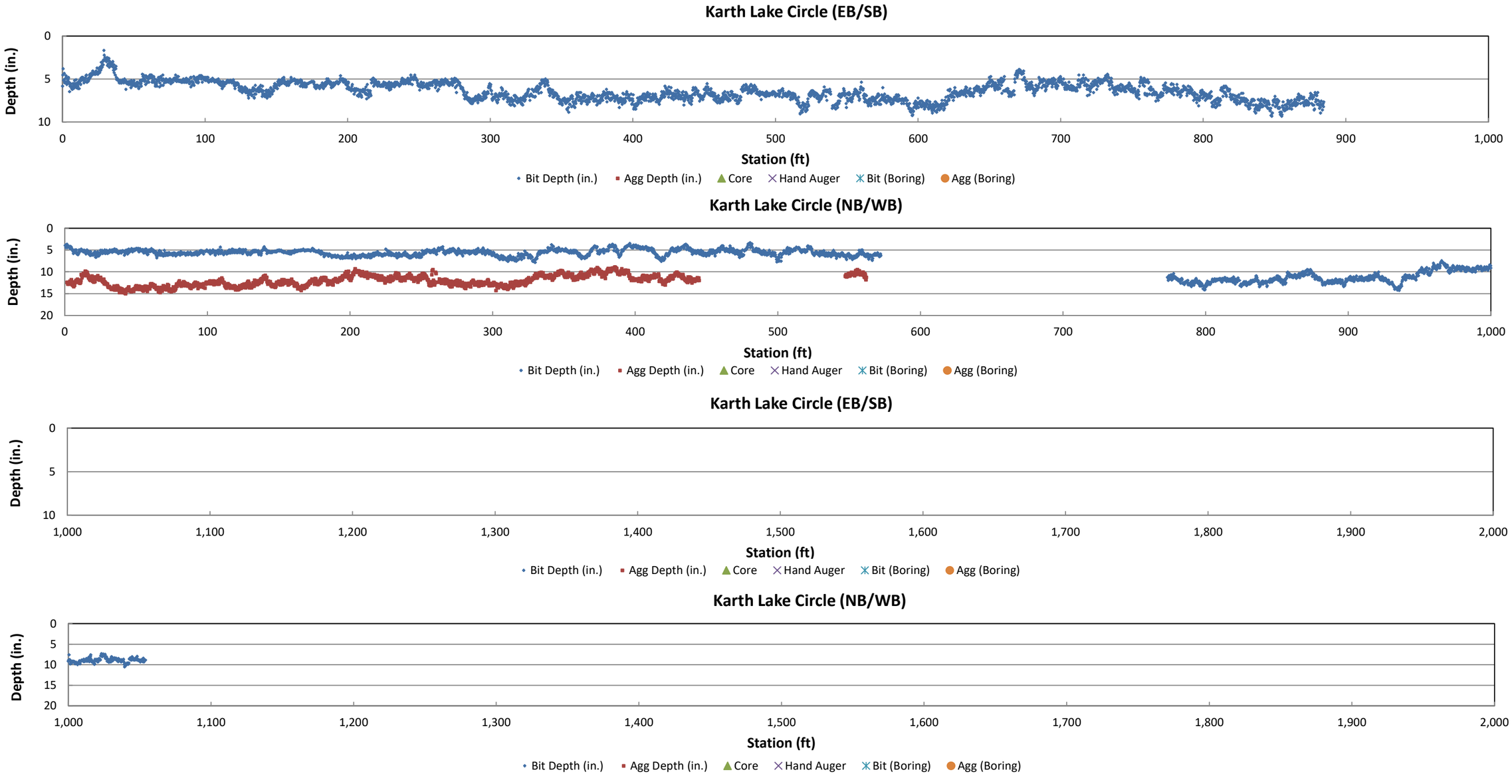


GPR Results: Karth Lake Circle - Hamline Ave N to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2007164**
Roadway	**Karth Lake Circle**
From	**Hamline Ave N**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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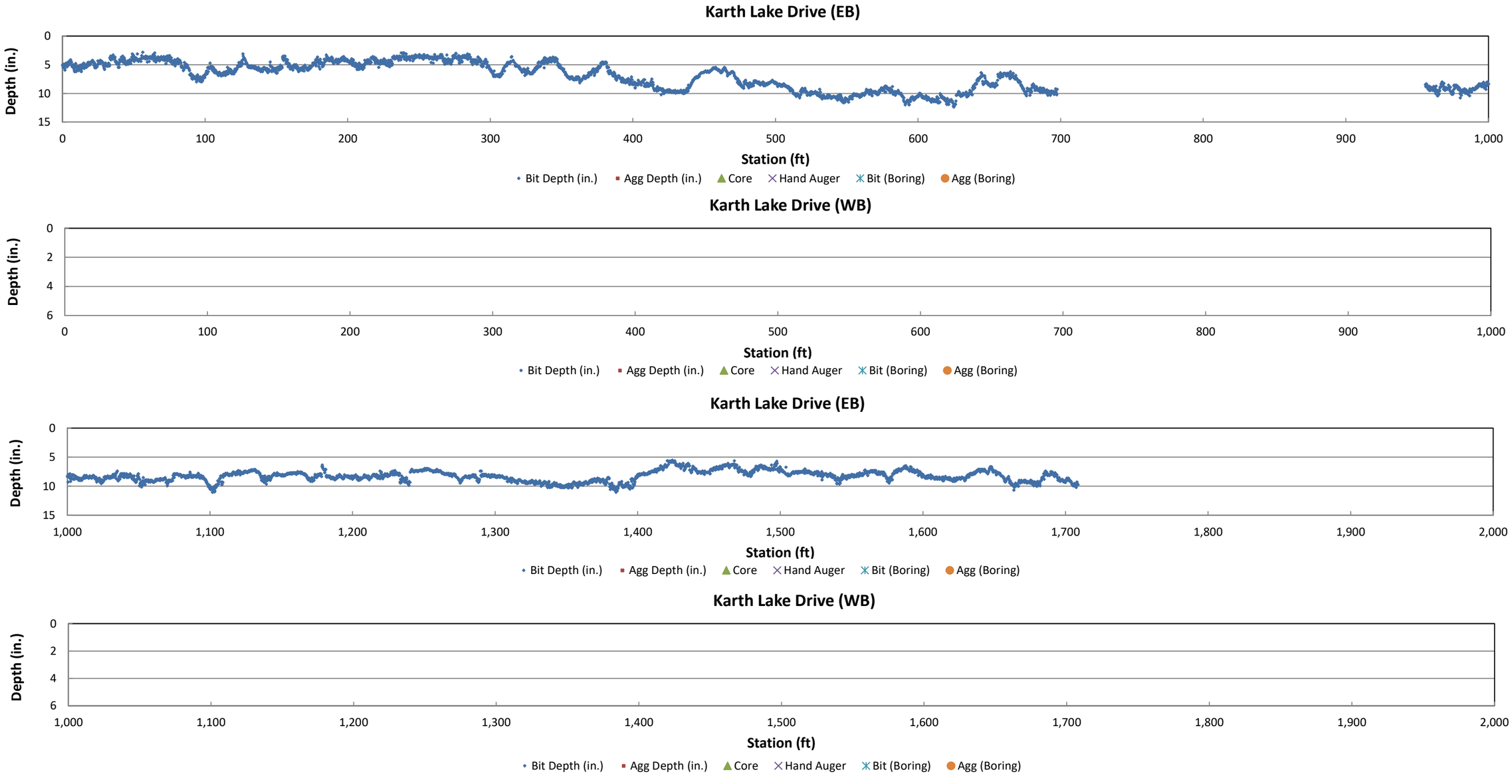


GPR Results: Karth Lake Drive - Cul-de-sac to Pleasant Drive

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Karth Lake Drive**
From	**Cul-de-sac**
To	**Pleasant Drive**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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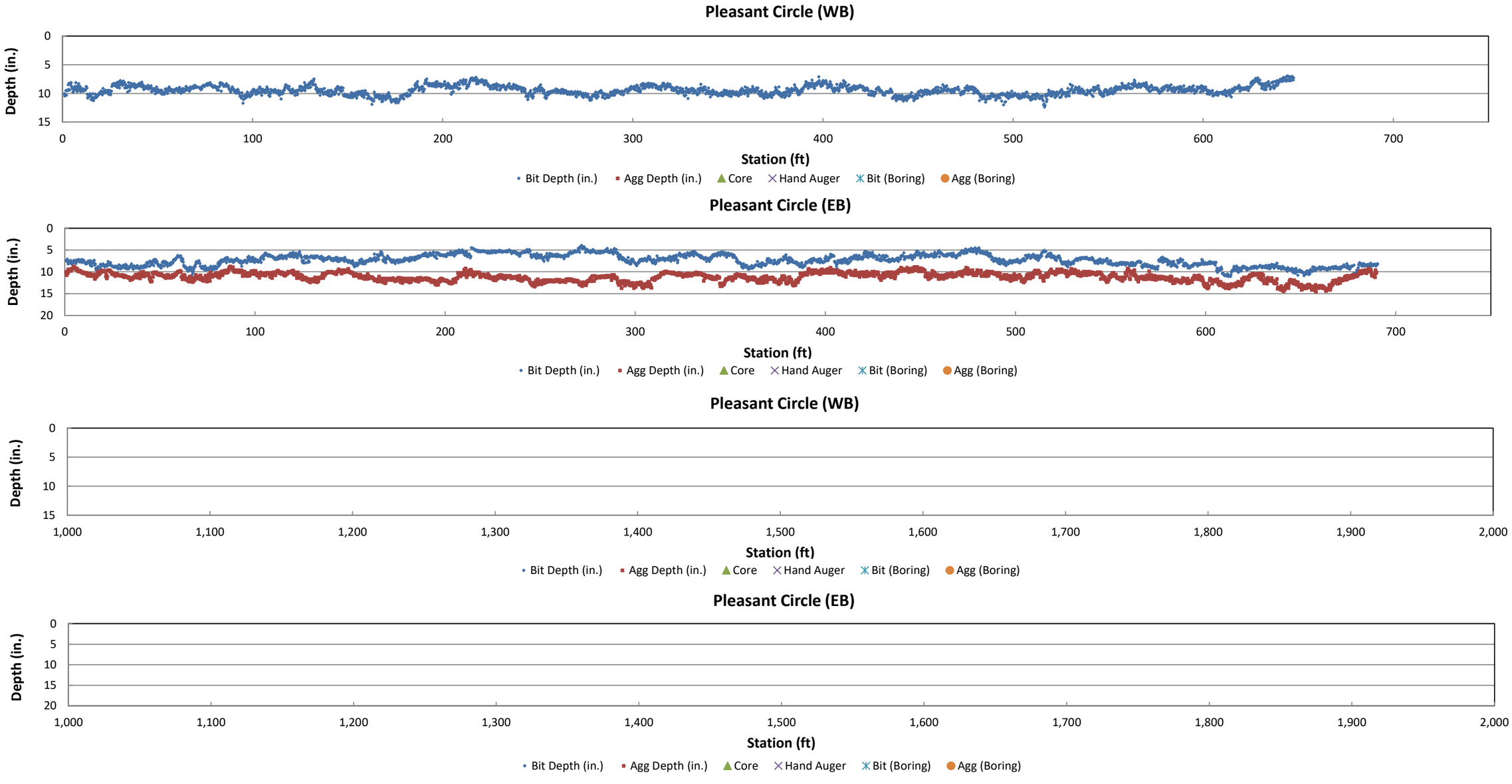


GPR Results: Pleasant Circle - Lexington Avenue North to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Pleasant Circle**
From	**Lexington Avenue North**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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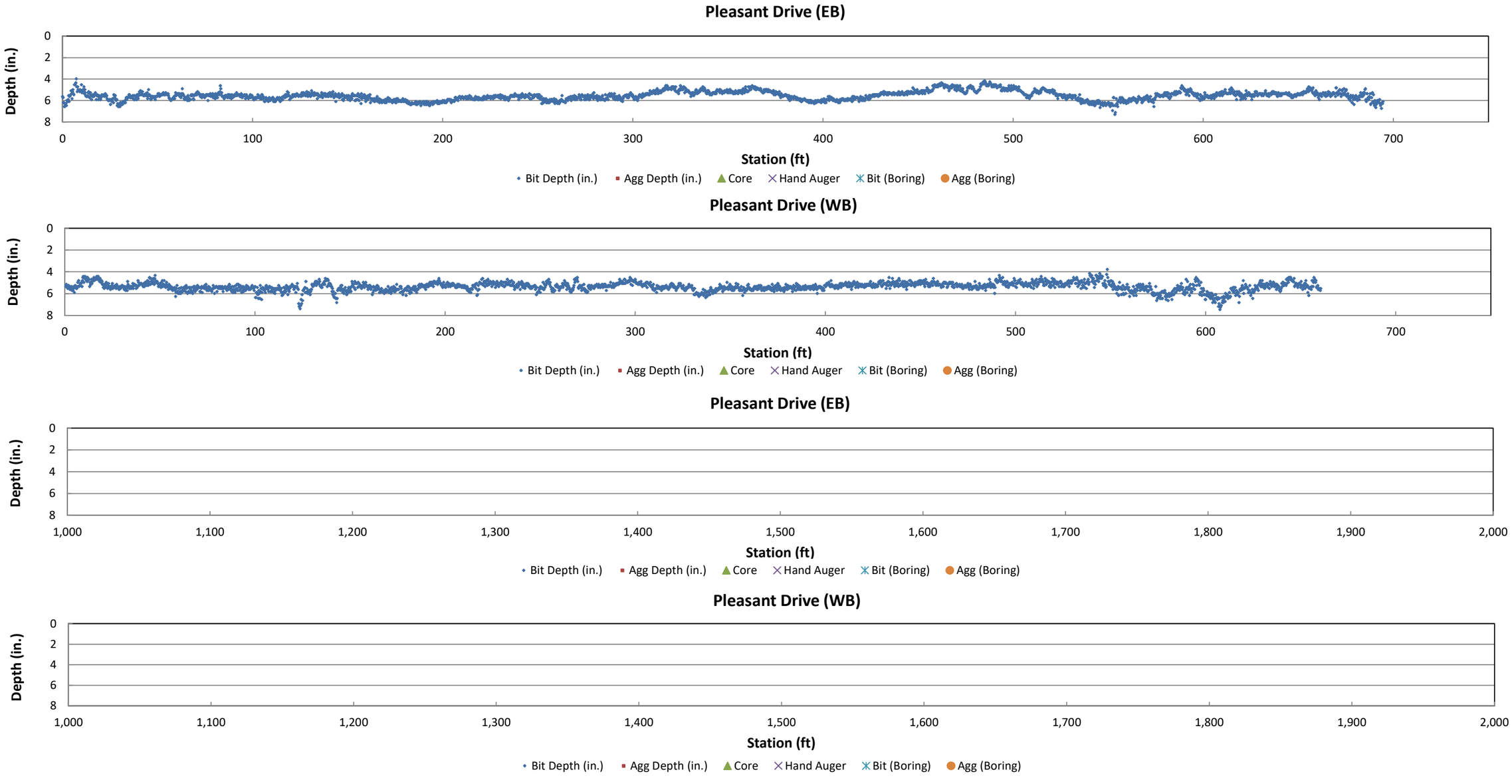


GPR Results: Pleasant Drive - Amble Drive to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Pleasant Drive**
From	**Amble Drive**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

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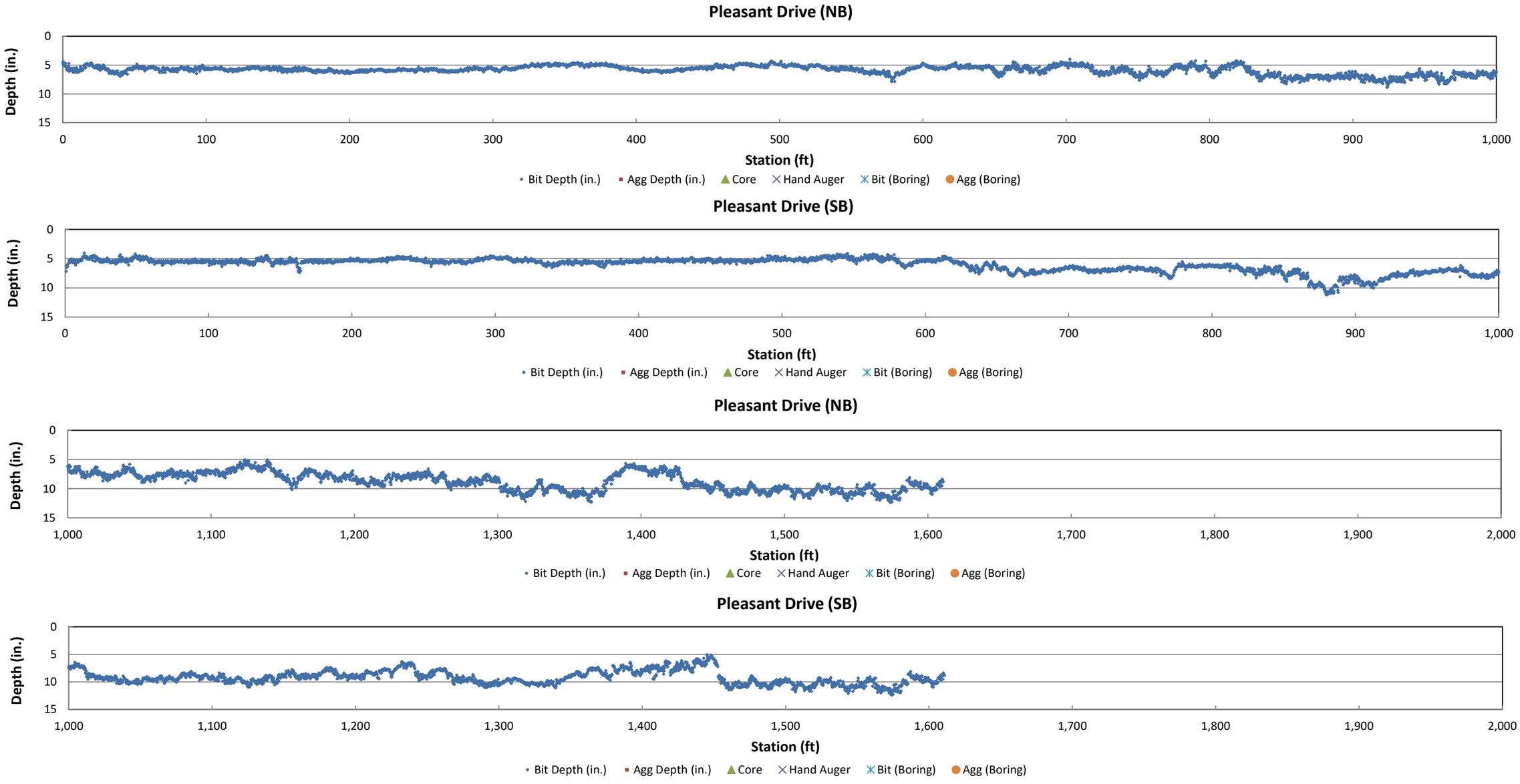


GPR Results: Pleasant Drive - Pleasant Drive (E-W bound) to Cul-de-sac

Location	**City of Arden Hills**
Project No.	**B2502087**
Roadway	**Pleasant Drive**
From	**Pleasant Drive (E-W bound)**
To	**Cul-de-sac**

Notes: stations increase in direction indicated; data for second direction is reversed. See attached report for complete results and core interpretation

BRAUN INTERTEC
The Science You Build On.



DEPARTMENT OF TRANSPORTATION

Created 6/5/2025 1:22 PM

MnPAVE 7.103 Design Summary — Hot-Mix Asphalt

MnPAVE File: MnPAVE B2502087.mp7

20 Year Reliability: 98.9% (85% recommended) 5,000 cycles

Project Information

District: Metro **County:** Ramsey **City:** Arden Hills

Project No.: B2502087 **Route:** 2026 PMP Streets **Ref. Post:** --- to ---

Letting Date: 5/30/2025

Designer: Bolton & Menk, Inc. **Soils Engineer:** Braun Intertec

Climate Information

Seasons: 5 **Location:** 45° 3.76' Latitude, 93° 5.07' Longitude

Structural Information

Layer	Type	Subtype	Thickness, in.
1a	Hot-Mix Asphalt	C - PG58H-34, 5% Pb, Size B	1.50
1b		C - PG58H-34, 5% Pb, Size B	2.50
2	Aggregate Base	FDR	6.00
3	Engineered Soil	CL R12	12.00
4	Undisturbed Soil	Clay Loam	

Traffic Information

Forecast #:

Speed: 30 mph **Growth Rate:** 1% **Design Flexible ESALs:** 250,000

Notes

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APPENDIX B

CITY ENGINEERS ASSOCIATION OF MINNESOTA (CEAM)

STANDARD UTILITIES SPECIFICATIONS (2025 EDITION)

CITY ENGINEERS ASSOCIATION OF MINNESOTA

Engineering Our Cities' Futures

STANDARD SPECIFICATIONS

2025 Edition

2600 Trench Excavation and Backfill/Surface Restoration

2611 Watermain and Service Line Installation

2621 Sanitary Sewer and Storm Sewer Installation

2631-CIPPS Sewer Pipe Rehabilitation - Cured In Place Pipe Systems

2641 – Pipeline Rehabilitation - Pipe Bursting Method

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SECTION 2600 – STANDARD SPECIFICATIONS FOR TRENCH EXCAVATION & BACKFILL/SURFACE RESTORATION

2600.1 DESCRIPTION

This work shall consist of excavation, trenching, backfilling, and restoration of existing surfaces for the construction of underground utilities.

The use of the term "Plans, Specifications and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto, published prior to the date of advertisement for bids.

All reference to other Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition available on the date of advertisement for bids.

2600.2 MATERIALS

A Granular Materials

Granular materials furnished for foundation, bedding, encasement, backfill, or other purposes as may be specified shall consist of any natural or synthetic mineral aggregate such as sand, gravel, crushed rock, crushed stone, or slag that shall be so graded ~~as~~ to meet the gradation requirements specified herein for each particular use by the material manufacturer or as indicated in the Plans, Specifications, or Special Provisions.

A1 Granular Material Gradation Classifications

Granular materials furnished for use in Foundation, Bedding, Encasement, or Backfill construction shall conform to the following requirements:

Foundation materials shall have one hundred percent (100%) by weight passing the one and one-half inch (1 1/2") sieve and a maximum of ten percent (10%) by weight passing the No. 4 sieve. Not less than fifty percent (50%) of the material by weight that is retained on the No. 4 sieve shall have one (1) or more crushed faces. Hard, durable crushed carbonate quarry rock may be used for Foundation materials.

Bedding and encasement materials for flexible pipe shall meet the requirements of MnDOT Specification 3149 Granular Material, Table 3149.2-1, Granular Material, except that one hundred percent (100%) by weight shall pass the one-inch (1") sieve.

Backfill materials shall consist of suitable existing trench materials, except as otherwise specified in the Special Provisions. Suitable material shall be defined as a mineral soil free of foreign materials (rubbish, organics, and debris), frozen clumps, oversize stone, rock, concrete or bituminous chunks, and other unsuitable materials that may damage the pipe, prevent thorough compaction, or increase the risks of settlement.

A gradation report, certified by an approved independent testing laboratory, of the proposed granular materials shall be furnished to the Engineer before any of the granular materials are delivered to the project.

A2 Granular Material Use Designations

Granular materials provided for Foundation, Bedding, Encasement, or Backfill use as required by the Plans, Specifications, and Special Provisions, either as part of the pipe item work unit or as a separate contract item, shall be classified for ~~as to~~ use in accordance with the following:

Material Use	Zone Designation
Granular Foundation	Placed below the bottom of pipe grade as replacement for unsuitable or unstable soils, to achieve improved foundation support.
Granular Bedding	Placed below the pipe midpoint, prior to pipe installation, to facilitate proper shaping and to achieve uniform pipe support. For flexible pipe installation, placed below the pipe midpoint to a point six inches (6") below the bottom of pipe or twenty five percent (25%) of the diameter below the pipe, whichever is greater.
Granular Encasement	Placed below an elevation one foot above the top of pipe, after pipe installation, for protection of the pipe and to assure proper filling of voids or thorough consolidation of backfill.
Granular Backfill	Placed below the surface base course, if any, as the second stage of backfill, to minimize trench settlement and provide support for surface improvements.

In each case above, unless otherwise indicated, the lower limits of any particular zone shall be the top surface of the next lower course as constructed. The upper limits of each zone are established to define variable needs for material gradation and compaction or void content, taking into consideration the sequence of construction and other conditions. The material use and zone designations described above shall only serve to fulfill the objectives and shall not be construed to restrict the use of any particular material in other zones where the gradation requirements are met.

B Insulation

Insulation shall be extruded rigid board material having a thermal conductivity of 0.23 BTU/hour/square foot/degree Fahrenheit/per inch thickness, maximum, at 40°F mean, a comprehensive strength of thirty-five (35) psi minimum, and water absorption of one quarter percent (0.25%) by volume maximum. Unless otherwise specified in the Plans, Specifications, or Special Provisions, board dimensions shall measure eight feet (8') long, two or four feet (2' or 4') wide, and one (1), one and one half (1-1/2), two (2), or three (3) inches thick.

C Geotextile Fabric

Geotextile fabric shall meet the requirements of MnDOT Specification 3733 and be used as required by the Plans, Specifications, and Special Provisions.

2600.3 CONSTRUCTION REQUIREMENTS

A General Provisions

A1 Maintenance of Traffic

Whenever work interferes with the flow of traffic along a roadway, the Contractor shall provide traffic control signing and public safety in accordance with the provisions Minnesota Manual on Uniform Traffic Control Devices (current edition and all amendments), MnDOT Specifications 1404 and 1710, and the Special Provisions. Neither road closures nor detours shall be permitted unless specified in the Special Provisions or authorized by the Engineer. Where road closures or detours are permitted by the Engineer, the Engineer shall determine the appropriate agencies, boards, or departments the Contractor must notify prior to taking the action and the proper advance notice to be provided to each body.

Compliance with this requirement shall not be construed to relieve the Contractor from the responsibility of notifying agencies or institutions whose services may be predicated upon a roadway being opened to traffic or whose services would be hindered if a roadway is closed to traffic. Such agencies or institutions shall include, but not be limited to, the police department, the fire department, municipal bus service, school bus service, ~~and~~ ambulance service, mail delivery, and waste hauler services. The Contractor shall keep the required agencies informed of changing traffic patterns and detour situations.

A2 Establishing Line and Grade

The primary line and grade will be established by the Engineer. For trench installation, line and grade stakes will be set parallel to the proposed pipeline at an appropriate offset therefrom as will best serve the Contractor's operations wherever practical. For tunnel installation, line and grade stakes will be set directly above the proposed pipeline setting.

The Contractor shall arrange operations to avoid unnecessary interference with the establishment of the primary line and grade stakes and shall render whatever assistance may be required by the Engineer in accomplishing the staking. The Contractor shall be responsible for preservation of the primary stakes and, if negligent in providing necessary protection, shall bear the full cost of any re-staking.

The Contractor shall be solely responsible for the correct transfer of the primary line and grade to all working points and for construction of the work to the prescribed lines and grades as established by the Engineer.

Unless otherwise specified in the Plans, Specifications, and Special Provisions the watermain shall generally be placed with the minimum specified cover. However, greater depth may be required to avoid conflicts with other utilities and obstructions. Installation of watermain and services to a depth deeper than specified shall be considered incidental with no additional compensation allowed therefore.

The existing grade shown on the plans is approximate. Modification of the pipe location or differences in existing elevation shall not be cause for additional compensation.

In areas where direct conflicts arise between watermain and water services, with storm sewer, sanitary sewer, sanitary sewer services, sewer forcemains, septic tanks, or subsoil treatment systems, the following shall apply:

Watermain and services located near sewer forcemains:

A minimum of ten feet (10') of separation, measured horizontally between the outer surfaces of the pipes is required.

If ten feet (10') of separation cannot be provided, an approved additional measure of containment must be provided for either the watermain or the sewer forcemain.

Watermain and services located near septic tanks, or subsoil treatment systems:

A minimum of ten feet (10') measured horizontally between the outer surfaces of the watermain, tank and subsoil treatment system is required.

Watermain and services located near gravity sanitary and storm sewers:

A minimum of ten feet (10') measured horizontally between the outer surfaces of the pipes is required.

In locations where local conditions prevent the required separation indicated above (due to the presence of rock, buildings, other significant obstructions), the watermain may be laid closer to gravity sewer if **one** (1) of the following conditions is met:

The bottom of the watermain is laid at least eighteen inches (18") above the top of the sewer on a separate shelf; or

The sewer is constructed of materials and with joints that are equivalent to watermain standards of construction and is pressure tested to assure water tightness prior to backfilling.

Watermain and services crossing gravity sanitary and storm sewers:

A minimum vertical separation of eighteen inches (18") must be provided between the outer surfaces of the pipes, with preference that the watermain cross above the sewer, wherever possible.

One full length of water pipe shall be located so both joints will be as far from the sewer as possible.

Watermain above-water crossings:

The pipe shall be adequately supported and anchored, protected from vandalism, damage and freezing, and accessible for repair or replacement.

Watermain underwater crossings:

A minimum cover of five feet (5') shall be provided over the pipe unless otherwise approved by the Department of Health. When crossing water courses which are greater than fifteen feet (15') in width, the following shall be provided:

1. The pipe shall be of special construction, having flexible, restrained or welded watertight joints.
2. Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding.
3. Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source.

A3 Protection of Surface Structures

All surface structures and features located outside the permissible excavation limits for underground installations, together with those within the construction areas which are indicated in the Plans as being saved, shall be properly protected against damage and shall not be disturbed or removed without approval of the Engineer. Within the construction limits, as indicated on the plans or as directed by the Engineer, the removal of improvements such as pavement, curb, curb & gutter, walks, turf, etc., shall be subject to equivalent acceptable replacement after completion of underground work, with all expense of removal and replacement being borne by the Contractor to the extent that separate compensation is not specifically provided for in the Contract.

Obstructions such as street signs, guard posts, small culverts, mailboxes, and other items of prefabricated construction may be temporarily removed during construction provided that essential service is maintained in a relocated setting as approved by the Engineer and that nonessential items are properly stored for the duration of construction. Upon completion of the underground work, all such items shall be replaced in their proper setting at the sole expense of the Contractor to the extent that separate compensation is not specifically provided for in the Contract.

The Contractor shall be responsible for protection of existing overhead utilities and poles. This shall include arranging with the utility owner and arrange paying the utility for holding poles that will be close to the edge of any trench. Holding of poles and repair of any damage to these facilities shall be considered incidental to the project with no additional compensation allowed. If relocation or removal of these facilities is required, the Owner will contact the concerned utility owner and arrange and pay for the relocation or removal at no additional expense to the Contractor.

In the event of damage to any surface improvements, either privately or publicly owned, in the absence of construction necessity, the Contractor will be required to replace or repair the damaged property to the satisfaction of the Engineer and without cost to the Owner.

A4 Interference of Underground Structures

When any underground structure interferes with the planned placement of the pipeline or appurtenances to such an extent that alterations in the work are necessary to eliminate the conflict or avoid endangering effects on either the existing or proposed facilities, the Contractor shall immediately notify the Engineer and the Owner of the affected structure. When any existing facilities are endangered by the Contractor's operations, the Contractor shall cease work at the site and take such precautions as may be necessary to protect the in-place structures until a decision is made as ~~to~~ how the conflict will be resolved.

Without specific authorization from the Engineer, no utility service shall be disrupted, nor shall any change be made in either the existing structures or the planned installations to overcome the interference. Alterations in existing facilities will be allowed only to the extent that service will not be curtailed and then only when the encroachment or relocation will satisfy all applicable regulations and conditions.

Wherever alterations are required as a result of unforeseen underground interferences not due to any fault or negligence of the Contractor, the Engineer will issue a written order covering any additional or extra work involved and specifying the revised basis of payment, if any. Any alterations made strictly for the convenience of the Contractor, shall be subject to prior approval and shall be at the Contractor's expense. No extra compensation will be allowed for delays caused by the interference of underground structures.

A5 Removal of Surface Improvements

Removal of surface improvements in connection with trench excavation shall be limited to actual needs for installation of the pipeline and appurtenances, based on the allowable trench widths and any other controls imposed in connection with the work. Removal operations shall be coordinated effectively with the excavation and installation operations as will cause the least practical disruption of traffic or inconvenience to the public. The debris resulting from removals shall become the property of the Contractor and shall be disposed of by the Contractor in accordance with MnDOT Specification 2104 and the Special Provisions. Removal debris shall not be deposited at locations that will block access to fire hydrants, private driveways, or other essential service areas, nor obstruct surface drainage. Removal and final disposal of debris shall be accomplished as a single operation when possible and, in any event, the debris shall be removed from the site before starting the excavating operations.

Removal of concrete or bituminous structures shall be by methods producing clean-cut breakage to pre-scored lines or saw cuts as will preserve the remaining structure without damage. Removal equipment shall not be operated in a manner that will cause damage to the remaining structure or adjoining property. Where not removed to an existing joint, concrete structures shall be sawed along the break lines to a minimum depth of one-third (1/3) of the structure depth.

Any reusable materials generated during the work, such as aggregate, sod, topsoil, shall be segregated from other waste materials and be stockpiled to maintain suitability and permit proper reuse.

The use of drop weight equipment for breaking pavement will be allowed to the extent that the Contractor shall assume full responsibility for any damages caused thereby. The pavement breaking operation shall not be allowed to become a nuisance to the public or a source of damage to underground or adjacent structures. The Engineer reserves the right to order discontinuance of drop weight breaking operations at any time.

A6 Temporary Service Measures

While any open excavations are maintained, the Contractor shall have available a supply of steel plates suitable for temporary bridging of open trench sections where either vehicular or pedestrian traffic must be maintained. Use of the plates shall be as directed or approved by the Engineer and where installed they shall be secured against possible displacement and be replaced with the permanent structure as soon as possible.

B Excavation and Preparation of Trench

B1 Operational Limitations and Requirements

Trench excavation must conform to all local, state and federal requirements. All work must be confined to the limits of the construction and to easements and right of way as indicated on the plans. The Contractor shall install at his expense the necessary trench support to meet the varying soil conditions and to protect existing structures and property. The trench shall be drained to provide stable excavation and permit the pipe to be laid in a dry trench.

Excavating operations shall proceed only so far in advance of pipe laying as will satisfy the needs for coordination of work and permit advance verification of unobstructed line and grade as planned, consistent with the Contractors methods and scheduling. Where interference with existing structures is possible or in any way indicated, and where necessary to establish elevation or direction for connections to in-place structures, the excavating shall be done at those locations in advance of the main operation so actual conditions will be exposed in sufficient time to make adjustments without resorting to extra work or unnecessary delay.

Wherever possible, excavated materials shall be placed in areas that will not block existing vehicle and pedestrian traffic and drainage ways. The Contractor shall review proposed methods of operation with the Engineer prior to beginning the work.

The Contractor shall backfill all trenches at the end of each workday, or upon written authorization of the Engineer, shall provide another approved method of protecting the trench area while work is not being performed.

All installations shall be accomplished by open trench with the exception that boring, jacking and tunnel construction methods shall be employed where specifically required by the Plans, Specifications, or Special Provisions.

The excavating operations shall be conducted to carefully expose all existing underground structures without damage. Wherever the excavation extends under or approaches so close to an existing structure to endanger it in any way, precautions and protective measures shall be taken as necessary to preserve the structure and provide temporary support. Hand methods of excavating shall be utilized to probe for and expose such critical or hazardous installations as gas pipe, power and communication cables, watermain, gravity and pressure sewers, and respective service pipes.

The Engineer shall be notified of any need for blasting to remove materials which cannot be broken up mechanically, and there shall be no blasting operations conducted until the Engineer's approval has been secured. Blasting will be allowed only when proper precautions are taken to protect life and property, and then shall be restricted as the Engineer directs. The hours of blasting operations shall be set by the Owner. The Contractor shall assume full responsibility for any damages caused by blasting, regardless of the requirements for notification and approval. The Contractor shall secure any required permits for blasting and shall conduct blasting operations in conformance with all applicable local, state and federal laws, regulations, and ordinances.

B2 Classification and Disposition of Materials

Excavated materials will be classified for payment only when specifically provided in the Special Provisions, or the Proposal. All other materials encountered in the excavations will be considered incidental to utility construction, with no additional compensation provided thereto.

Miscellaneous excavated materials that are not specifically identified for payment in the Special Provisions or Proposal, exceed one (1) cubic yard in volume, cannot be re-used within the project limits, and in the opinion of the Engineer requires special means for handling and disposal, may be considered for payment through supplemental agreement as extra work. Miscellaneous excavated materials include but are not limited to organic soils, potentially contaminated soils, rubble, wood debris, boulder stone, masonry, concrete fragments, and metals.

Rock excavation shall be defined to include all hard, solid rock in ledge formation, bedded deposits and unstratified masses; all natural conglomerate deposits so firmly cemented to present all the characteristics of solid rock; and any boulder stone, masonry or concrete fragments exceeding one (1) cubic yard in volume. Materials such as shale, hard pan, soft, weathered, or disintegrated rock which can be dislodged with a hand pick or removed with a power operated excavator will not be classified as Rock Excavation.

Excavated materials will be classified for reuse as being either Suitable or Unsuitable for backfill or other specified use, subject to selective controls. All suitable materials shall be reserved for backfill to the extent needed, and any surplus remaining shall be utilized for other construction on the project as may be specified or ordered by the Engineer. To the extent practicable, granular materials and topsoil shall be segregated from other materials during the excavating and stockpiling operations to permit best use of the available materials at the time of backfilling. Unless otherwise specified in the Plans, Specifications, and Special Provisions, material handling as described above shall be considered incidental with no additional compensation provided.

All excavated materials reserved for backfill or other use on the project shall be stored at locations approved by the Engineer that will cause a minimum of inconvenience to public travel, adjacent properties, and other special interests. The material shall not be deposited so close to the edges of the excavations in a manner that could create hazardous conditions, nor shall any material be placed to block access to emergency services. All materials considered unsuitable by the Engineer, for any use on the project, shall be immediately removed from the project and be disposed of as arranged for by the Contractor with no additional compensation.

B3 Excavation Limitations and Requirements

Trench excavating shall be to a depth that will permit preparation of the foundation as specified and installation of the pipeline and appurtenances at the prescribed line and grade, except where alterations are specifically authorized. Trench widths shall be sufficient to permit the pipe to be laid and joined properly and the backfill to be placed and compacted as specified. Extra width shall be provided as necessary to permit convenient placement of sheeting and shoring and to accommodate placement of appurtenances.

Excavations shall be extended below the bottom of structures as necessary to accommodate any required Granular Foundation material. When rock or unstable foundation materials are encountered at the established grade, additional materials shall be removed as specified or directed by the Engineer to produce an acceptable foundation. Unless otherwise indicated or directed, rock shall be removed to an elevation at least six inches (6") below the bottom surface of the pipe barrel and below the lowest projection of flange and bell/spigot joint. All excavations below grade shall be to a minimum width equal to the outside pipe diameter plus two feet (2'). Rock shall be removed to such additional horizontal dimensions as will provide a minimum clearance of six inches (6") on all sides of appurtenant structures such as valves, housings, access structures, etc.

Where no other grade controls are indicated or established for the pipeline, the excavating and foundation preparations shall provide a minimum cover over the top of the pipe as specified. Trench widths shall allow for at least six inches (6") of clearance on each side of the flange and bell/spigot joint. The maximum allowable width of the trench at the top of pipe level shall be the outside diameter of the pipe plus two feet (2'), subject to the considerations for alternate pipe loading set forth below. The width of the trench at the ground surface shall be held to a minimum to prevent unnecessary destruction of the surface structures.

The maximum allowable trench width at the top of pipe level may be exceeded only by approval of the Engineer, after consideration of pipe strength and loading relationships. Any alternate proposals made by the Contractor shall be in writing, giving the pertinent soil weight data and proposed pipe strength alternate, at least seven (7) days prior to the desired date of decision. Approval of alternate pipe designs shall be with the understanding that there will be no extra compensation allowed for any increase in material or construction costs.

If the trench is excavated to a greater width than that authorized, the Engineer may direct the Contractor to provide a higher class of bedding and/or a higher strength pipe than that required by the Plans, Specifications, and Special Provisions in order to satisfy design requirements, without additional compensation.

Excess excavated materials generated by utility construction without a specified use on the project site, shall become the property of the Contractor and disposed of offsite. Offsite disposal of excess excavated materials is considered incidental to the construction with no additional compensation allowed thereto.

The use of granular foundation materials shall not be used as an aid to facilitate installation of pipe in wet soil conditions. Use of these materials in this manner in lieu of providing adequate dewatering measures shall be considered incidental to the construction with no additional compensation allowed thereto.

B4 Sheeting and Bracing Excavations

All trench excavations that require slope support shall be sheeted, shored, and braced in a manner that will meet all requirements of the applicable safety codes and regulations; comply with any specific requirements of the Contract; and prevent disturbance or settlement of adjacent surfaces, foundations, structures, utilities, and other properties. Any damage to the work under contract, to adjacent structures, or other property, caused by settlement, water or earth pressures, slides, cave-ins, or other causes due to the failure or lack of sheeting, shoring, or bracing, through negligence or fault of the Contractor in any manner shall be repaired at the Contractor's expense and without delay.

The Plans, Specifications, and Special Provisions may require special precautions to protect life and property. The Engineer may order other precautions when excavation conditions appear to warrant additional measures. Failure of the Engineer to order correction of improper or inadequate sheeting, shoring, or bracing shall not relieve the Contractor's responsibilities for protection of life, property, and the work.

The Contractor shall assume full responsibility for proper and adequate placement of sheeting, shoring, and bracing, to prevent displacement. Bracing shall be so arranged to provide ample working space and without increase of stress or strain on the in-place structures to any extent that may cause damage.

Sheeting, shoring and bracing materials shall be removed only when and, in such manner, as will assure adequate protection of the in-place structures and prevent displacement of supported grounds. Sheeting and bracing shall be left in place only as required by the Plans, Specifications, and Special Provisions or ordered by the Engineer. Otherwise, sheeting and bracing may be removed as the backfilling reaches the level of respective support. Wherever sheeting and bracing is left in place, the upper portions shall be cut and removed to an elevation of three feet (3') or more below the established surface grade or as the Engineer may direct.

All costs of furnishing, placing and removing sheeting, shoring, and bracing materials, including the value of materials left in place as required by the Contract, shall be included in the prices bid for pipe installation and will not be compensated for separately. When sheeting, shoring, or bracing materials are left in place by written order of the Engineer, in the absence of specific requirements of the Contract, payment will be made for those materials by supplemental agreement.

B5 Preparation and Maintenance of Foundations

Foundation preparations shall be conducted as necessary to produce a stable foundation and provide continuous and uniform pipe bearing between bell holes. The initial excavating or backfilling operations shall produce a subgrade level slightly above finished grade to permit hand shaping to finished grade by trimming of high spots and without the need for filling of low spots to grade. Final subgrade preparations shall produce a finished grade at the centerline of the pipe that is within three hundredths of a foot (0.03') of a straight line between pipe joints and to provide bell excavation at each joint as will permit proper joining of pipe and fittings.

In excavations made below grade to remove rock or unstable materials, the backfilling to grade shall be made with available suitable materials unless placement of Granular Foundation or Bedding material is specified or is ordered by the Engineer. Placement of the backfill shall be in relatively uniform layers not exceeding eight inches (8") in loose thickness. Each layer of backfill shall be compacted thoroughly, by means of approved mechanical compaction equipment, as will produce uniform pipe support throughout the full pipe length and facilitate proper shaping of the pipe bed.

It shall be the Contractor's responsibility to notify the Engineer of changing soil conditions which may be of poor bearing capacity and when organic soils are encountered. Where utilities are placed on unstable soils without notification of the Engineer, the Contractor shall be responsible for all repairs and correction of the installation without further compensation.

Care shall be taken during final subgrade shaping to prevent any over-excavation. Should any low spots develop, they shall only be filled with approved material, which shall have optimum moisture content and be compacted thoroughly without additional compensation to the Contractor. The finished subgrade shall be maintained free of water and shall not be disturbed during pipe lowering operations except as necessary to remove pipe slings. The discharge of trench dewatering pumps shall be directed to natural drainage channels or storm water drains. Draining trench water into sanitary sewers or combined sewers will not be permitted.

The Contractor shall install and operate a dewatering system of wells or points to maintain pipe trenches free of water whenever necessary or as directed by the Engineer. Unless otherwise specified in the Plans, Specifications, and Special Provisions such work shall be considered incidental.

All costs of excavating below grade and placing foundation or bedding aggregates as required shall be included in the bid prices for pipe items to the extent that the need for such work is indicated in the Contract provisions and the Proposal does not provide for payment under separate Contract Items. Any excavation below grade and any foundation or bedding aggregates required by order of the Engineer in the absence of Contract requirements will be compensated for separately.

If examination by the Engineer reveals that the need for placement of foundation aggregate was caused by the Contractor's manipulation of the soils in the presence of excessive moisture or lack of proper dewatering, the cost of the corrective measures shall be borne by the Contractor.

B6 Contaminated Materials and Regulated Wastes

If during the course of the Project, the Contractor unexpectedly encounters any of the following conditions indicating the possible presence of contaminated soil, contaminated water, or regulated waste, the Contractor shall immediately stop work in the vicinity, and notify the Engineer.

At the direction of the Engineer, a documented inspection and evaluation will be conducted prior to the resumption of work. The Contractor shall not resume work in the suspected area without authorization by the Engineer.

Indicators of contaminated soil, groundwater or surface water include, but are not limited to the following:

(1) Odor including gasoline, diesel, creosote (odor of railroad ties), mothballs, or another chemical odor.
(2) Soil stained green or black (but not because of organic content), or with a dark, oily appearance, or any unusual soil color or texture.
(3) A rainbow color (sheen) on surface water or soil.

Indicators of regulated wastes include, but are not limited to the following:

(1) Cans, bottles, glass, scrap metal, wood (indicators of solid waste and a potential dump site).
(2) Concrete and asphalt rubble (indicators of demolition waste).
(3) Roofing materials, shingles, siding, vermiculite, floor tiles, transite or any fibrous material (indicators of demolition waste that could contain asbestos, lead or other chemicals).
(4) Culverts or other pipes with tar-like coating, insulation or transite (indicators of asbestos).
(5) Ash (ash from burning of regulated materials may contain lead, asbestos or other chemicals).
(6) Sandblast residue (could contain lead).
(7) Treated wood including, but not limited to products referred to as green treat, brown treat and creosote (treated wood disposal is regulated).
(8) Chemical containers such as storage tanks, drums, filters and other containers (possible sources of chemical contaminants).
(9) Old basements with intact floor tiles or insulation (could contain asbestos), sumps (could contain chemical waste), waste traps (could contain oily wastes) and cesspools (could contain chemical or oily wastes).

Discovery of contaminated soil, contaminated water, or regulated waste on State right of way, State property, and State funded projects shall be handled in accordance with guidance procedures of the MNDOT Office of Environmental Stewardship (OES) and the MPCA requirements for materials handling, disposal, re-use and remediation.

Discovery of contaminated soil, contaminated water, or regulated waste on projects or properties that are not under the ownership or financed by the State shall be handled in accordance with guidance procedures of the MPCA requirements for materials handling, disposal, re-use and remediation.

C Trenchless Pipe Installation

The Contractor shall inspect and verify soil conditions as necessary in order to determine the type of construction to employ. Natural and/or manmade obstructions may be encountered in the soil. These contract documents do not warrant the nature or condition of the soils, and do not warrant that natural or manmade obstructions will not be encountered, nor guarantee the extent to which rocks, boulders, or other obstructions, regardless of size, may be encountered during boring operations. The Contractor shall not be entitled to additional compensation for any natural or manmade obstructions encountered during trenchless construction.

The Contractor shall be responsible for protecting all existing utilities within the construction limits.

C1 Jacking/Boring

The terms "auger", "boring", "jack", "jacking", and "tunneling" in the proposal, specifications, and plans refers only to trenchless construction.

The minimum diameter of the casing pipe shall be four inches (4") greater than the outside diameter of the bell of the carrier pipe.

The Contractor shall prevent excavated materials from flowing back into the excavation during the trenchless construction. This shall include the use of a shield conforming to the size and shape of the casing that will prevent materials from flowing into the leading edge of the casing. The machine used shall be capable of controlling line and grade and shall conform to the size and shape of the casing pipe.

No jacking/augering of pipe will be allowed below the water table unless the water table has been lowered sufficiently to keep the water below the pipe being installed. The use of water under pressure (jetting) or puddling will not be permitted to facilitate jacking/augering operations.

If any installation is augered, the head shall be approved by the Engineer and the auger shall be located six inches (6") behind the lead edge of the casing or carrier pipe.

The jacking system shall be provided with an integral grout pipe and casing pipe. A one-inch (1") grout pipe shall be tack welded to the front edge of the first length of casing pipe. The grout pipe shall be extended with the casing pipe, but not fastened to the casing pipe during the remaining jacking operations. After the pipes are through to the receiving pit, the grout pipe shall be cut free from the casing pipe. The grout pipe shall be pulled back through the embankment applying positive piston pressure on the grout along the outside of the casing pipe throughout the pulling operation. A cement slurry grout mix with as little water as possible shall be used. Bentonite shall not be used to fill voids. The Engineer shall approve grout and backfill material prior to placement of any material.

Deviation from the pipe grade, as provided by the Engineer, in excess of five tenths of a percent (0.50%) may be cause for removal and relaying of the pipe by the Contractor with no additional compensation allowed therefore.

If a void develops, the jacking or boring operation shall be stopped immediately, and the void shall be filled by an approved method.

The Contractor shall take the following precautions when boring:

Extend casing through entire distance bored.

Check grade and alignment after each casing section is installed.

Coordinate operations to provide continuous support to surrounding earth materials.

Excavation shall be carried on in such a manner to provide adequate support to surface structures and roads above and adjacent to the boring and not create any hazards to overhead traffic and other activities.

These contract documents do not guarantee the extent to which rocks, boulders, or other obstructions, regardless of size, may be encountered during boring operations. No extra compensation will be made for removal of rocks, boulders or other natural or manmade obstructions encountered during trenchless construction or excavation.

All voids caused by boring shall be filled by pressure grouting. The grout material shall consist of sand cement slurry of at least two (2) sacks of cement per cubic yard and a minimum of water to assure satisfactory placement. All slurry shall be pre-approved by the Engineer prior to use by the Contractor.

The Contractor shall take the following precautions when jacking:

The jacking machine shall be capable of controlling line and grade.

Progressively push carrier pipe through completed casing.

Strap two (2) wooden saddle blocks to each pipe length, or approved manufactured spacers, to provide support at regular intervals.

Center carrier pipe in casing at all times.

Seal each end of the casing with a concrete block and mortar bulkhead with PVC filler and vent pipes at opposite ends.

Fill the annular space between casing and carrier pipe with dry blown sand. Space shall be considered filled when dry sand blows out of the vent pipe at the opposite end of casing pipe.

Seal the filler and vent pipes after the sand has been deposited.

The location, size, and configuration of all jacking pits shall be subject to approval of the Engineer.

C2 Directional Boring

Direction boring/drilling installation shall be accomplished where required on the Plans or in the Special Provisions to minimize disturbance of existing surface improvements. The installer shall have a minimum of five (5) years of experience in this method of construction and have successfully installed at least ten thousand feet (10,000') of eight inch (8") or larger diameter pipe to specified grades. The field supervisor employed by the Contractor shall have at least five (5) years of experience and shall be at the site full-time during the boring/drilling installation.

The Contractor shall submit boring/drilling pit locations to the Engineer before beginning construction. Boring pits may be located within roadway right-of-way and easements. Any other boring pit locations that may be desired by the Contractor for boring or other uses shall be the responsibility of the Contractor to attain authorization, including use of private property.

Unless otherwise provided in the Special Provisions, the Contractor shall be compensated for the restoration work within the areas at the connection points, or other locations as may be approved by the Engineer. The Contractor shall be responsible for repairs, without compensation, for any other repair areas, including pit/boring points and areas above the drilled pipe where drilling fluid pressure may have caused heaving or damage to pavement and other surfaces.

The drilling equipment shall be capable of placing the pipe as shown on the plans. The installation shall be by a steerable drilling tool capable of installing continuous runs of pipe between appurtenances such as valves, manholes, etc., without intermediate pits. The guidance system shall be capable of installing pipe within 2-percent of the plan vertical and plan horizontal dimensions. The Contractor shall remove and reinstall pipes which vary in depth and alignment from these tolerances.

Pull back forces shall not exceed the allowable pulling forces for the pipe being installed. Drilling fluid shall be a mixture of water and bentonite clay and shall be suitable for existing soil conditions. Disposal of excess fluid and spoils shall be the responsibility of the Contractor.

D Placement of Insulation

Rigid insulation board shall be placed within the pipe encasement zone, six inches (6") above the pipe.

Insulation boards shall be placed with the long dimension parallel to the centerline of the pipe. Boards shall be placed in a single layer with tight joints. No continuous joints or seams shall be placed directly over the pipe. If two (2) or more layers of insulation boards are used, each layer shall be placed to cover the joints of the layer immediately below.

The Contractor shall exercise caution to ensure that all joints between boards are tight during placement and backfilling with only extruded ends placed end to end or edge to edge.

Backfill material shall be placed in such a manner that construction equipment does not operate directly on the insulation and compacted with equipment which exerts a contact pressure of less than eighty (80) psi.

E Pipeline Backfilling Operations

All pipeline excavations shall be backfilled to restore preexisting conditions as the minimum requirement, and fulfill all supplementary requirements indicated in the Plans, Specifications, and Special Provisions. The backfilling operations shall be started as soon as conditions permit on each section of pipeline, to provide continuity in subsequent operations and restore normal public service as soon as practicable. All operations shall be pursued diligently, with proper and adequate equipment, to assure acceptable results.

The backfilling shall be accomplished with the use of Suitable Materials selected from the excavated materials to the extent available and practical. Should the materials available within the trench section be unsuitable or insufficient, the required additional materials shall be furnished from outside sources as provided in the Special Provisions, or as arranged otherwise through supplemental agreement.

Backfill material selection shall make the best and fullest utilization of what is available, taking into consideration particular needs of different backfill zones. Material containing stone, rock, or chunks of any sort shall only be utilized where and to the extent there will be no detrimental effects. Placement of backfill material containing stones, boulders, chunks, greater than eight inches (8") in any dimension shall not be allowed.

All flexible pipe shall be bedded in accordance with ASTM Specification D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications". Where existing soils do not meet the requirements of bedding and encasement materials, the Contractor shall furnish the required granular materials. Placement and compaction of bedding and encasement materials around the pipe shall be considered incidental to the installation of the pipe.

Compaction of materials placed within the pipe bedding and encasement zones shall be accomplished with portable or hand equipment methods, to achieve thorough consolidation under and around the pipe and avoid damage to the pipe. Above the cover zone material, the use of heavy roller type compaction equipment shall be limited to safe pipe loading.

Backfill materials shall be carefully placed in uniform loose thickness layers up to twelve inches (12") thick spread over the full width and length of the trench section to provide simultaneous support on both sides of the pipeline. Granular backfill may be placed in layers up to twelve inches (12") above an elevation one foot (1') above the top of the pipe.

Each layer of backfill material shall be compacted effectively, by approved mechanical or hand methods, until there is no further visual evidence of increased consolidation or the density of the compacted layer conforms to the density requirements specified in the Special Provisions. Compaction of each layer shall be completed acceptably before placing material for a succeeding layer thereon. The manner of placement, compaction equipment, or procedure effectiveness shall be subject to approval of the Engineer.

All surplus or waste materials remaining after completion of the backfilling operations shall be disposed of in an acceptable manner within twenty-four (24) hours after completing the backfill work on each particular pipeline section. Disposal at locations within the project limits shall be as specified, or as approved by the Engineer; otherwise, disposal shall be accomplished outside the project limits at the Contractor's discretion. The backfilling and surplus or waste disposal operations shall be a part of the work required under the pipeline installation items, without delay.

Compaction of backfill within Roadbed areas shall meet the density requirements of MnDOT Specification 2106.3.G1. Compaction of backfill in all other areas shall be as required in the Special Provisions.

Until expiration of the guarantee period, the Contractor shall assume full responsibility and expense for all backfill settlement and shall refill and restore the work as directed to maintain an acceptable surface condition, regardless of location. All additional materials required shall be furnished without cost to the Owner.

Any settlement of road surfaces placed under this Contract and that are within the guarantee period that are in excess of one inch (1"), as measured by a ten foot (10') straight edge shall be considered failure of the mechanical compaction. The Contractor shall be required to repair such settlement without cost to the Owner.

F Restoration of Surface Improvements

Wherever any surface improvements such as pavement, curbing, pedestrian walks, fencing, or turf have been removed, damaged or otherwise disturbed by the Contractor's operations, they shall be repaired or replaced to the Engineer's satisfaction, as will restore the improvement in kind and structure to the preexisting condition. Disturbance of ADA pedestrian curb ramps or curb immediately adjacent to the ADA ramp shall be restored in compliance with current ADA pedestrian ramp requirements. Each item of restoration work shall be done as soon as practicable after completion of installation and backfilling operations on each section of pipeline.

In the absence of specific payment provisions, as separate Contract Items, the restoration work shall be compensated for as part of the work required under those Contract Items which necessitated the destruction and replacement or repair, and there will be no separate payment. If separate pay items are provided for restoration work, only that portion of the repair or reconstruction which was necessitated by the Contract work will be measured for payment. Any improvements removed or damaged unnecessarily or undermined shall be replaced or repaired at the Contractor's expense.

G Maintenance and Final Cleanup

All subgrade surfaces shall be maintained acceptably until the start of surfacing construction or restoration work, and until the work has been finally accepted.

Final disposal of debris, waste materials, and other remains or consequences of construction, shall be accomplished intermittently as new construction items are completed and shall not be left to await final completion of all work. Cleanup operations shall be considered an incidental part of the work covered under the Contract Items.

If disposal operations and other cleanup work are not conducted properly as the construction progresses, the Engineer may withhold partial payments until such work is satisfactorily performed or the Engineer may deduct the estimated cost of its performance from the partial estimate value.

2600.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions. Complete-in-Place items shall include all component parts thereof as described or required to complete the unit, but excluding any excesses covered by separate Pay Items.

A Rock Excavation

Rock Excavation shall be measured by volume in cubic yards. Depth shall be measured from the top of the rock to a point six inches below the outside barrel of the pipe and width shall be the inside diameter of the pipe plus twenty-four inches (24") (12" from each side). The minimum width of measurement shall be three feet (3’).

B Granular Materials

Granular materials furnished and placed as special foundation, bedding, encasement, or backfill construction will be measured by weight or volume of material furnished by the Contractor from outside sources and placed within the limits defined. Unless otherwise specified, volume will be determined by compacted volume at the point of delivery. Measurements will not include any materials required to be placed as a component part of other Contract Items as may be specified.

C Geotextile Fabric

Where geotextile fabric is used for improving pipe foundation, it shall be measured by the square yard of material installed, with specified overlaps incidental.

D Insulation

Rigid board insulation shall be measured on a square yard basis installed to the specified thickness noted on the Plans, Specifications, and Special Provisions and shall include all materials, equipment, and labor required for placement.

2600.5 BASIS OF PAYMENT

All costs of excavating to foundation grade, preparing the foundation, placing and compacting backfill materials, restoring surface improvements, and other work necessary for prosecution and completion of the work as specified, shall be included for payment as part of the pipe and pipe appurtenance items without any direct compensation being made.

In the absence of special payment provisions, all costs of restoring surface improvements as required, disposal of surplus or waste materials, maintenance and repair of completed work, and final cleanup operations shall be incidental to the Contract Items under which the costs are incurred.

Granular materials furnished for foundation, bedding, cover, or backfill placement as specified in connection with pipe or structure items will only be paid for as separate Contract Items to the extent that the Proposal contains specific Pay Items. Otherwise, the furnishing and placing of granular materials as specified shall be incidental to the pipe or structure item without any direct compensation being made.

Materials utilized for filling annular spaces due to jacking/boring and drilling fluids for directional boring shall be incidental to the installation of the casing and pipe installed.

Contaminated Materials and Regulated Wastes not anticipated in the plans, specifications and special provisions, and unexpectedly discovered during construction shall be compensated for as negotiated by supplemental agreement.

Contaminated Materials and Regulated Wastes specifically identified for payment in the plans, specifications, and special provisions, will be paid for under separate Contract Items provided in the Proposal.

SECTION 2611 – STANDARD SPECIFICATIONS FOR WATERMAIN AND SERVICE LINE INSTALLATION

2611.1 DESCRIPTION

This work shall consist of the construction of watermain and building service pipelines utilizing manufactured pipe and other appurtenant materials, installed for conveyance of potable water. The work includes the relocation or adjustment of existing facilities as may be specified in the Plans, Specifications and Special Provisions.

The use of the term "Plans, Specifications, and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto, published prior to the date of advertisement for bids.

All reference to other Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition available on the date of advertisement for bids.

The following American Water Works Association (AWWA) Specifications and American Society for Testing and Materials (ASTM) Standards have been referenced in this Specification:

AWWA C104 Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C105 Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110 Standard for Ductile-Iron and Gray-Iron Fittings
AWWA C111 Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115 Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116 Standard for Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 Standard for Thickness Design of Ductile-Iron Pipe
AWWA C151 Standard for Ductile-Iron Pipe, Centrifugally Cast
AWWA C153 Standard for Ductile-Iron Compact Fittings
AWWA C301 Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type
AWWA C304 Standard for Design of Prestressed Concrete Cylinder Pipe
AWWA C500 Standard for Metal-Seated Gate Valves for Water Supply Service
AWWA C502 Standard for Dry-Barrel Fire Hydrants
AWWA C504 Standard for Rubber-Seated Butterfly Valves
AWWA C509 Standard for Resilient-Seated Gate Valves for Water Supply Service
AWWA C515 Standard for Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA C550 Standard for Protective Interior Coatings for Valves and Hydrants
AWWA C600 Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
AWWA C651 Standard for Disinfecting Water Mains
AWWA C800 Standard for Underground Service Line Valves and Fittings
AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

AWWA C901 Standard for Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service
AWWA C904 Standard for Crosslinked Polyethylene (PEX) Pressure Tubing, ½ In. (13 mm) Through 3 In. (76 mm) for Water Service
AWWA C906 Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks
AWWA C907 Standard for Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12 In. (100mm Through 300 mm) for Water, Wastewater, and Reclaimed Water Services
AWWA M23 Manual for PVC Pipe Design and Installation
AWWA M55 Manual for P.E. Pipe Design and Installation
ASTM A48 Standard Specification for Gray Iron Castings
ASTM A536 Standard Specification for Ductile Iron Castings
ASTM B88 Standard Specification for Seamless Copper Water Tube
ASTM C270 Standard Specification for Mortar for Unit Masonry
ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D1784 Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2467 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Controlled Outside Diameter
ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM F593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594 Standard Specification for Stainless Steel Nuts
ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold-Water Distribution Systems

Service installations shall include either Branch Service Lines or Tapped Service Lines in accordance with the standards set forth herein.

Tapped Service installations shall include all water service lines less than three inches (3") nominal inside diameter pipe. The component parts of a tap service installation shall include a corporation stop coupling complete with watermain tap and saddle where required; a curb stop coupling complete with service box; and service piping extending from the corporation stop to the curb stop coupling and beyond to the property line or to the limits as established by the Engineer.

Branch Service installations shall include all water service lines of three inches (3") nominal inside diameter pipe and larger. The component parts of a branch service installation shall include a tapping sleeve and valve or a tee connection and valve complete with valve box, and piping extending from the watermain connection to the property line or to the limits as specified by the Engineer.

All references to "structure" shall include any man-made object that is not otherwise exempted by special terminology or definition.

2611.2 MATERIALS

All materials required for this work shall be new material conforming to requirements of the reference specifications for the class, kind, type, size, grade, and other details indicated in the Contract. Unless otherwise indicated, all required materials shall be furnished by the Contractor. If any options are provided for, such as ~~to~~ type, grade, or design of the material, the choice shall be limited as may be stipulated in the Plans, Specifications, or Special Provisions.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Plans. Otherwise, the Owner may require advance approval of material suppliers, product design, or other unspecified details as it deems desirable for maintaining adopted standards.

At the request of the Engineer, the Contractor shall submit, in writing, a list of materials and suppliers for approval.

A Certificate of Compliance shall be furnished stating that the materials furnished have been tested and are in compliance with the specification requirements.

A Water Pipe Materials

All pipe furnished for watermain and branch line installations shall be of the type, kind, size, and class indicated for each particular line segment as shown in the Plan and designated in the Contract Items. Wherever connection of dissimilar materials or designs is required, the method of joining and any special fittings employed shall be subject to approval of the Engineer.

A1 Ductile Iron Pipe and Ductile Iron and Gray Iron Fittings

The pipe furnished shall be Ductile Iron pipe and pipe fittings furnished shall be of the Ductile Iron or Gray Iron type as specified for each particular use of installation. When Gray Iron is specified, either type may be furnished. Gray Iron may not be substituted for Ductile Iron unless specifically authorized in the Special Provisions.

Ductile iron pipe shall conform to the requirements of AWWA C115 or C151 for potable water, and thickness design shall conform to AWWA C150. In addition, the pipe shall comply with the following supplementary provisions:

(1) Fittings shall conform to the requirements of AWWA C110 (Gray Iron and Ductile Iron Fittings) or AWWA C153 (Ductile Iron Compact Fittings) for the joint type *and pressure class* specified.

(2) Unless otherwise specified all pipe and fittings shall be furnished with cement mortar lining meeting the requirements of AWWA C104 for standard thickness lining. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection.

Fittings specified to be furnished with fusion bonded epoxy external coating and/or interior lining shall conform to the requirements of AWWA C550 and C116/A21.16, with 6-8 mil nominal thickness.

Fittings and pipe specified to be furnished with zinc coating shall meet the requirements of ISO 8179-1 or ISO 8179-2. Pipe and fittings shall be coated with the manufacturer compatible asphaltic coating

(3) Rubber gasket joints for Ductile Iron Pressure Pipe and fittings shall conform to AWWA C111.

(4) The nuts and bolts shall be constructed of corrosion resistant, high-strength, low-alloy steel with a ceramic filled, baked on fluorocarbon resin, or stainless steel. The nuts and bolts shall be in compliance with ANSI/AWWA C111/A21.11.

(5) Conductivity shall be maintained through pipe and fittings with an external copper jumper wire or specialty gaskets which are capable of meeting conductive requirements. Wedge type connectors will not be allowed.

A2 Polyvinyl Chloride (PVC) Pressure Pipe and Fittings

Polyvinyl chloride (PVC) pressure pipe shall be manufactured with compounds that meet or exceed cell classification 12454 as defined in ASTM D1784 and shall conform to the requirements of AWWA C900 for the nominal size, grade, and pressure class indicated on the Plans, Specifications, and Special Provisions. Fittings shall be the same pressure class as the pipe and injection molded PVC fittings shall conform to AWWA C907. PVC pressure pipe and fittings shall have a pressure class of two hundred (200) psi or greater, unless otherwise provided in the special provisions. The pipe shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D543. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast-iron pipe equivalent outside diameters.

Polyvinyl Chloride (PVC) pressure pipe for trenchless installation shall conform to the requirements of AWWA C900 and shall be manufactured specifically for the purposed construction type, horizontal directional drilling (HDD), pipe bursting, or other trenchless method as specified.

A3 Polyethylene (PE) Pressure Pipe and Fittings

Polyethylene pressure pipe and fittings shall be manufactured with compounds that meet or exceed cell classification 44557C/E as defined in ASTM D3350 and shall conform to the requirements of AWWA C-901(for 0.75” to 3” diameters) and AWWA C906 (for 4” to 65” diameters) for the size, grade and pressure class indicated on the plans, specifications and special provisions. Polyethylene pipe and fittings shall be PE 4710 and pressure class of two hundred (200) psi or greater, unless otherwise provided in the special provisions. Polyethylene compounds used in potable water applications shall also be classified as CC3 per ASTM D3350. The pipe and fittings shall be manufactured from the same resin type, grade, and cell classification. Unless otherwise specified, the dimensions and tolerances of the pipe barrel shall conform to Ductile Iron Pipe equivalent outside diameters (DIPS) for pipe diameters greater than three inches (3"). The method of joining material shall be by the Thermal Butt Heat Fusion Method in accordance with ASTM D3261.

The minimum "quick-burst" strength of the fittings shall not be less than that of the pipe with which the fitting is to be used.

B Fire Hydrants

Fire hydrants shall be of the type, size, and construction specified in the Plans and shall conform to the applicable requirements of AWWA C502.

Unless otherwise specified in the Plans, Specifications, and Special Provisions, hydrants shall be furnished in conformance with the following supplementary requirements:

(1) Hydrants shall have a five inch (5") (nominal diameter) main valve opening of the type that opens against water pressure.

(2) Hydrant barrels shall be two (2) piece, non-jacket type, with flanged joint above finished grade line and with mechanical joint connection at the hub end for joining a six inch (6") ductile iron branch pipe.

(3) Hydrant operating rod shall be equipped with a breakable joint coinciding with the flange joint above the grade line.

(4) Hydrant bury length shall be measured from the bottom of the branch pipe connection to the finished ground line at the hydrant.

(5) Hydrants shall have two (2) outlet nozzles for two and one-half inch (2-1/2") (I.D.) hose connection and one outlet nozzle for four-inch (4") (I.D.) steamer connection. All outlet nozzle threads shall be National Standard Fire-Hose Coupling Screw Threads (NFPA 1963).

(6) Hydrant operating mechanisms shall be provided with "O" ring seals preventing entrance of moisture and shall be lubricated through an opening in the operating nut or bonnet.

(7) Hydrants shall be provided with outlets for drainage in the base or barrel, or between the base and barrel, unless the Special Provisions require that drain outlets be omitted or plugged.

(8) The hydrant operating nut shall be rotated counterclockwise to open.

(9) Detailed drawings, catalog information, and maintenance data shall be furnished as requested by the Engineer.

(10) Hydrant body bolts shall be corrosion resistant, stainless steel conforming to the requirements of ASTM F593 and F594, alloy group 1, 2, 3, suitable for exterior use above and below ground. Bolts shall conform to manufacturer recommendation for tensile strength and torque.

C Valves and Valve Housing

C1 Valve Housings

Valve housings shall be of ductile or cast iron, High Density Polyethylene or masonry construction as specified in the Plans, Specifications, and Special Provisions for the particular valve size or installation. Masonry manhole or vault type units shall be constructed in accordance with the provisions of MnDOT Specification 2506. Precast Concrete Manholes shall conform to ASTM C478 suitable for HS 20 traffic loading for all units located in driving areas. Ductile or cast-iron valve boxes and all castings for manhole or vault type units shall conform to the requirements of MnDOT Specification 3321.

C2 Gate Valves

Gate Valves shall conform to all applicable requirements of AWWA C509 or AWWA C515, together with such supplementary requirements as may be covered in the Plans, Specifications, and Special Provisions. Unless otherwise specified gate valves shall comply with the following supplementary requirements:

(1) Gate valves meeting the requirements of AWWA C509 and C515 shall be single disc type with resilient seat bonded or mechanically attached to either the gate or valve body, and the wedge shall be ductile iron fully encapsulated with EPDM rubber, shall be symmetrical and seal equally well with flow in either direction without misalignment. All valves shall be provided with a two-inch square operating nut opening counterclockwise and mechanical joint ends.

(2) All gate valves shall be non-rising stem (NRS) type furnished with O-Ring stem seals.

(3) All gate valves sixteen inches (16") or larger in size shall be arranged for operation in the horizontal position and shall be equipped with bypass valves.

(4) All gears on gate valves shall be cut tooth steel gears, housed in heavy ductile or cast iron extended type grease cases of approved design.

(5) All gate valves shall have an open indicating arrow, the manufacturer's name, pressure rating and year of manufacture cast on the valve bodies.

(6) All internal and external surfaces of the valve body and bonnet shall have an epoxy coating, complying with ANSI/AWWA C550.

(7) All gate valves shall have stainless steel body bolts unless otherwise specified.

C3 Butterfly Valves

Butterfly valves shall be manufactured in conformance with all applicable requirements of AWWA C504 for 150 p.s.i. working pressure minimum, together with such supplementary requirements as may be covered in the Plans, Specifications, and Special Provisions. Unless otherwise specified, the butterfly valves furnished shall comply with the following supplementary requirements.

(1) The butterfly valves shall be short body of ductile or cast iron with mechanical joint ends.

(2) The butterfly valves shall be rubber seated with ductile or cast disc, non-rising stem type furnished with O-ring stem seals.

(3) The butterfly valves shall be equipped with a two-inch square operating nut opening counterclockwise.

(4) The butterfly valves shall be designed for direct burial installation.

(5) All butterfly valves shall have an open indicating arrow, the manufacturer's name, pressure rating and year of manufacture on the valve bodies.

(6) All internal and external surfaces of the valve body and bonnet shall have an epoxy coating, complying with ANSI/AWWA C550.

(7) All butterfly valves shall have stainless steel body bolts unless otherwise specified.

D Water Service Pipe and Fittings

Water service pipe of 3 inches or larger inside diameter shall conform to the requirements as set forth under the provisions of 2611.2.

Water service pipe of less than three inch (3") inside diameter shall conform to the requirements of ASTM B88 for Seamless Copper Water Tube, Type K, Soft Annealed temper; Polyethylene Pipe as per AWWA C901 and ASTM D3350, or Polyvinyl Chloride Pipe and fittings as per a ASTM D1785, D2241, D2466, D2467 and D2740, or Cross-linked Polyethylene (PEX) pipe as per ASTM F876, ASTM F877, and AWWA C904, NSF/ANSI Standard 61 for potable water distribution, as specified on the Proposal or in the Special Provisions. Water service piping supplied shall include markings indicating the type, pressure class, testing certification, and use for potable water systems.

Corporation stops, saddles, curb stops, and curb stop service boxes shall conform to the requirements of AWWA C800 and as detailed in the Plans, Specifications, and Special Provisions or approved designations.

Saddles for Polyethylene Pipe shall conform to the requirements of AWWA C800 and shall be thermal fusion polyethylene type; ductile iron with dual stainless steel straps, spring washers, bolts and washers; or stainless steel sleeve type, with stainless steel bolts, nuts, and spring washers. Stainless steel bolts, nuts, and washers. Spring washers shall be manufactured from type 304 stainless steel, special “spring grade”. Saddles shall include threaded outlet tapping sleeves and Nitrile Butadiene Rubber (NBR) gaskets.

All fittings for copper tubing shall be cast brass, having uniformity in wall thickness and strength, and shall be free of defects affecting serviceability. All copper pipe fittings shall be flared or compression type. All threads for underground service line fittings shall conform to the requirements of AWWA C800. Each fitting shall be permanently and plainly marked with the name or trademark of the manufacturer. Fittings for thermoplastic pipe types shall be of the same material and pressure class as the piping.

Curb stop service boxes shall be gray iron conforming to the requirements of ASTM A 48 for Class 20 or higher tensile strength and shall have at least twelve inches (12") of vertical adjustment for the cover depth specified in the Plans, Specifications, and Special Provisions.

E Polyethylene Encasement Material

Polyethylene encasement material shall conform to the requirements of AWWA C105 for tube type installation and 8 mil nominal film thickness.

F Mechanical Joint Restraints

Mechanical joint restraints shall be ductile iron conforming to the requirements of ASTM A536 and AWWA C600. Joint restraints shall be Lug or Grip Ring type, and be designed to withstand the design pressures indicated in the Plans, Specifications, and Special Provisions. Mechanical joint restraints shall be fusion bonded epoxy coated meeting the requirements of AWWA C116.

All nuts, bolts, and tie rod type restraints shall be stainless steel, corrosion-resistant coating, or coated with an owner approved rustproofing material.

G Mortar

Mortar for use in masonry construction shall meet the requirements of MNDOT 2506.2 B.2 and ASTM C270.

H Concrete

Concrete used for cast-in-place masonry construction shall be produced and furnished in accordance with the provisions of MnDOT Specification 2461 for the mix design indicated in the Plans, Specifications, or Special Provisions. The requirements for Grade B concrete shall be met where a higher grade is not specified. Type 3, air-entrained, concrete shall be furnished and used in all structures having weather exposure.

I Tracer Wire for Non-Conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be Underwriters Laboratories (UL) listed for use in direct burial applications, color coated per APWA uniform color code for the specific utility being marked. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, insulation shall be High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.

Tracer wire shall meet the following additional criteria for the construction method specified:

Open Trench - Trace wire shall be High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.

Directional Drilling/Boring - Trace wire shall be Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.

Pipe Bursting/Slip Lining - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 mil HDPE insulation thickness.

Connectors for tracer wire shall meet the following:

All mainline trace wires must be interconnected at tees and crosses, joined using a single 3-way or 4-way lockable connector for tees and crosses, respectively.

Lockable connectors shall be for direct bury application and shall be dielectric silicon filled to seal out moisture and corrosion.

2611.3 CONSTRUCTION REQUIREMENTS

A Installation of Pipe and Fittings

Installation of ductile iron watermains and their appurtenances shall conform to the requirements of AWWA C600, the Plans, Specifications and Special Provisions.

Installation of Polyvinyl Chloride (PVC) pipe and their appurtenances shall conform to the requirements of AWWA C605, and the bedding and backfill conditions specified by the Manufacturer, Plans, Specifications, and Special Provisions.

Installation of Polyethylene Pipe and their appurtenances shall conform to the requirements of AWWA M55 and to the bedding and backfill conditions specified by the Manufacturer, Plans, Specifications, and Special Provisions.

No existing valves or hydrants shall be operated by individuals other than personnel from the City Public Works Department. Only under emergency conditions or after specific authorization is given by the City Public Works Department shall the Contractor operate valves or hydrants.

Installation of pipe and fittings shall also conform to the following general guidelines:

A1 Inspection and Handling

Proper and adequate implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work.

During the process of unloading delivered materials, all pipe and accessories shall be inspected by the Contractor for damage. The Contractor shall notify the Engineer of all material found to have cracks, flaws or other defects. The Engineer shall inspect the damaged material and have the right to reject any materials found to be unsatisfactory. The Contractor shall promptly remove all rejected material from the site.

All materials shall be handled carefully, as will prevent damage to protective coatings, linings, and joint fittings; preclude contamination of interior areas; and avoid jolting contact, dropping, or dumping.

During pipe laying operations, each pipe section shall be inspected by the Contractor. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection.

Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair.

A2 Pipe Laying Operations

Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper placement and joining of the pipe and fittings at the prescribed grade and alignment without unnecessary hindrance. All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench, and they shall be kept clean. The watermain materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped or dumped into the trench.

As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved encasement and backfill materials.

When pipe laying is not in progress, all open ends of the pipe line shall be closed by watertight plugs or other means approved by the Engineer. If water is present in the trench, the plugs shall remain in-place until the trench is pumped completely dry.

When connecting to existing stubs, the Contractor shall prevent dirt or debris from entering the existing pipe.

A3 Aligning and Fitting of Pipe

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe to leave a smooth square-cut end. Pipe shall be cut with approved mechanical tools. Flame cutting will not be allowed under any conditions. All rough edges shall be removed from the cut ends of pipe and, where rubber gasket joints are used, the outer edge shall be rounded or beveled by grinding or filing to produce a smooth fit.

When necessary to deflect pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, plumb stems, or produce a long radius curve when permitted, the amount of deflection allowed at each joint shall not exceed the limits to maintain a satisfactory joint seal in conformance with AWWA C600 for ductile iron pipe mechanical and push-on joints, AWWA C605 for PVC pipe and AWWA M55 for PE pipe. The maximum angular deflection at any joint for other pipe materials and joints shall not exceed the manufacturer's recommendations. If the specified alignment requires angular deflections greater than recommended or allowed, the Contractor shall provide appropriate bends or shorter pipes such that the maximum angular deflection is not exceeded.

A4 Blocking and Anchoring of Pipe

All plugs, caps, tees, bends, and other thrust points shall be provided with reaction backing, or movement shall be prevented by attachment of suitable restraining devices or tie rods, in accordance with the requirements of the Plans, Specifications, and Special Provisions.

In the absence of other specified requirements for reaction backing or restraining devices, the following provisions shall apply:

(1) All horizontal bends exceeding twenty (20) degrees deflection, and all caps, plugs, and branch tees shall be provided with concrete buttress blocking.

(2) All vertical bends exceeding twenty (20) degrees deflection shall be provided with concrete buttress blocking at the low points and with metal tie rod or strapping restraints at the high points.

(3) Offset bends made with standard offset fittings need not be strapped or buttressed.

(4) Hardwood blocking shall not be used.

Concrete buttresses shall be poured against firm, undisturbed ground and shall be formed in such a way that the joints will be kept free of concrete and remain accessible for repairs. The concrete mix used in buttress construction shall meet the requirements for Grade B concrete in conformance with MnDOT Specification Section 2461. Buttress dimensions shall be a minimum of twelve inches (12") in thickness, and the minimum area, in square feet shall be as follows:

PIPE SIZE	TEE OR PLUG	1/4 BEND	1/8 BEND	1/32 & 1/16 BEND
6”	2.9	3.1	1.6	0.8
8”	3.7	5.3	2.9	1.4
10”	5.7	8.1	4.4	2.2
12”	8.1	13.4	6.6	3.2
16”	15.1	21.4	11.6	5.9
20”	23.2	30.2	18.1	9.3
24”	33.6	48.5	26.1	13.3

Contractors are instructed to size concrete buttress blocking on fittings and dead ends where the blocking must withstand the pressure of larger main line fittings equipped with reducers, for the larger sized main line thrust and not for smaller fitting size only. This is of particular importance on tees and crosses where the main size is reduced on the run from large to small size by use of reducers.

All metal parts of tie rod or strap type restraints shall be galvanized or coated with other approved asphaltic type rustproofing.

All necessary fittings, bands, tie rods, nuts, and washers, and all labor and excavation required for installation of reaction restraints shall be incidental to the installation of the pipe, unless a specific payment item is provided in the bid proposal.

A5 Polyethylene Encasement of Pipeline

Wherever so required by the Plans, Specifications, or Special Provisions the pipeline, including valves, fittings, and appurtenances, shall be fully encased in polyethylene film meeting the requirements of these Specifications. The film shall be furnished in tube form for installation on pipe and all pipe-shaped appurtenances such as bends, reducers, off- sets, etc. Sheet film shall be provided and used for encasing all odd-shaped appurtenances such as valves, tees, crosses, etc.

The polyethylene tubing shall be installed on the pipe prior to being lowered into the trench. Tubing length shall be sufficient to provide a minimum overlap at all joints of one foot or more. Overlap may be accomplished with a separate sleeve tube placed over one end of the pipe prior to connecting another section of pipe, or by bunching extra overlap material at the pipe ends in accordion fashion. After completing the pipe jointing and positioning the overlap material, the overlap shall be secured in place with plastic adhesive tape wrapped circumferentially around the pipe not less than three (3) turns.

After encasement, the circumferential slack in the tubing film shall be folded over at the top of the pipe to provide a snug fit along the barrel of the pipe. The fold shall be held in place with plastic adhesive tape applied at intervals of approximately three feet (3') along the pipe length. Also, any rips, punctures, or other damage to the tubing shall be repaired as they are detected. These repairs shall be made with adhesive tape and overlapping patches cut from sheet or tubing material.

At odd-shaped appurtenances such as gate valves, the tubing shall overlap the joint and be secured with tape, after which the appurtenant piece shall be wrapped with a flat film sheet or split length of tubing by passing the sheet under the appurtenance and bringing it up around the body. Seams shall be made by bringing the edges together, folding over twice, and taping down. Wherever encasement is terminated, it shall extend for at least two feet (2') beyond the joint area.

Openings in the tubing for branches, service taps, air valves and similar appurtenances shall be made by cutting an X-shaped slit and temporarily folding back the film. After installing the appurtenance, the cut tabs shall be secured with tape and the encasement shall be completed as necessary for an odd-shaped appurtenance.

Unless otherwise specified in the Plans, Specifications, and Special Provisions, hydrants encased in polyethylene tubing shall have plugged drain outlets.

B Connection and Assembly of Joints

Where rubber gasket joints are specified, care shall be taken during the laying and setting of piping materials to ensure that the units being joined have the same nominal dimension of the spigot outside diameter and the socket inside diameter. A special adaptor shall be provided to make the connection when variations in nominal dimension might cause unsatisfactory joint sealing.

Immediately before making the connection, the inside of the bell or socket and the outer surface of the spigot ends shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. Insertion of spigot ends into the socket or bell ends shall be accomplished in a manner that will assure proper centering and insertion to full depth. The joint seal and securing requirements shall be as prescribed below for the applicable pipe and joint type.

B1 Ductile Iron Pressure Pipe and Fitting Joints

B1a Push-On Joints

The circular rubber gasket shall be kept in a warm, flexible condition at all times, and for purposes of placement shall be flexed inward and inserted in the gasket recess of the bell socket. A thin film of approved gasket lubricant shall be applied to either the inside surface of the gasket or the outside surface of the spigot end, or to both. Care shall be taken while inserting the spigot end to prevent introduction of contaminants. The joint shall be completed by forcing the spigot end to the bottom of the socket using suitable pry-bar or jack type equipment. Spigot ends which do not have depth marks shall be marked before assembly to ensure full insertion. The use of the bucket on the excavation equipment to force the pipe into the socket shall not be permitted.

B1b Mechanical Joints

The last eight inches (8") of the outside spigot surface and the inside bell surface of each pipe and appurtenance joint shall be painted with a thin film of approved gasket lubricant after being thoroughly cleaned. The gland shall then be slipped on the spigot end with the lip extension toward the socket or bell end. The rubber gasket shall be kept in a warm, flexible condition at all times, and for purposes of placement shall be painted with a thin film of approved gasket lubricant and be placed on the spigot end with the thick edge toward the gland

After the spigot end is inserted into the socket to full depth and centered, the gasket shall be pressed into place within the bell evenly around the entire joint. After the gland is positioned behind the gasket, all bolts shall be installed and the nuts tightened alternately to the specified torque to produce equal pressure on all parts of the gland.

Unless otherwise specified, the bolts shall be tightened by means of a suitable torque-limiting wrench to within a foot-pound range of: 45 to 60 for 5/8 inch bolts; 75 to 90 for 3/4 inch bolts; 100 to 120 for 1 inch bolts; and 120 to 150 for 1-1/4 inch bolts. After tightening, all exposed parts of the bolts and nuts shall be completely coated with an approved asphaltic type rust preventive material.

B1c Flanged Joints

Flanged joints shall be installed only in above grade or exposed locations and shall conform to the requirements of AWWA C115, the Plans, Specifications and Special Provisions. Flanged joints shall have full face gaskets.

B2 Polyvinyl Chloride Pipe Joints

B2a Push-On Joints

The circular rubber gasket shall be bonded to the inner wall of the gasket recess of the bell socket. Insertion of pipe spigot into the bell socket shall conform to manufacturer recommended insertion depth.

B2b Fusion Joints

The method of joining shall be specified and conform with AWWA C605. Joining by pipe fusion shall be performed by “qualified” fusion technicians, as documented by the manufacturer. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. Appropriately sized and outfitted fusion machines that have been approved by the manufacturer shall be used for the fusion process.

B3 Polyethylene Pipe Joints

The joining of polyethylene pipe joints shall conform to the requirements of AWWA M55, shall be made by the Thermal Butt Heat Fusion Method, Mechanical Flange Adaptor Method, Mechanical Joint Adaptor Method and Mechanical Transition Fittings. Mechanical joints shall include stainless steel pipe stiffeners. Compression fittings are not allowed for pipe diameters greater than two inches (2") in diameter.

B4 Tracer Wire for Non-conductive Pipe

Tracer wire shall be installed along the length of all non-conductive mainline pipes, laterals, and services with vertical riser to the surface, at gate valve boxes, hydrants, curb boxes, and/or utility location boxes as required by the Special Provisions. Tracer wire shall be taped, clamped or affixed to the pipe in another manner as approved by the Engineer. Splicing tracer wire shall be in a manner to prevent any uninsulated wire exposure.

A twelve-inch (12") tracer wire loop shall be provided on each side of a spliced connection.

Tracer wire lengths greater than 500 linear feet without service laterals or hydrants are to include an approved grade level/in-ground access box, located at the edge of the road right-of-way and outside of the roadway.

Tracer wire shall be grounded at all terminal ends (stubs, plugs).

C Water Service Installations

Water service facilities consisting of Tap Service Lines and Branch Service Lines, complete with all required appurtenances, shall be installed as required by in the Plans, Specifications, and Special Provisions, in accordance with all pertinent requirements for main line installations together with the provisions hereof.

It shall be the responsibility of the Contractor to keep an accurate record of the location, depth and size of each service connection and other pertinent data such as the location of curb stops and pipe endings. Tap locations shall be recorded in reference to survey line stationing. Curb stops shall be tied to definable land marks such as building corners, lot corner markers, hydrants, gate valves, etc. Pipe terminals at the property line shall be marked to the ground surface with a suitable wood timber four by four inch (4"x4"), eight feet (8') long set vertically into the ground with the top two feet (2') painted blue. Approved record keeping forms will be furnished by the Engineer and the completed records shall be submitted by the Contractor upon completion of the work.

Water service lines shall be subject to the same requirements as prescribed for the main pipeline installation.

Water service lines shall be installed to provide a minimum of six inches (6") of clearance shall be maintained in crossing over or under other structures. Where the service pipe may be exposed to freezing due to insufficient cover or exposure from other underground structures, the water pipe shall be insulated as directed by the Engineer.

C1 Tee Branch Service Lines

Tee branch service piping shall be of the type, size, and wall thickness specified. The pipe and appurtenances shall have rubber gasketed push-on or mechanical joints. Tee branch service lines shall be provided as required by the Plans.

Installation of tee branch service facilities shall be in accordance with all applicable requirements of these specifications as pertain to the mainline installations.

C2 Tapped Service Lines

Service piping shall be of the size and type specified. Unless otherwise specified, minimum pipe size for tap service installations shall be one inch (1") nominal inside diameter. Larger size pipe may be specified for commercial and industrial uses or for some domestic service as specifically identified.

Installation of service facilities shall be in accordance with all applicable requirements of these specifications as pertain to the mainline installations, subject to the exceptions and supplementary provisions set forth hereinafter.

Installation of tapped service lines shall be performed while the mainline watermain is at system operating pressure. Dry tapping watermain pipe will not be allowed.

Unless otherwise indicated, service piping may be laid directly on any solid foundation soil that is free of stones and hard lumps. However, when specified or ordered, aggregate materials shall be furnished and placed as necessary to secure proper foundation drainage, pipe covering, or backfill support.

Tapped service piping of three quarters inch (3/4") to and including one and one quarter inches (1-1/4”) in diameter shall be installed in one piece without intermediate joint couplings between the corporation stop and the curb stop. Service pipe of one and one-half inches (1-1/2") in diameter and larger shall be furnished in standard roll lengths to eliminate any intermediate joints. When full roll lengths are less than the service length the rolls may be joined with approved couplings.

Unless otherwise specified, connection of tapped service lines to the watermain shall be made at an angle of not more than twenty-two (22) degrees from the horizontal. A double wrap of Teflon tape shall be placed on the corporation stop threads prior to installation in the main.

Unless otherwise indicated, tap service lines shall be installed on a straight line at right angles to the watermain or property line as directed by the Engineer. In the absence of specific requirements, the service line shall be terminated at the property line, where it shall be connected to an existing line or, in the case of undeveloped property, it shall be capped, plugged, or peened as approved by the Engineer.

The flaring of new copper tubing ends shall be accomplished only with the use of the proper size and type of tools as designed for the purpose. Tubing shall be cut squarely and all edge roughness shall be removed prior to flaring. All couplings shall be tightened securely, so the flared end fits snugly against the bevel of the fitting without leakage. The flared joint couplings shall be made up without the use of jointing compounds.

The service pipe and curb stop coupling depth shall maintain not less than the specified minimum cover. The service box shall be connected to or centered over the curb stop and be firmly supported on concrete blocking as required by the Plans, Specifications, and Special Provisions. Clearance shall be provided so the service box does not rest on the water pipe. Service boxes shall be installed plumb.

The service boxes shall be brought to proper surface grade when the final ground surface has been established.

D Setting Valves, Hydrants, Fittings and Specials

Valves, hydrants, fittings, and specials shall be provided and installed as required by the Plans, Specifications, and Special Provisions with the exact locations and setting as directed by the Engineer, and with each installation accomplished in accordance with the requirements for installation of mainline pipe to the extent applicable. Support blocking, reaction backing, and anchorage devices shall be provided as required by the Plans, Specifications, and Special Provisions or as otherwise ordered by the Engineer.

Hydrants shall be installed plumb, with the height and orientation of nozzles as shown in the Plans or as directed by the Engineer. Unless otherwise specified, the hydrants shall be connected to the mainline pipe with six-inch (6") diameter pipe, controlled by an independent valve.

When a hydrant with an open drain outlet is set in clay or other impervious soil, a drainage pit of at least one cubic yard shall be excavated below and around the hydrant base and the pit shall be filled with Foundation Material to a level six inches (6") above the drain outlet. MnDOT 3733 geotextile Type 5, or other material approved by the Engineer, shall be carefully placed over the rock to prevent backfill material from entering voids in the rock drain. Hydrants located where the groundwater table is above the drain outlet shall have the outlet drain hole plugged or the drain tube cut off to prevent draining, and shall be equipped with a tag stating, "Pump After Use".

Valve boxes shall be centered over the valve wrench nut and be installed plumb, with the box cover flush with the surface of the finished pavement or at such other level as may be directed.

Valve box adaptors for use to stabilize the valve box in a centered position over the valve wrench nut shall include a rubber gasket between the adaptor plate and valve body. The adaptor shall be epoxy coated conforming to the requirements for fittings in section 2611.2A1, or as otherwise allowed by the plans, specifications and special provisions. Gate valve box adaptors shall be incidental to the valve box unless otherwise provided in the bid proposal.

Masonry valve pit structures, for valves with exposed gearing or operating mechanisms, shall be constructed in accordance with the details shown in the Plans and with the applicable provisions of these Specifications.

Drainage blow-offs, air vents, and other special appurtenances shall be provided and installed as required by the Plans, Specifications, and Special Provisions.

All dead ends shall be closed with approved plugs and shall be equipped with suitable blow-off facilities.

E Disinfection of Watermains

Before being placed in service, the completed water main shall be disinfected. Disinfection materials and procedures, and the collection and testing of water samples, shall be in accordance with the provisions of AWWA C651. After the final flushing of watermain, the water shall be tested for bacteriologic quality and found to meet the standards prescribed by the Minnesota Department of Health.

Where an existing watermain is cut for the installation of any fitting, the pipe and fittings proposed to be installed shall be disinfected prior to installation as follows:

(1) The interior of the pipe and fittings shall be cleaned of all dirt and foreign material.

(2) The interior of the pipe and fittings shall be thoroughly swabbed or sprayed with a one percent (1%) minimum hypochlorite solution.

Unless otherwise indicated in the Plans, Specifications, and Special Provisions, the Contractor shall furnish all materials and perform the disinfecting, flushing, and testing as necessary for meeting the water quality requirements.

The flushing operations and the form of chlorine and method of application to be used shall be subject to approval by the Engineer.

F Electrical Conductivity Test

The Contractor shall perform a conductivity test within one week after completion of pressure testing of the main on all watermains to ensure continuous conductivity for locating watermain. Sufficient conductivity shall be provided to allow for the location of watermain, services, hydrant leads, and laterals for mainline segments at least one thousand two hundred (1,200) linear feet in length.

G Hydrostatic Testing of Watermains

After the pipe has been laid, including fittings and valves and blocking, all newly-laid pipe or any section between valves thereof, unless directed otherwise by the Engineer, shall be subject to hydrostatic pressure of one hundred fifty (150) pounds per square inch. The duration of each such test shall be at least two (2) hours.

Each section of pipe to be tested shall be filled with water and all air expelled at the highest point. The required taps to expel air or to fill the watermain shall be supplied and installed by the Contractor, shall be three quarters inch (3/4") and shall include an approved service saddle when required.

The test apparatus shall be applied at the lowest elevation on the section to be tested. The apparatus shall be connected to the main at a service tap or special tap location.

The pressure gauge shall be a standard pressure gauge. The dial shall register from 0 - 200 psi and have a dial size of four and one-half inches (4-1/2") with one (1) psi increments.

The hydrostatic test pressure requirement for an acceptable test shall be a maximum pressure drop of two (2) psi during the last hour of the two (2) hour pressure test. The test pressure shall not drop more than five (5) psi for the duration of the test.

If this test requirement cannot be met, the Contractor shall investigate the cause, make corrections, and retest until the pressure drop requirement can be met.

Only if several consecutive tests indicate a consistent pressure drop and only after the Contractor has made numerous attempts to resolve the problem, acceptable to the Engineer, may the Contractor request in writing and the Engineer consider the use of the leakage test. The leakage test may be performed by the Contractor to determine the magnitude of the leak, however, meeting the leakage allowance shall not automatically be considered acceptance, in lieu of the pressure test, for the section being tested. Final acceptance shall be at the discretion of the Engineer.

When allowed, the leakage test shall be performed in accordance with AWWA C600.

H Operational Inspection

At the completion of the project and in the presence of the Engineer and the Contractor, representatives of the Owner shall operate all valves, hydrants, and water services to ascertain that the entire facility is in good working order; that all valve boxes are centered and valves are opened; that all hydrants operate and drain properly; that all curb boxes are plumb and centered; and that water is available at all curb stops.

2611.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions. Pipe will generally be designated by size (inside diameter or span), strength class, kind or type, and laying condition. Payment shall include all component parts thereof as described or required to complete the unit, but excluding any item covered by a separate pay item. Lineal measurement of piping will include the running length of any special fittings (tees, wyes, bends, gates, etc.) installed within the line of measure between specified terminal points.

A Water Pipe

Mainline pipe and service pipe of each kind and size will be measured separately by the overall length along the axis of the pipeline, from beginning to end of each installation and without regard to intervening valves or specials. Terminal points of measure will be the spigot or cut end, base of hub or bell end, center of valves or hydrants, intersecting centers of tee or wye branch service connections, and center of corporation stop or curb stop couplings.

B Valves

Valves of each size and type will be measured separately as complete units, including the required manhole or valve box setting.

C Corporation Stops

Corporation stops of each size and type will be measured separately by the number of units installed, including the watermain tap and saddle.

D Curb Stops

Curb stops of each size and type will be measured separately by the number of units installed, including the required curb box.

E Hydrants

Hydrants will be measured by the number of units installed.

F Air Vents

Air vents of each type and size will be measured separately by the number of complete units installed, including the required manhole or valve box setting.

G Polyethylene Encasement

Polyethylene encasement of pipe will be measured by the linear foot of pipe encased of each specified size.

H Ductile and Gray Iron Fittings

Ductile Iron and Gray Iron fittings shall be measured by the pound without joint accessories or on per each basis as specified on the Proposal or in the Special Provisions. Joint accessories including tie rods, joint restraints, nuts and bolts shall be incidental to the watermain unless otherwise provided on the Proposal or in the Special Provisions.

The standard weight of Ductile Iron and Gray Iron fittings, for payment basis, shall be as published in AWWA C153 and C110, respectively.

I Polyvinyl Chloride or Polyethylene Fittings

Polyvinyl Chloride or Polyethylene fittings shall be measured per each basis or as specified and shown on the Proposal or in the Special Provisions.

J Access Structures

Access structures, such as valve boxes, service boxes, manholes and vaults, will be measured for payment only when and to the extent that the Proposal contains specific items, therefore. Otherwise, the required structures are included for payment as part of the pipe appurtenance (Gate Valve, Curb Stop, Air Vent, etc.) item which is served. When applicable, measurement will be by the number of individual units installed of each type and design.

2611.5 BASIS OF PAYMENT

Payment for construction of water distribution facilities will be made as detailed in the method of measurement and as shown on the Bid Proposal or detailed in the Special Provisions. Payment shall include all costs of furnishing and installing the complete facility as required by the Plans, Specifications, and Special Provisions.

Payment shall be made for Watermain Pipe, Service Pipe, and Tapped Service Pipe, of each size and kind at the appropriate Contract prices per linear foot installed. All costs of pipeline disinfection, leakage testing, pipe jointing materials, dead end plugs, making connections to existing facilities, blocking and anchorage materials, and other work necessary for proper installation of pipe as specified shall be included for payment as part of the pipe item, without any direct compensation being made therefore unless specific pay items are included on the Proposal.

Payment shall be made for Valves, Corporation Stops, Curb Stops, Hydrants, Air Vents, Polyethylene Encasement, Insulation, and other specially identified appurtenant items, at the appropriate Contract prices per unit of measure for each size and type or kind installed.

Access structures such as Valve Boxes, Service Boxes, Manholes, and Vaults will be paid for as separate items only when separate pay items are included on the Proposal.
Payment for rearrangement of in-place facilities or vertical offset of proposed facilities shall be made under specially named items at the appropriate Contract prices per unit of measure and shall be compensation in full for all costs of performing the work as specified.

All costs of excavating to foundation grade, preparing the foundation, placing and compacting backfill materials, restoring surface improvements, and other work necessary for prosecution and completion of the work as specified, shall be included for payment as part of the pipe and pipe appurtenance items without any direct compensation being made therefore, unless specific pay items are included on the Proposal.

Watermain connections shall be paid per each connection to new watermain. All necessary labor, materials, and work required to make the connection shall be included in the price per each as provided in the bid proposal.

Installation of tracer wire for thermoplastic and other non-conductive pipe materials shall be considered incidental with no direct compensation made thereto, except where noted otherwise.

SECTION 2621 – STANDARD SPECIFICATIONS FOR SANITARY SEWER AND STORM SEWER INSTALLATION

2621.1 DESCRIPTION

This work shall consist of the construction of pipe sewers utilizing manufactured pipe and other appurtenant materials, installed for conveyance of sewage, industrial waste, or storm water. The work includes construction of manhole structures, drainage structures and other related items as specified.

The use of the term "Plans, Specifications and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto published prior to the date of advertisement for bids.

All references to other Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition available on the date of advertisement for bids.

The following specifications have been referenced in this Specification:

AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 300-mm to 1500-mm (12-in. to 60-in.) Diameter
ASTM A48 Standard Specification for Gray Iron Castings
ASTM A74 Standard Specification for Cast Iron Soil Pipe and Fittings
ASTM A798 Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM C12 Standard Practice for Installing Vitrified Clay Pipe Lines
ASTM C76 Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C270 Standard Specification for Mortar for Unit Masonry
ASTM C301 Standard Test Methods for Vitrified Clay Pipe
ASTM C361 Standard Specification for Reinforced Concrete Low Head Pressure Pipe
ASTM C425 Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings
ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C700 Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C969 Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1479 Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
ASTM D543 Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications

ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3262 Standard Specification for “Fiberglass” (Glass Fiber Reinforced Thermosetting Resin) Sewer Pipe
ASTM D3839 Standard Guide for Underground Installation of “Fiberglass” (Glass Fiber Reinforced Thermosetting Resin) Pipe
ASTM D4161 Standard Specification for Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F679 Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F949 Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F1417 Standard Practice for Installation Acceptance of Plastic Non pressure Sewer Lines Using Low Pressure Air
ASTM F2764 Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F3219 Standard Specification for 3 to 30 in. (75 To 750 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Fittings
AWWA C104 Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
AWWA C110 Standard for Ductile-Iron and Gray-Iron Fittings
AWWA C111 Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115 Standard for Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116 Standard for Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings
AWWA C150 Standard for Thickness Design of Ductile-Iron Pipe
AWWA C151 Standard for Ductile-Iron Pipe, Centrifugally Cast
AWWA C153 Standard for Ductile-Iron Compact Fittings
AWWA C550 Standard for Protective Interior Coatings for Valves and Hydrants

2621.2 MATERIALS

All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade, and other details indicated in the Contract. Unless otherwise indicated, all required materials shall be furnished by the Contractor. If any options are provided for, type, grade, or design of the material, the choice shall be limited as may be stipulated in the Plans, Specifications, or Special Provisions.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Plans. Otherwise, the Owner may require advance approval of material suppliers, product design, or other unspecified details as it deems desirable for maintaining adopted standards.

At the request of the Engineer, the Contractor shall submit in writing a list of materials and suppliers for approval. Suppliers shall submit a Certificate of Compliance that the materials furnished have been tested and are in compliance with the specifications.

A Sewer Pipe and Service Line Materials

All pipe furnished for main sewer and service line installations shall be as indicated for each particular line segment as shown in the Plans and designated in the Contract Items. Wherever connection of dissimilar materials or designs is required, the method of joining and any special fittings employed shall be products specifically manufactured for this purpose and subject to approval by the Engineer.

A1 Vitrified Clay Pipe and Fittings

Vitrified clay extra strength pipe and fittings shall conform to the requirements of ASTM C700 for the size and type and class specified, subject to the following supplementary provisions:

(1) Unless otherwise specified, the pipe and fittings shall be non-perforated, full circular type, either glazed or unglazed.

(2) All pipe and fittings manufactured with bell-and-spigot ends shall be furnished with factory fabricated compression joints conforming to the requirements of ASTM C425.

(3) In lieu of the bell-and-spigot jointing requirements, the pipe and fittings may be furnished with plain ends, in which case the jointing shall be by means of compression couplings conforming to the requirements of ASTM C425, Type B.

(4) All clay pipe fittings (wyes, tees, bends, plugs, etc.) shall be of the same pipe class and joint design as the pipe to which they are to be attached.

A2 Ductile Iron Pipe and Ductile Iron and Gray Iron and Fittings

The pipe furnished shall be Ductile Iron pipe and pipe fittings furnished shall be of the Ductile Iron or Gray Iron type as specified for each particular use of installation. When Gray Iron is specified, either type may be furnished. Gray Iron may not be substituted for Ductile Iron unless specifically authorized in the Special Provisions.

Ductile iron pipe shall conform to the requirements of AWWA C115 or C151 for water, and thickness design shall conform to AWWA C150. In addition, the pipe shall comply with the following supplementary provisions:

(1) Fittings shall conform to the requirements of AWWA C110 (Gray Iron and Ductile Iron Fittings) or AWWA C153 (Ductile Iron Compact Fittings) for the joint type specified.

(2) Unless otherwise specified all pipe and fittings shall be furnished with cement mortar lining meeting the requirements of AWWA C104 for standard thickness lining. All exterior surfaces of the pipe and fittings shall have an asphaltic coating at least one mil thick. Spotty or thin seal coating, or poor coating adhesion, shall be cause for rejection.

Fittings specified to be furnished with fusion bonded epoxy external coating and/or interior lining shall conform to the requirements of AWWA C550 and C116/A21.16, with 6-8 mil nominal thickness.

Fittings and pipe specified to be furnished with zinc coating shall meet the requirements of ISO 8179-1 and ISO 8179-2. Pipe and fittings shall be coated with the manufacturer compatible asphaltic coating. Zinc coatings for pipe and fittings in corrosive environments shall be wrapped with polyethylene encasement material.

(3) Rubber gasket joints for Ductile Iron Pressure Pipe and fittings shall conform to AWWA C111.

(4) The nuts and bolts shall be constructed of corrosion resistant, high-strength, low-alloy steel with a ceramic filled, baked on fluorocarbon resin. The nuts and bolts shall be in compliance with ANSI/AWWA C111/A21.11.

(5) Conductivity, when required by the Special Provisions, shall be maintained through pipe and fittings with an external copper jumper wire or specialty gaskets which are capable of meeting conductive requirements. Wedge type connectors will not be allowed.

A3 Reinforced Concrete Pipe and Fittings

Reinforced concrete (RC) pipe, fittings and specials shall conform to the requirements of MnDOT 2501, 2503, 3236, 3726, and ASTM C76 (Reinforced Concrete Pipe) with rubber O-ring or profile joints for the type, size, and strength class specified, subject to the following supplementary provisions:

(1) All branch fittings such as tees, wyes, etc. shall be cast as integral parts of the pipe. All fittings and specials shall be of the same strength class as the pipe to which they are attached.

(2) Joints shall meet the requirements of ASTM C361, and ASTM C443.

(3) Lift holes will not be permitted unless specifically authorized in the Plans, Specifications, and Special Provisions

(4) RC pipe shall be free of irregularities in the bell and spigot such as concrete spurs, rough edges or ridges, and other irregularities that may interfere with tight closure of the joint.

(5) RC pipe interior wall shall have smooth finish, free of surface air pockets and other irregularities.

A4 Corrugated Steel Pipe and Fittings

Corrugated Steel (CS) Pipe and fittings shall conform to the requirements of MnDOT 2501, 2503, and 3226 (CS) Pipe for the application, type, size and sheet thickness specified. Joints for joining CS Pipe shall be the band type, soil-tight and watertight, with preformed gasket seals meeting MnDOT 3726. Fittings and bands for joining pipe sections shall be of the same material and thicknesses as the mainline pipe.

Specialty coatings for the pipe shall be as indicated in the Plans, Specifications, and Special Provisions.

A5 Polyvinyl Chloride Pipe and Fittings

Smooth walled polyvinyl chloride pipe and fittings shall conform to the requirements of ASTM D3034 and ASTM F679 for the size, standard dimension ratio (SDR), and strength requirements indicated on the Plans, Specifications, and Special Provisions. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D543.

Pipe fittings shall be of the same class and grade as specified for the pipe, unless otherwise specified in the special provisions.

Unless otherwise specified, all pipe and fittings shall be of the size and class as shown on the plans. PVC pipe, fittings, and connections shall be push-on type with elastomeric gasket joints which are bonded to the inner wall of the gasket recess of the bell socket.

PVC pipe and fittings for pressure sewer and forcemains shall meet the requirements of 2611.2 A3 for watermain class pipe.

Corrugated polyvinyl chloride pipe and fittings with smooth interior shall conform to the requirements of ASTM F949 for the size and wall thickness indicated on the Plans, Specifications, and Special Provisions. Unless otherwise specified, all pipe and fittings shall be push-on with snug fit elastomeric joints meeting tightness requirements of ASTM D3212 and ASTM F477.

A6 Cast Iron Soil Pipe (Removed)

A7 Acrylonitrile-Butadiene-Styrene Pipe (Removed)

A8 Corrugated Polyethylene Pipe

Dual-Wall Corrugated Polyethylene Pipe (PE/HDPE) for gravity sewers shall conform to the requirements of AASHTO M294 for storm sewer pipe sizes twelve inch (12") through sixty inch (60"). Joints shall be bell and spigot push-on type, soil-tight and watertight joints in accordance with ASTM D3212 and ASTM F477. Pipe manufacture, watertight joint testing, and installation shall conform to MnDOT 2501, 2503, 3247, ASTM C969, and as indicated in the Plans, Specifications, and Special Provisions.

A9 Solid Wall High Density Polyethylene Pipe

Solid wall HDPE for pressure and gravity sewer pipes shall meet the requirements of 2611.2A3.

A10 Fiberglass Reinforced Pipe

Fiberglass Reinforced Pipe (FRP/GRP) for gravity sewers shall meet requirements of ASTM D3262 for Glass-Fiber-Reinforced Thermosetting Resin pipe, such as reinforced thermosetting-resin pipe (RTRP) and reinforced polymer mortar pipe (RPMP; natural polymers not included) for use in gravity-flow systems. The pipe shall be manufactured with polyester resin systems with a proven history of performance in this application.

The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.

Sand used to manufacture the pipe and fittings shall be minimum ninety eight percent (98%) silica sand with a maximum moisture content of two tenths of a percent (0.2%).

Pipe resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the products.

Gaskets shall be supplied by approved gasket manufacturers and be suitable for the service intended. Minimum pressure rating of gaskets shall be two hundred fifty (250) psi.

Unless otherwise specified, the pipe shall be field connected with sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound to provide watertight joints meeting the requirements of ASTM D4161. Fittings shall be the same class as the pipe. Joints at tie-ins, when needed, may utilize fiberglass, gasket-sealed closure couplings.

Fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings are allowed unless otherwise stated in the Special Provisions.

The actual outside diameter (eighteen inch (18") to forty-eight inch (48")) of the pipes shall be in accordance with ASTM D3262. Other pipe diameter OD’s shall be per manufacturer’s literature.

Pipe shall be supplied in nominal lengths of twenty feet (20') except where noted otherwise on the drawings. Actual laying length shall be nominal ±1/4 inches. At least ninety percent (90%) of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

Pipe ends shall be square to the longitudinal pipe axis with a maximum tolerance of one-eighth inch (1/8").

Pipe shall be marked identifying each pipe with the name of manufacturer, plant location, code date of manufacturer, nominal pipe size, pipe stiffness designation and ASTM D3262.

Service lateral connections (wye, tee, bend) to the sanitary sewer shall be as recommended by the main line sewer pipe manufacturer recommendation.

A11 Polypropylene Pipe

Corrugated Polypropylene Pipe (PP) for gravity storm sewers shall conform to ASTM F2881. Pipe joints shall be bell and spigot push-on type, soil-tight and watertight joints in accordance with ASTM D3212 and ASTM F477, and shall conform to the requirements of AASHTO M330 dual wall Type “S” pipe for storm sewer pipe sizes twelve inch (12") through sixty inch (60"). Pipe manufacture, watertight joint testing, and installation shall conform to current MnDOT requirements, and as indicated in the Plans, Specifications, and Special Provisions.

A12 Tracer Wire for Non-conductive Pipe

Tracer wire for use with all thermoplastic pipe types shall be Underwriters Laboratories (UL) listed for use in direct burial applications, color coated per APWA uniform color code for the specific utility being marked. Tracer wire shall be a minimum 12 AWG copper clad steel rated to 30 volts, insulation shall be High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.
Tracer wire shall meet the following additional criteria for the construction method specified:

Open Trench - Trace wire shall be High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.

Directional Drilling/Boring - Trace wire shall be Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.

Pipe Bursting/Slip Lining - Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 ml HDPE insulation thickness.

Connectors for tracer wire shall meet the following:

All mainline trace wires must be interconnected at tees and crosses, joined using a single 3-way or 4-way lockable connector for tees and crosses, respectively.

Lockable connectors shall be for direct bury application and shall be dielectric silicon filled to seal out moisture and corrosion.

B Metal Sewer Castings

Metal castings for sewer structures such as manhole frames and covers, catch basin frames, grates and curb boxes, shall conform to the requirements of ASTM A48 (Gray Iron Castings), subject to the following supplementary provisions:

(1) Casting assemblies or dimensions, details, weights, and class shall be as indicated in the detailed drawings for the design designation specified. Unless otherwise specified, the castings shall be Class 30 or better.

(2) Lid-to-frame surfaces on round casting assemblies shall be machine milled to provide true bearing around the entire circumference.

(3) Casting weight shall be not less than ninety five percent (95%) of theoretical weight for a unit cast to exact dimensions, based on four hundred forty-two (442) pounds per cubic foot.

(4) A Certificate of Compliance shall be furnished with each shipment of castings stating that the materials furnished have been tested and are in compliance with the specification requirements.

(5) Unless otherwise specified, sanitary sewer manholes shall have self-sealing lids and concealed pick holes.

C Precast Concrete Manhole and Catch Basin Sections

Precast concrete riser sections and appurtenant units (grade rings, top and base slabs, special sections, etc.) used in the construction of manhole and catch basin structures shall conform with the requirements of ASTM C478, MnDOT 2506 and the following supplementary provisions:

(1) The precast sections and appurtenant units shall conform to all requirements as shown on the detailed drawings.

(2) Joints of manhole riser sections shall be tongue and groove with rubber "O" ring or profile gaskets conforming to the requirements of ASTM C443.

(3) Sanitary sewer inlet and outlet pipes shall be joined to the manhole with a gasketed, flexible, watertight connection, watertight boot, or any watertight connection arrangement approved by the Engineer that allows differential settlement of the pipe and manhole wall to take place.

(4) Air-entrained concrete shall be used in the production of all wet-cast units. Air content shall be maintained within the range of five (5) to eight (8) percent (%).

(5) A Certificate of Compliance shall be furnished with each shipment of precast manhole and catch basin sections stating that the materials furnished have been tested and are in compliance with the specification requirements.

(6) Lift holes will not be permitted in precast manholes.

D Mortar

Mortar for use in masonry construction shall meet the requirements of MNDOT 2506.B.2 and ASTM C270.

E Concrete

Concrete used for cast-in-place masonry construction shall be produced and furnished in accordance with the provisions of MnDOT Specification 2461, Table 2461.2-6, grade G, for the mix design indicated in the Plans, Specifications, or Special Provisions. Type 3, air-entrained, concrete shall be furnished and used in all structures having weather exposure.

2621.3 CONSTRUCTION REQUIREMENTS

A Installation of Pipe and Fittings

The Contractor shall take all necessary precautions to handle and install all pipe and appurtenances as recommended by the manufacturer, Engineer, Plans, Specifications, and the Special Provisions.

Installation of PVC pipe and fittings for pressure sewer and forcemains shall meet the requirements of 2611.3 for watermain class pipe.

A1 Inspection and Handling

Proper and adequate implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. During the process of unloading, all pipe and accessories shall be inspected by the Contractor for damage. The Contractor shall notify the Engineer of all material found to have cracks, flaws or other defects. The Engineer shall inspect the damaged materials and have the right to reject any materials found to be unsatisfactory. The Contractor shall promptly remove all rejected material from the site. All materials shall be handled carefully, as will prevent damage to protective coatings, linings, and joint fillings; preclude contamination of interior areas; and avoid jolting contact, dropping, or dumping.

All work and materials are subject to tests by the Owner at such frequency as may be determined by the Engineer.

While suspended and before being lowered into laying position, each pipe section and appurtenant unit shall be inspected by the Contractor to detect damage or unsound conditions that may need corrective action or be cause for rejection. The Contractor shall inform the Engineer of any defects discovered and the Engineer will prescribe the required corrective actions or order rejection.

Immediately before placement, the joint surfaces of each pipe section and fitting shall be inspected for the presence of foreign matter, coating blisters, rough edges or projections, and any imperfections so detected shall be corrected by cleaning, trimming, or repair as needed.

A2 Pipe Laying Operations

Trench excavation and bedding preparations shall proceed ahead of pipe placement as will permit proper laying and joining of the units at the prescribed grade and alignment without unnecessary deviation or hindrance.

All foreign matter or dirt shall be removed from the inside of the pipe and fittings before they are lowered into position in the trench and they shall be kept clean. The sewer materials shall be carefully lowered into laying position by the use of suitable restraining devices. Under no circumstances shall the pipe be dropped into the trench.

Unless otherwise permitted by the Engineer, bell and spigot pipe shall be laid with the bell ends facing upgrade and the laying shall start on the downgrade end and proceed upgrade. As each length of bell and spigot pipe is placed in laying position, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

Connection of pipe to existing lines or previously constructed manholes or catch basins shall be accomplished as shown in the Plans or as otherwise approved by the Engineer. Where necessary to make satisfactory closure or produce the required curvature, grade or alignment, deflections at joints shall not exceed that which will assure watertight joints and shall comply with the pipe manufacturer recommendations.

Entrance of foreign matter into pipeline openings shall be prevented at all times to the extent that suitable plugs or covering can be kept in place over the openings without interfering with the installation operations.

Installation of thermoplastic pipe shall conform to ASTM D2321; FRP/GRP pipe to ASTM D3839, and the manufacturers' recommendations; ASTM A798 for CS pipe, and ASTM C1479 for RC pipe.

A3 Connection and Assembly of Joints

All pipe and fitting joints shall fit tightly and be fully closed. Spigot ends shall be marked as necessary to indicate the point of complete closure. All joints shall be soil tight and watertight in all sanitary sewer and storm sewer pipe.

A4 Bulkheading Open Pipe Ends

All pipe and fitting ends left open for future connection shall be bulkheaded by approved methods prior to backfilling. Unless otherwise specified or approved, all openings of twenty-four inches (24") in diameter or less shall be closed off with prefabricated plugs or caps and all openings larger than twenty four inches (24") in diameter shall be closed off with masonry bulkheads.

Prefabricated plugs and caps shall be of the same material as the pipe material, or an approved alternate material, and they shall be installed with watertight seal as required for the pipeline joints. Masonry bulkheads for concrete pipe materials shall be constructed with concrete brick to a wall thickness of eight inches (8").

Bulkheads installed for temporary service during construction may be constructed with two-inch (2") timber planking securely fastened together and adequately braced, as an alternate to the masonry construction.

A5 Tracer Wire

Tracer wire shall be installed along the length of all non-conductive mainline pipe, laterals, and services with vertical riser to the surface, at manholes, catch basins, stubs, laterals, services, and/or utility location boxes as required by the Special Provisions. Tracer wire shall be taped, clamped or affixed to the pipe in another manner as approved by the Engineer.

Splicing tracer wire shall be by mechanical split bolt type or a crimp type compression fitting fully encased in approved electrical insulation putty. A twelve-inch (12") tracer wire loop shall be provided on each side of a spliced connection.

Tracer wire lengths greater than 500 linear feet are to include an approved grade level/in-ground access box, located at the edge of the road right-of-way and outside of the roadway.

Tracer wire shall be grounded at all terminal ends (stubs, plugs).

B Appurtenance Installations

Appurtenance items such as aprons, trash guards, gates and castings shall be installed where and as required by the Plans and in accordance with such standard detail drawings or supplementary requirements as may be specified.

Casting assemblies installed on manhole or catch basin structures shall be set in a full mortar bed for concrete adjustment rings and Engineer approved adhesive for thermoplastic rings, and be adjusted to the specified elevation without the use of shims or blocking.

Sewer aprons shall be subject to all applicable requirements for installation of pipe. All aprons and outfall end sections shall have the last three (3) sections tied. Two (2) tie bolt fasteners shall be placed in each of the last three joints, one on each side of top center at the sixty (60-degree point (from vertical). Tie bolt diameter shall be: 5/8 inch for 12" to and including 27" pipe; 3/4 inch for 30” to and including 66” pipe; 1 inch for 72” to and including 144” pipe. The tie bolts shall be of a design approved by the Engineer.

C Sewer Service Installations

Main sewer service connections and building service sewer pipe shall be installed as provided for in the Contract and as may be directed by the Engineer. The sewer service connections and pipe lines shall be installed in conformance with all applicable requirements of the main sewer installation and as more specifically provided for herein.

The Engineer, with the assistance of the Contractor, shall keep accurate records of all service installations as to type, location, elevation, point of connection and termination, etc. This service record shall be maintained jointly by the Contractor and Engineer on forms provided by the Engineer. The service installations shall not be backfilled until all required information has been obtained and recorded.

The main sewer service connection shall consist of installing a Branch Tee or Wye section in the main sewer line at designated locations or providing an insert type Saddle Tee or Wye fitting in a pipe cut-out where specified. Orientation of service connection fitting shall be as shown in the standard drawings unless otherwise directed by the Engineer.

Where the depth of cover over the main sewer invert is greater than fifteen (15) feet (or such other maximum as may be indicated), the service connection shall be extended upward by means of a Service Riser Section.

Unless otherwise specified, service pipe shall be installed at right angles to the main sewer and at a straight line grade to the property line. The standard and minimum grades shall be a uniform rise of one inch (1") in four feet (4') (two percent (2%)) for sanitary service lines and one inch (1") in eight feet (8') (one percent (1%)) for storm sewer service lines. These minimum grades may be reduced (by not more than one-half (1/2) pitch) where the Engineer so approves in the case of restrictive elevation differences.

Building service pipelines shall generally be kept as deep as required to serve the building elevation and maintain the specified minimum pipe grades. Pipe bends shall be provided as necessary to bring the service lines to proper location and grade. Pipe bends shall not exceed twenty-two and one half (22-1/2) degrees without approval of the Engineer.

Unless otherwise indicated, service pipe installation shall terminate at property line or as designated on the Plans, with a gasketed plug placed in the end, at which point the Contractor shall furnish and set a four inch by four inch (4" x 4") wooden timber six feet (6') to eight feet (8') in length embedded four feet (4') below grade, or approved steel post to mark the exact end of pipe. The timber or post shall be set vertically, with the top two feet (2') painted green.

Wherever service line connections to the main sewer are permitted or required to be made by the open cut-out method in the absence of a built-in Tee or Wye fitting, the connection shall be made by using an approved type of Saddle Tee or Wye fitting. The pipe cut-out shall be made with an approved type coring machine or by other approved methods producing a uniform, smooth circular cut-out as required for proper fit. The cut-out discs shall be retrieved and shall not be allowed to remain within the main sewer pipe. The Saddle Tee shall be securely fastened to the main sewer pipe by means of epoxy resin or other approved adhesive. The entire connection fitting shall be encased in concrete to a minimum thickness of six inches (6") and as may be shown in the standard drawings.

Wherever service line connections to the main sewer are required to be made by means of built-in Branch Tee or Wye fittings, the Contractor shall, in the absence of such fitting, remove a section of the main sewer pipe and replace it with the required Branch Tee or Wye section connected by means of an approved sleeve coupling.

Sanitary sewer service lines shall not be connected to a manhole at an elevation more than twenty-four inches (24") above the crown of the outgoing sewer. Where the elevation difference is greater than twenty-four inches (24"), the connection shall be made by means of an Outside Drop Connection in accordance with the details shown in the standard drawings.

All pipe and fitting openings at temporary terminal points shall be fitted with suitable plugs or shall be bulkheaded as required for the main sewer pipe.

D Manhole and Catch Basin Structures

Manholes, catch basins, and other special access structures shall be constructed at designated locations as required by the Plans and in accordance with any standard detail drawings or special design requirements given therefor.

Unless otherwise specified or approved, storm sewer manholes and catch basins shall be constructed on a precast or cast-in-place concrete base and the barrel riser sections, and cone section shall all be of precast concrete. Sanitary sewer manholes shall be constructed with precast concrete integral base with pre-formed invert barrel section and with watertight boots at all pipe locations. All units shall be properly fitted and sealed to form a completely watertight structure. Manholes and catch basin structures shall be fabricated to provide a twelve-inch (12") or sixteen-inch (16") barrel section immediately below the cone or top slab whenever possible. Barrel and cone height shall permit placement of at least two (2) and not more than six (6) standard two-inch (2") precast concrete or high-density polyethylene adjusting immediately below the casting assembly. Sanitary manhole adjustment rings and casting flange shall be fitted with specified method/materials as indicated in the Special Provisions to reduce inflow and infiltration. Storm sewer manhole and drainage structure adjustment rings and casting flange shall be wrapped with a Type 1 Geotextile fabric meeting MnDOT 3733.

Unless otherwise specified or approved, manholes and catch basins shall have an inside barrel diameter at the bottom of forty-eight inches (48") minimum and the inside diameter at the top of the cone section and all adjusting rings shall be of the same size and shape as the casting frame. Casting assemblies shall be as specified in the Plans

Concrete cast-in-place base shall be poured on undisturbed or firmly compacted foundation material which shall be trimmed to proper elevation. The bottom riser section shall be set in fresh concrete, mortar, or approved preformed flexible gasket seal, and all other riser section joints of the tongue and groove design shall be sealed with rubber gaskets. The concrete base under an outside drop connection shall be monolithic with the manhole base.

Wherever special designs require or permit, and as may be approved by the Engineer, a precast concrete base may be used or the structure may be constructed with solid sewer brick or block units or with cast-in-place concrete. Any combination of cast-in-place concrete and brick or block mortar construction will be allowed and may be required where it is impossible to complete the construction with standard precast manhole sections.

All storm sewer manhole and catch basin structure doghouses shall be completely filled on the interior and exterior wall with mortar, concrete masonry, or concrete to completely seal the pipes into the structure wall. When formed inverts are specified, the inside bottom of each manhole and catch basin shall be shaped with fresh concrete to form free flow invert troughs.

When connecting to an existing sanitary sewer manhole without an existing opening for sewer pipe, the Contractor shall be required to core-drill an opening of the correct size and elevation for the proposed sanitary sewer facility. The Contractor shall set the connecting pipe through the full thickness of the wall flush with the inner face of the wall. Connection to the structure shall be made with a watertight joint, by means of a rubberized boot. The Contractor shall ensure the flow line of the manhole is constructed in a manner to provide steady flow from the new sanitary line to the existing sanitary line. The flow line and the core-drilled hole are to be grouted smooth. The Contractor shall install a plug in the connecting pipe once the connection is complete and construction has advanced to the next manhole to prevent rainwater or sediment from entering the existing system. The plug shall be removed once all the proposed sanitary sewer mains on the project have been installed, tested, inspected, and approved.

E Sanitary Sewer Leakage Testing

All sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by Others. Each test section of the sewer shall be subjected to exfiltration testing, either by hydrostatic or air test method as described below and at the Contractor's option. The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test.

If the ground water level is greater than three feet above the invert elevation of the upper manhole and the Engineer so approves, infiltration testing may be allowed in lieu of the exfiltration testing, in which case the allowable leakage shall be the same as would be allowed for the Hydrostatic Test.

All testing shall be performed by the Contractor without any direct compensation being made therefore, and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.

E1 Air Test Method

E1a Gravity Sewers

All gravity sanitary sewer lines, including service connections, shall be substantially watertight and shall be tested for excessive leakage upon completion and before connections are made to the service by Others. Each test section of the sewer shall be subjected to exfiltration testing by the ASTM F1417 (low pressure air) test method regardless of pipe material.

The requirements set forth for maximum leakage shall be met as a condition for acceptance of the sewer section represented by the test. All testing shall be performed by the Contractor without any direct compensation being made therefore, and the Contractor shall furnish all necessary equipment and materials, including plugs and standpipes as required.

The sewer pipe section under test shall be clean at the time of testing but the pipe may be wetted. Pneumatic balls shall be used to plug the pipe ends at manholes. Low pressure air shall be introduced to the plugged line until the internal air pressure reaches three and one half (3.5) psi greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two (2) minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started. During this time the Contractor shall check all plugs to detect plug leakage. If plugs are found to leak, air shall be bled off, the plugs shall be retightened, and the air shall be reintroduced into the line.

The sewer section under test will be accepted as having passed the air leakage test when the rate of air loss as measured by pressure drop, does not exceed a specified amount in a specified time. Pressure drop may be determined by using the table below, or calculated by use of the formulas provided below.

TABLE

Minimum Specified Time Required for a 0.5 psig Pressure Drop for Size and Length of Pipe Indicated for Q = 0.0015 CFM/SF

Pipe Diameter (Inches)	Minimum Time (Min:Sec)	Length for Min. Time (Feet)	Time for increased Length (Sec)	Specification Time for Length (L) Shown (Min:Sec)							
				100 Ft.	150 Ft.	200 Ft.	250 Ft.	300 Ft.	350 Ft.	400 Ft.	450 Ft.
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51.	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	28:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
*27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:18	50:30	57:42	64:54
*30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:131	80:07
*33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
*36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

*NOTE - Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater than twenty-four inches (24") in diameter.

FORMULA

The formula below calculates the specified minimum time required for a **1.00 psig pressure drop** from a starting pressure of 3.5 psig to a final pressure of 2.5 psig using a leakage rate of 0.0015 cubic feet/minute/square foot of internal surface.

Calculate all test times by the following formula:

$$T = 0.085\ DK/Q$$

where:
T = shortest time allowed for the **air pressure to drop 1.0 psig**, sec.
K = 0.000419 DL but not less than 1.0,
Q = leak rate = 0.0015 CFM/SF,
D = measured average inside diameter of sewer pipe, in., and
L = length of test section, ft.

E2 Hydrostatic Test Method

E2a Gravity Sewers

After bulkheading the test section, the pipe shall be subjected to a hydrostatic pressure produced by a head of water at a depth of three feet (3') above the invert elevation of the sewer at the upstream manhole of the test section. In areas where ground water exists, this head of water shall be three feet (3') above the existing water table.

The water head shall be maintained for a period of one (1) hour during which time it will be presumed that full absorption of the pipe body has taken place, and thereafter for an extended period of one (1) hour the water head shall be maintained as the test period. During the test period, the measured water loss within the test section, including service stubs, shall not exceed an infiltration / exfiltration rate of thirty-five (35) gallons / inch diameter / mile / day.

If measurements indicate exfiltration within a test action section is not greater than the allowable maximum, the section will be accepted as passing the test.

E2b Pressure Sewers

For sewers designated as pressure pipe sewers, the sewer shall be subjected to hydrostatic testing under 2611.3G Hydrostatic Testing of Watermains, except the hydrostatic testing pressure shall be two (2) times the maximum design operating pressure, but not less than one hundred (100) psig and the duration of the test shall be one hour.

E3 Test Failure and Remedy

In the event of test failure on any test section, testing shall be continued until all leakage has been detected and corrected to meet the requirements. All repair work shall be subject to approval of the Engineer. Introduction of sealant substances by means of the test water will not be permitted.

Unsatisfactory repairs or test results may result in an order to remove and replace pipe as the Engineer considers necessary for test conformance. All repair and replacement work shall be at the Contractor's expense.

F Deflection Test

Deflection tests shall be performed on all plastic gravity sewer pipes. The test shall be conducted after the sewer trench has been backfilled to the desired finished grade and has been in place for thirty (30) days.

The deflection test shall be performed by pulling a rigid ball or nine-point mandrel in accordance with MnDOT 2503.3 C.4. Direct measurement of the pipe diameter to determine deflection is not allowed. The ball or mandrel shall have a minimum diameter equal to ninety five percent (95%) of the actual inside diameter of the pipe. The maximum allowable deflection shall not exceed five percent (5%) of the pipe's internal diameter. The line will be considered acceptable if the mandrel can progress through the line without binding. The time of the test, method of testing, and the equipment to be used for the test shall be subject to the approval of the Engineer.

All testing shall be performed by the Contractor at his expense without any direct compensation being made therefore, and he shall furnish all necessary equipment and materials required.

F1 Test Failure and Remedy

In the event of test failure on any test section, the section shall be replaced, with all repair work subject to approval of the Engineer. The replaced section shall be retested for leakage and deflection in conformance with the specifications contained herein. All repairs, replacement, and retesting shall be at the Contractor's expense.

G Televising

Sewer line televising may be required by the Engineer, at the cost of the Contractor, if visual inspection, leakage testing, or deflection testing indicate the sewer has not been constructed in accordance with these specifications and the requirements of the Plans, Specifications, and Special Provisions.

2621.4 METHOD OF MEASUREMENT

All items will be measured separately according to design designation as indicated in the Pay Item name and as may be detailed and defined in the Plans, Specifications, or Special Provisions.

Complete-in-place items shall include all component parts thereof as described or required to complete the unit, but excluding any excesses covered by separate Pay Items. Linear measurement of piping will include the running length of any special fittings (tees, wyes, elbows, gates, etc.) installed within the line of measure between specified terminal points.

A Sewer Pipe

Sewer pipe of each design designation will be measured by length in linear feet along the line of pipe. Terminal points of measurement will be the pipe end at free outlets; the point of connection with in-place pipe; the center of manholes or catch basins; the point of centerline intersections at branch fittings; or the point of juncture with other appurtenances or units as defined.

Separation of quantities according to "depth zone classification", when so designated in the Pay Item, will be determined by depth of pipe invert below the ground surface profile.

B Manholes

Manholes of each design designation will be measured by number of each constructed complete-in-place, including the base and castings as required, but excluding any excess depth greater than eight feet (8') measured from top of manhole cover to invert elevation of lowest pipe.

Excess manhole depth of each design designation will be measured by the linear foot difference in depth between the eight feet (8') allowed as standard and the actual increased depth as constructed.

C Catch Basins

Catch basins of each design designation will be measured by number of each constructed complete-in-place, including the base and castings as required, but excluding any excess depth greater than five feet (5') measured from top of grate (low point) to invert elevation of lowest outlet pipe.

Excess catch basin depth of each design designation will be measured by the linear foot difference in depth between the five feet (5') allowed as standard and the actual increased depth as constructed.

D Outside Drop Connection

Outside drop connections of each design will be measured by linear foot constructed complete-in-place, and shall include granular encasement, fittings, any special piping required, including coring holes and watertight boots for existing manholes for the drop connection. Measurement shall be made vertically from the invert of the lower outside drop invert to the upper outside drop invert.

E Service Connection

Service Connections of each design will be measured by number of each constructed complete-in-place as specified.

F Service Pipe

Service pipe of each design will be measured separately by length in linear feet, horizontally along the line of installation, between the service end and the point of juncture with the main pipe connection fitting.

G Special Pipe Fittings

Special pipe fittings (wyes, tees, bends, etc.) of each design designation will be measured by number of each installed complete-in-place as specified, but excluding any such fittings required to be installed as a component part of any other Work Unit.

H Appurtenant Items

Appurtenant items such as aprons, trash guards, gates and other prefabricated units or assemblies as identified by Pay Item name will be measured separately by number of each installed complete-in-place as specified.

2621.5 BASIS OF PAYMENT

Payment for sewer pipe and service pipe items at the Contract prices per linear foot of pipe of each design shall be compensation in full for all costs of providing a complete-in-place pipeline, including excavation, foundation preparation, backfilling, leakage testing, restoration of surface improvements, disposal of surplus or waste materials, final cleanup, and such other work as may be specified, but excluding the construction of other structures or special sections and the placement of special fittings, appurtenances or materials specifically designated for payment under other Contract Items.

Payment for manhole, catch basin, outside drop connection, service connection, and other structures as specified, at the Contract prices per structure, shall be compensation in full for all costs of constructing each unit complete-in-place as specified, including all required castings, special fittings, base or encasement, and appurtenant materials as specified for the complete structure or section, but excluding such additional work as may be designated for payment under other Contract Items.

Where the specified standard manhole, catch basin, or outside drop connection depths are exceeded, the excess depth of each design will be paid for separately as linear footage items and payment at the Contract prices therefor shall be compensation in full for all costs of providing the extra depth.

Special pipe fittings such as wyes, tees and bends will be paid for as separate Contract Items to the extent they are required to be installed in the sewer pipe and service pipe lines and not as a component part of a complete-in-place structure (outside drop connections, service connections, etc.)

Appurtenant items such as aprons, trash guards, drainage gates, and other prefabricated units or assemblies and specials as designated will be paid for as separate Contract Items to the extent they are not included as a component part of any complete-in-place structure.

SECTION 2631 CIPPS – STANDARD SPECIFICATIONS FOR SEWER PIPE REHABILITATION WITH CURED IN-PLACE PIPE SYSTEMS (CIPPS)

2631.1 CIPPS DESCRIPTION

A General

This work shall consist of the rehabilitation of pipelines and conduits by the installation of a resin-impregnated flexible tube Cured-In-Place Pipe System (CIPPS). The rehabilitation of pipelines shall be constructed by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. The CIPP shall extend the full length of the original pipe and provide a structurally sound, joint less and watertight new pipe within the existing pipe. The Contractor is responsible for proper, accurate and complete installation of the CIPP using the system selected by the Contractor.

Neither the CIPP system, nor its installation, shall cause adverse effects to any downstream facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products that may affect downstream structures, pups, pipe, equipment and wastewater treatment facilities. The Contractor shall notify the Engineer and identify any by-products produced as a result of the installation operations, test and monitor the levels, and comply with any and all local waste discharge requirements. The Contractor shall clean up, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and residents.

The use of the term "Plans, Specifications, and Special Provisions" within this specification shall be construed to mean those documents which compliment, modify, or clarify these specifications and are an enforceable component of the Contract Documents.

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto, published prior to the date of advertisement for bids.

All references to other Specifications of AASHTO, ASTM, ANSI, AWWA, etc. shall mean the latest published edition available on the date of advertisement for bids.

The following specifications have been referenced in this Specification:

ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)
ASTM D543 Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D638 Standard Test Method for Tensile Properties of Plastics
ASTM D790 Standard Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by displacement.
ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic Cured-in- Place (GRP-CIPP) Using the UV-Light Curing Method
ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
ASTM D2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
ASTM D5813 Standard Specification for Cured-in Place Thermosetting Resin Sewer Piping Systems

B Qualifications

The Contractor shall be responsible for all aspects of the design of the liner pipe. The Contractor shall guarantee that the installed liner is capable of sustaining outside loads, resist chemical attack that normally occurs in sanitary and storm sewer systems, and will maintain hydraulic characteristics over a fifty (50) year design life.

Unless provided otherwise in the plans or Special Provisions, the existing sewer pipe shall be considered to be in a fully deteriorated condition, is not structurally sound, and cannot support soil and live loads. The cured-in-place pipe shall be designed to support hydraulic, soil, and live loads.

The sewer products are intended to have a fifty (50) year or greater design life, and in order to minimize the Owner's risk, only proven products with substantial successful long term track records will be approved.

B1 Manufactured Products and Installation

Contractors must meet all of the following criteria:

a. For a Product to be considered acceptable, a minimum of 100,000 linear feet or two hundred fifty (250) manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Engineer. In addition, at least 50,000 linear feet of the product shall have been in successful service within the State for a minimum of five (5) years.

b. The Contractor's personnel must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least 5 (five) years active experience in the commercial installation of the product bid. In addition, the Contractor's personnel must have successfully installed at least 100,000 feet of the same product bid. The Field Supervisor/Foreman shall have a minimum five (5) years as a foreman/superintendent for a cured-in-place lining crew (installing actual product included with this bid/proposal), and a minimum of 100,000 lineal feet of cured-in-place lining, diameters up to and including twenty-four inches (24") installed under his/her supervision. Such experience shall include the actual product, by trade name, Contractor proposes to install. Acceptable documentation of these minimum installations must be submitted to the Engineer.

c. Sewer rehabilitation products submitted for approval must provide Third Party Test Results supporting the long-term performance and structural strength of the product and such data shall be satisfactory to the Engineer. Test samples shall be prepared ~~so as~~ to simulate installation methods and trauma of the product. No product will be approved without independent third-party testing verification.

2631.2 CIPPS MATERIALS

A General

All materials required for this work shall be new material conforming to requirements of the referenced specifications for the class, kind, type, size, grade, and other details indicated in the Contract. Unless otherwise indicated, all required materials shall be furnished by the Contractor. If any options are provided for~~, as to~~ type, grade, or design of the material, the choice shall be limited as may be stipulated in the Plans, Specifications, or Special Provisions.

All manufactured products shall conform in detail to such standard design drawings as may be referenced or furnished in the Plans. Otherwise, the Owner may require advance approval of material suppliers, product design, or other unspecified details as it deems desirable for maintaining adopted standards.

All materials shipped to the project site shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein. Materials shall be shipped, stored, and handled in a manner consistent with written recommendations of the CIPP manufacturer to avoid damage. Damage includes but is not limited to gouging, abrasion, flattening, cutting, puncturing, and ultra-violet (UV) degradation. All damaged materials shall be promptly removed from the project site at no cost to the Owner. On-site material storage locations shall be approved by the Engineer.

A1 CIPPS Fabric Tube

The CIPPS fabric “Tube” shall consist of one or more layers of absorbent non-woven felt fabric, felt/fiberglass or fiberglass and meet the requirements of ASTM F 1216, ASTM F 1743, ASTM D5813 & ASTM F2019. The fabric Tube shall be capable of absorbing and carrying resins, manufactured to withstand installation pressures and curing temperatures, have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections.

The fabric Tubes shall have a uniform thickness that when compressed at installation pressures will equal the specified nominal tube thickness.

The wet-out fabric tube shall have a uniform thickness and excess resin distribution that when compressed at installation pressures will meet or exceed the design thickness after cure.

The fabric tube shall be manufactured to a size and length that when installed will tightly fit the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during installation. The tube shall be properly sized to the diameter of the existing pipe and the length to be rehabilitated and be able to stretch to fit irregular pipe sections and negotiate bends. The Contractor shall determine the minimum tube length necessary to effectively span the designated run between manholes. The Contractor shall verify the lengths in the field prior to ordering and prior to impregnation of the tube with resin, to ensure that the tube will have sufficient length to extend the entire length of the run.

The Contractor shall also measure the inside diameter of the existing pipelines in the field prior to ordering liner so that the liner can be installed in a tight-fitted condition. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be allowed.

The minimum length of the fabric tube shall be that deemed necessary by the installer to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process.

The outside and/or inside layer of the fabric tube (before inversion/pull-in, as applicable) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate, if applicable, vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wet-out) procedure.

No material shall be included in the fabric tube that may cause de-lamination in the cured CIPP. No dry or unsaturated layers shall be acceptable upon visual inspection as evident by color contrast between the felt fabric and the activated resin containing a colorant. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No materials shall be included in the tube that is subject to delamination in the CIPPS.

The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. The hue of the color shall be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.

Seams in the fabric tube, if applicable, shall meet the requirements of ASTM D5813. The outside of the fabric tube shall be marked every five feet (5') with the name of the manufacturer or CIPP system, manufacturing lot and production footage.

The nominal fabric tube wall thickness shall be constructed to the nearest 0.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 0.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation shall be sufficient to fill all of the felt voids for the nominal felt thickness.

The resin shall be a corrosion resistant polyester or vinyl ester resin and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216, ASTM F1743 or F2019, the physical properties herein, and those, which are to be utilized in the design of the CIPP for this application. The resin shall produce CIPP which will comply with or exceed the structural and chemical resistance requirements of this specification.

A2 CIPPS Structural Requirements

The physical properties and characteristics of the finished liner will vary considerably, depending on the types and mixing proportions of the materials used, and the degree of cure executed. It shall be the responsibility of the Contractor to control these variables and to provide a CIPP system which meets or exceeds the minimum properties specified herein:

(1) The CIPP shall be designed as per ASTM standards. The CIPP design shall assume no bonding to the original pipe wall.

(2) The design engineer shall set the long term (fifty (50) year extrapolated) Creep Retention Factor at thirty three percent (33%) of the initial design flexural modulus as determined by ASTM D-790 test method. This value shall be used unless the Contractor submits long-term test data (ASTM D2990) to substantiate a higher retention factor.

(3) The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two (2) layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

Minimum Physical Properties: The cured pipe material (CIPP) shall, at a minimum, meet or exceed the structural properties, as listed in the table below.

Property	Test Method	Cured Composite Per ASTM F1216	Cured Composite Per Design
Flexural Modulus of Elasticity (Short Term)	ASTM D790	250,000 Psi	Contractor Value
Flexural Strength (Short Term)	ASTM D790	4,500 Psi	Contractor Value

The required structural CIPP wall thickness shall be based as a minimum, on the physical properties listed above and in accordance with the Design Equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0 (1.5 For Pipes 36” Or Larger)
Creep Retention Factor	33%
Ovality	2% Or as Measured By Field Inspection
Constrained Soil Modulus	Per AASHTO LRFD Section 12 And AWWA Manual M45
Groundwater Depth	As Specified or Indicated On The Plans
Soil Depth (Above the Crown)	As Specified or Indicated On The Plans
Live Load	H20 Highway
Soil Load (Assumed)	120 Lb/Cu. Ft.
Minimum Service Life	50 Years

The Contractor shall submit, prior to installation of the lining materials, certification of compliance with these specifications and/or the requirements of the pre-approved CIPP system. Certified material test results shall be included that confirm that all materials conform to these specifications. Materials not complying with these requirements will be rejected.

CIPP Short-Liners or segmental liners shall be of the same materials and meet the structural requirements of the full CIPP Tube liner.

A3 Material Testing Requirements

(1) Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.

(2) Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

(3) CIPP Field Samples - When requested by the Owner, the Contractor shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in above have been achieved in previous field applications. Samples for this project shall be made and tested as described herein.

2631.3 CIPPS CONSTRUCTION REQUIREMENTS

The Contractor shall clean the interior of the existing host pipe prior to installation of the CIPP liner. All debris and obstructions that will affect the installation and the final CIPP product shall be removed and disposed of. The CIPP liner shall be constructed of materials and methods, that when installed, shall provide a joint less and continuous structurally sound liner able to withstand all imposed static and dynamic loads on a long-term basis.

A Installation of CIPPS

A1 Access

It will be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work and provide rights of access to these points. If a street must be closed to traffic because of the orientation of the sewer, the Contractor shall institute the actions necessary to do this for the mutually agreed time period. Traffic Control shall be the responsibility of the Contractor and shall conform to the latest revision of the MMUTCD and other provisions of this specification herein. The Contractor shall keep the roadway open to traffic at all times unless given prior approval by the Engineer.

A2 Water Usage

Water is available from the City at designated locations for cleaning, inversion, and other work items requiring water. Use of an approved double check backflow assembly shall be required. The Contractor shall provide his own approved assembly. The Contractor may use City water but shall inform the Public Works Department of such use and obtain a meter for documenting water usage. No fees will be charged for water.

A3 Cleaning of Sewer Lines

The Contractor shall remove all internal debris from the pipe line that will interfere with the installation and the final product delivery of the CIPP as required in these specifications. Solid debris and deposits shall be removed from the system and disposed of properly by the Contractor. Moving material from manhole section to manhole section shall not be allowed. As applicable the contractor shall either plug or install a flow bypass pumping system to properly clean the pipe lines. The Contractor shall ensure that no debris is transferred downstream during cleaning operations. The Contractor shall use a vacuum vehicle or similar means to remove debris during cleaning operations. Precaution shall be taken, by the Contractor in the use of cleaning equipment to avoid damage to the existing pipe. The repair of any damage, caused by the cleaning equipment, shall be the responsibility of the Contractor. Disposal of the cleaning debris shall be in accordance with local, State and Federal Law and shall be incidental to the CIPPS.

A4 Bypassing Wastewater

The Contractor shall provide a bypass for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for CIPP installation. Installation of the liner shall not begin until the Contractor has installed a sewage bypass system and all pumping facilities have been installed and tested under full operating conditions including the bypass of mainline and side sewer flows. Once the lining process has begun, existing sewage flows shall be maintained, until the resin/felt tube composite is fully cured, cooled down, fully televised and the CIPP ends finished. The Contractor shall coordinate sewer bypass and flow interruptions with the Engineer at least fourteen (14) days in advance and with the property owners and businesses at least three (3) business days in advance. The pump and bypass lines shall be of adequate capacity and size to handle peak flows. The Contractor shall submit a detail of the bypass plan and design to the Engineer prior to proceeding with any CIPP installation. Compensation for bypass pumping and all associated plans and approvals shall be included in the price bid for CIPPS Installation.

A5 Inspection of Pipelines

Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the CIPPS into the pipelines and it shall be noted so that these conditions can be corrected. A video and suitable log shall be kept for later reference by the Owner. The Owner has copies of a video inspection of the sewers to be relined, and these are available for prospective bidders. However, since the deterioration of sewer is an ongoing process, and roots, solids, and deposits can accumulate over time, the Contractor shall base the design of the liner on inspections made immediately prior to installation.

A6 Line Obstructions

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the inversion process, that was not evident on the pre-bid video and it cannot be removed by conventional sewer cleaning equipment, if directed by the Owner, the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.

A7 Public Notification

The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be out of service, the maximum amount of time of no service shall be eight (8) hours for any property served by the sewer. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:

(1) Written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any problem which could arise.

(2) Personal contact with any home or business, which cannot be reconnected within the time stated in the written notice.

(3) Notification shall include advisory statements to the resident that:

a. To minimize odor problems during the installation of CIPP, residents should be advised to ensure that their sewer traps are in a proper state of repair. In cases of damaged, dry, or non-existent traps, the areas or rooms where floor drains or access to traps are located should be ventilated, if possible, by leaving doors or windows open to the outside during the CIPP installation process.

The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.

A8 Liner Installation

CIPP installation shall be in accordance with the applicable ASTM standards with the following modifications:

(1) The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point. If pulled into place, a power winch should be utilized, and care should be exercised not to damage the tube as a result of pull-in friction.

(2) Prior to installation and as recommended by the manufacturer remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.

(3) Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles. The manufacturer's recommended cure schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.

(4) The Contractor shall remove protruding taps to the inside wall of the pipe. In no case shall the pipe be less than ninety five percent (95%) open to flow.

A9 Resin Impregnation

The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used. To ensure a through wet-out, the point of vacuum shall be no further than twenty-five feet (25') from the point of initial resin introductions. After vacuum in the tube is established, the vacuum points shall be no further than seventy-five feet (75') from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular to the longitudinal axis of the tube as possible. A roller system shall be used to uniformly distribute tie resin throughout the tube. If the Installer proposes an alternate method of resin impregnation, the method must produce the same results and the method approved by the Engineer.

A10 Cool Down

The Contractor shall cool the CIPP in accordance with the manufacturer's recommendations. Temperatures and curing data shall be monitored and recorded, by the Contractor, throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP System manufacturer's recommendations.

Proper curing and handling of CIPP systems shall be done using the following guidelines for discharge of by-products:

Water Curing Method:

Sanitary Sewers
(1) Release process water to the sewer after per industry standards during/after cool-down.

Storm Sewers and Culverts
(1) Based upon receiving waterway's assimilative capacity
    a. Discharge water when cooled to ambient air temperature;
    b. Discharge water once styrene concentration is confirmed to be at or below 25ppm; or,
    c. Transport process water to nearest wastewater treatment facility

Steam Curing Method:

Sanitary Sewers
(1) Release condensate water directly to receiving sewer while processing.

Storm Sewers and Culverts
(1) Based upon receiving waterway's assimilative capacity
    a. Detain condensate in a lined holding pond until it cools to ambient;
    b. Discharge water once styrene concentration is confirmed to be less than 25ppm; or
    c. Retrieve condensate by pumping it into the steam generation truck's reservoir; or
    d. Transport condensate to nearest wastewater treatment facility.

A11 Finishing Operations

The installed CIPP shall be continuous over the entire length of a sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and delamination. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe. Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Contractor's expense. The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal. If any of the service connections leak water between the host pipe and the installed liner, the connection mainline interface shall be sealed to provide a watertight connection. If the wall of the CIPP leaks, it shall be repaired or removed and replaced with a watertight pipe as recommended by the manufacture of the CIPP system.

At all points where the liner pipe has been exposed (such as service connection fittings, or other points where the old pipe must be removed), the liner pipe and fittings shall be encased in cement-stabilized sand or other high-density material as specified by the Engineer to prevent deflection due to difference in subsidence. After the encasement material is in place and accepted by the Engineer, backfill is placed and compacted to require finish grade in accordance with the specifications. Particular care should be taken to ensure compaction of earth beneath the lateral/service pipe in order to reduce subsidence and resultant bending at the lateral connection at the sewer main.

A12 Manhole Connections

A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole walls in accordance with the CIPP System manufacturer's recommendations.

A13 Reconnections of Existing Services

Services shall be identified by the Contractor prior to lining work. After the pipe has been reconstructed and tested, the service connections shall be reconnected. It is the Contractor's responsibility to make sure that all service connections are reconnected, unless otherwise directed by the Engineer. A CCTV camera and remote cutting tool shall be used for internal reconnections. The machined opening shall be at least ninety-five percent (95%) of the service connection opening and the bottom of both openings must match. The opening shall not be more than one hundred percent (100%) of the service connection opening.

The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris. In the event that service reinstatements result in openings that are greater than one hundred percent (100%) of the service connection opening, the Contractor shall install a CIPP type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections. Discs of pipe material resulting from service tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Discs shall not be allowed to pass through the system.

A14 CIPP Short-Liner

The CIPP short-liner shall meet the requirements of the full length CIPP liner and the following:

(1) The Short-Liner shall be inserted into the existing sewer line with a power winch and steel cable attached to the end of the liner by use of an appropriate pulling head. Length of the liner to be inserted at any one time shall be governed by the length of the section in need of repair or the maximum length of the installation equipment considering the size and condition of the sewer.

(2) A mobile installation unit shall be brought to the site ready to process the liner. The installation unit shall contain heat generating equipment, CCTV facility and other auxiliary miscellaneous equipment necessary for controlling processing of the Short-Liner pipe. The equipment shall be positioned next to the point of entry with minimum obstruction to the other side activities and shall be operated by trained personnel only.

(3) The pressure shall be increased to compensate for the heating-cooling transition and it shall be maintained until the temperature at the lowest critical point is 100º F (38º C). This shall constitute completion of the Short-Liner pipe processing. The pipe within the pipe shall be tight fitting and adapted to the existing sewer pipe.

B TESTING AND INSPECTION

B1 Testing

CIPP samples shall be prepared and tested in accordance with ASTM F1216, Section 8.1, using either method proposed. Leakage testing of the CIPP shall be accomplished during cure while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by the Engineer.

B2 Inspection

Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.4. The relined pipe shall be continuous without joints through the entire pipe length. The liner shall be free of all visible defects except those resulting from pre-lined conditions which the Contractor has noted prior to lining. There shall be no pits, pinholes, cracks, or crazing, and the surface shall be smooth and free of waviness throughout the pipe. Any defects shall be repaired by the Contractor with no expense to the Owner. Where leakage is observed through the wall of the pipe, the contractor shall institute additional testing including but not limited to air testing, localized testing and any other testing that will verify the leak proof integrity of the installed CIPP to the satisfaction of the Owner.

B3 Televising

Prior to final acceptance of any sanitary sewer relining including short-liners, the Contractor shall inspect by means of remote closed circuit television equipment the entire segment of sanitary sewer, manhole-to manhole. Sewer shall be cleaned prior to inspection. A video of the inspection shall be furnished to the City. The following conditions shall apply to the sewer acceptance TV inspection:

(1) The video shall be in a format to be decided by the Owner, that creates high quality picture and sound and shall be recorded in color.

(2) The TV camera shall be pulled through the sewer at a maximum rate of thirty-five feet (35') per minute.

(3) The camera shall be pulled downstream in all cases.

(4) The lens of the camera shall be cleaned at each manhole or when directed by the Owner.

(5) The recording shall have an on-screen display showing the following:
   a. Upstream and downstream manhole numbers
   b. Footage from the upstream manhole
   c. Inspection date

(6) Sewers shall not be televised within forty-eight (48) hours of a rainfall event greater than one half inch (½").

2631.4 CIPPS METHOD OF MEASUREMENT

Measurement for CIPP Lining shall be on a linear foot basis, to the nearest whole foot, measured from center of manhole to center of manhole.

2631.5 CIPPS BASIS OF PAYMENT

The proposal form shall cover all work shown on the contract drawings, specifications, and Special Provisions. All costs associated with the work including furnishing of all materials, providing all construction and equipment, and performing all necessary labor, coordination, supervision, and management to fully complete the work, shall be included in the unit or lump sum prices quoted in the proposal form. This work shall include restoration of all surfaces to their original condition or better. Reconnection of all existing services shall be considered incidental to the CIPPS. All work not specifically set forth as a pay item in the proposal form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the amounts and prices submitted in the proposal form.

The following methods of measurement for payment will be used to derive the quantities installed:

(1) Site Protection and Restoration

a. No separate payment will be made for protection and restoration of roadway surfaces, curb and gutter, landscaping, and other site features unless otherwise specified.

(2) Spot Repair to existing pipe

a. Bid items have been provided in the proposal for removal and replacement of pipe as Spot or Point Repairs. No additional compensation will be granted for repairs.

(3) Cured-in-Place Pipe System (CIPPS)

a. Payment shall be made at the unit price as listed on the proposal. All work related to the cleaning, installation and acceptance of the system as a whole shall be considered incidental to CIPPS installation.

b. Payment for re-instatement of services shall be at the unit price listed on the proposal per each service, and shall be compensation in full for all materials, labor, equipment, and maintenance necessary to complete the work as required by the plans or required by the Engineer.

c. Payment for Short-Liner installations shall be made at the unit price listed on the proposal and shall be compensation in full for all materials, labor, equipment, and maintenance necessary to complete the work as required by the plans or required by the Engineer.

SECTION 2641 – STANDARD SPECIFICATIONS FOR PIPELINE REHABILITATION BY PIPE BURSTING

2641.1 DESCRIPTION

A General

All references to MnDOT Specifications shall mean the latest published edition of the Minnesota Department of Transportation “Standard Specifications for Construction”, and all supplements and amendments thereto, published prior to the date of advertisement for bids.

This specification shall cover the rehabilitation of existing gravity and pressure utility pipelines using pipe bursting methods. Pipe bursting is a process by which the bursting unit fractures the existing pipe while simultaneously installing a new pipe of the same size or larger size pipe in the place of the existing pipe. Existing lateral and service connections are disconnected prior to mainline pipe bursting to reduce lateral pipe/service pipe damage, then reconnected after testing and disinfection of the new pipe as applicable is approved, television inspection of the new pipe is performed, and the installation is completed in accordance with the contract documents.

2641.2 QUALIFICATIONS

The Contractor shall be certified by the Pipe Bursting System Manufacturer as a fully trained installer of the pipe bursting system. The Contractor shall provide certifications of training and proficiency in the use of the equipment. Only the Contractor’s employees that are trained and certified shall operate the equipment.

The Contractor shall have a minimum of five (5) years' experience using the pipe-bursting method proposed and shall have installed no less than 50,000 feet by this method.

2641.3 MATERIALS

Pipe materials shall meet the requirements described in Sections 2611.2 and 2621.2 of these specifications, and as provided in the Special Provisions and the following:

(1) The size of the new pipe insertions shall provide equal or greater than the original flow capacity.

(2) All pipe and fittings shall be made of virgin material. No rework except that obtained from the manufacturer’s own production of the same formulation shall be used.

(3) The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

(4) Tensile strength of the pipe shall be in accordance with manufacturer’s recommendation for the specified purpose and method of installation.

(5) Material color shall be as specified with interior of pipe having a light reflective color to allow for viewing for television inspection. The fused pipe joints shall be de-beaded to reduce collection of sediment and allow a camera to pass during inspection.

(6) The Contractor shall consult with the selected pipe bursting equipment manufacturer regarding recommendations for the installation of pipe materials specified.

2641.4 SUBMITTALS

The Contractor shall submit the following:

(1) Tests for compliance with this specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate from the manufacturer indicating the materials furnished meet the requirements of these specifications.

(2) Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.

(3) Certification of Contractor and assigned personnel training for installing pipe.

(4) Detailed submittal of the procedures and method proposed by the Contractor to burst the existing pipe and insert the new pipe.

(5) Television inspection reports and video made of the existing pipe and after new pipe installation.

2641.5 DELIVERY, STORAGE, AND HANDLING

The Contactor shall transport, handle, and store pipe and fittings as recommended by the manufacturer. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further. Deliver, store and handle other materials as required to prevent damage.

2641.6 LICENSE AGREEMENTS

The Contractor shall submit evidence acceptable to the Owner, such as a certified copy of a license or agreement that it has the authority to use the proposed method from the patent holder and licensed manufacturer. The Contractor agrees to defend, indemnify, and hold harmless the Owner and the Engineer against all claims, suits, and actions or other damages as a result of negligence of any person or property arising out of patent infringement by the Contractor or the Contractor's employee's, agents, the suppliers, or any tier of subcontractors involved in the work.

2641.7 CONSTRUCTION REQUIREMENTS

Before excavation is started, it will be the responsibility of the Contractor to check with the various utility companies and determine the location and depth of the existing utilities in the vicinity of the work area.

Damage to utilities and the resulting repair, temporary service cost, etc., shall be borne by the Contractor. Access pits shall be backfilled in accordance with Section 2600, Trench Excavation and Backfill.

All excavations shall be properly sheeted/shored in accordance with relevant specifications for trench safety systems. Any damage resulting from improperly shored excavations shall be corrected to the satisfaction of the Engineer with no compensation to the Contractor.

All open excavations shall be kept secure at all times by the use of barricades and fencing with appropriate lights and signs, construction tape, covering with steel plates, etc., or as directed by the Engineer.

All lateral and service connections shall be identified, located and excavated prior to the pipe insertion to expedite reconnection. The Contractor shall use excavation methods that will not create a rise or sag at the service or lateral connection for gravity sewers. A rise or sag in the sewer will be repaired by the contractor at no expense to the Owner, in a manner approved by the Engineer.

The location and number of insertion and receiving excavations shall be planned by the Contractor and submitted in writing for approval by the Engineer at least ten (10) days prior to excavation.

One (1) or more receiving pits shall be excavated at the end(s) of the pipe to be replaced or at appropriate points within the length of the existing pipe. Pit shall be centered over the existing pipe. The number of pits for machine and pipe insertion shall be the minimum necessary to most efficiently accomplish the work. The Contractor shall consider the use of excavation required for other purposes such as for sanitary sewer service reconnections and manhole replacement.

Where manholes are used as machine or new pipe insertion pits, the Contractor shall identify such manholes and replace them at no additional cost to the Owner if damaged. Any manhole modification or replacement required shall be considered incidental to the installation of the new pipe. Equipment used to perform the work shall be located away from buildings so as not to create noise impact. Provide a silent engine compartment to reduce machine noise as required to meet local requirements.

The Contractor shall install all pulleys, rollers, bumpers, alignment control devices, and other equipment required to protect existing manholes and pipe components not intended for removal/replacement, and to protect the new pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. If lubrication is used for insertion, the Contractor shall ensure that the lubricant does not backfill existing services. Under no circumstances will the pipe be stressed beyond eighty percent (80%) of its elastic limit as published and recommended by the manufacturer.

Pipe insertion shall be continuous and without interruption from manhole to manhole for sewers, or junction to junction for watermain, except as approved by the Engineer. Upon completion of insertion of the new pipe, and after the relaxation period, the Contractor shall expedite the reconnection of laterals and services to minimize any inconvenience to customers. Connection of services shall be in accordance with Sections 2611 and 2621 of these specifications and as provided in the Special Provisions.

The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than four inches (4"), shall be allowed to protrude into manholes. Restraint of pipe ends shall be achieved by means of electrofusion couplings. The electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electrofusion couplings shall be done in accordance with the manufacturers recommended procedures.

Following the relaxation period, the annular space at the manhole shall be sealed. Sealing shall be made with material approved by the Engineer and shall extend a minimum of eight inches (8") into the manhole wall in such a manner ~~as~~ to form a smooth, uniform, watertight joint.

Fused pipe joints shall be de-beaded to create a smooth flow line. There shall be no ridges or burrs from the fusion method exposed on the interior of the pipe following installation.

Tracer wire shall be installed with the pipe in accordance with 2611 and 2621.

Equipment: The pipe bursting tool shall increase the external dimensions sufficiently, causing breakage of the existing pipe at the same time expanding the surrounding ground. Simultaneously, the new pipe, directly attached to the expander, shall also move forward. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.

The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the pipe insertion.

Bypass Pumping: The Contractor, when and where required for sanitary sewer replacement, shall provide diversion for the pipe bursting/replacement process. The pumps and bypass lines shall be of adequate capacity and size to handle all flows. All costs for bypass pumping required during installation of the pipe shall be incidental to the installation of the pipe, unless otherwise provided in the Special Provisions.

Temporary Water: The Contractor when and where required for watermain replacement, shall provide all labor, materials, and equipment associated with managing, constructing, and maintaining a temporary potable water distribution system for all existing water users which must be taken out of service for a period exceeding eight (8) hours, or as required at the discretion of the Engineer. All costs to provide temporary water required during installation of the pipe shall be incidental to the installation of the pipe, unless otherwise provided in the Special Provisions.

2641.8 TESTING AND INSPECTION

Testing: Tests for compliance with this specification shall be made as described herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification.

Inspection: Video inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video inspection shall include the following:

- Two (2) copies of the DVD's in mpeg4 format (post) to be submitted to the Owner before final invoice.

- DVD's are to remain property of the Owner; Contractor to retain second copy.

- All flows tributary to reach of sewer being inspected are to be completely by-passed around the reach during inspection if necessary and required by the Owner.

- Pre-construction video of the existing pipe and post construction video inspection upon completion of reconstruction of each reach of pipe, with the voice description, with stationing of services indicated. Data and stationing to be on video.

- Should any portion of the video inspection be of inadequate quality or coverage, as determined by the Owner the Contractor will have the portion re-inspected and video recorded at no additional expense to the Owner.

2641.9 METHOD OF MEASUREMENT

Measurement for pipe bursting shall be on a linear foot basis, to the nearest whole foot, measured from center of manhole to center of manhole or junction point to junction point as indicated on the plans.

2641.10 BASIS OF PAYMENT

Pipe Bursting: The work performed as prescribed by this item will be paid for by the linear foot at the unit price bid for the pipe bursting/replacement at the specified pipe diameter and location which price shall be full compensation for the installation of the new pipe, furnishing and placing of all materials, labor, tools, equipment, cleaning, and preparation of the existing pipe to receive the new pipe, tracer wire, pipe bedding, backfill material, annulus sealing material and launching pits, and video inspection of final installed pipe, bypass pumping, temporary water distribution, traffic control, sealing at manholes, locating, excavating, disconnecting, testing in accordance with the Contract Documents, and all else incidental thereto for which separate payment is not provided under other Items in the Bid Form.

APPENDIX C

ARDEN HILLS TRACER WIRE SPECIFICATION

(ADAPTATION OF THE MINNESOTA RURAL WATER ASSOCIATION

SEWER/WATER UTILITY – TRACE WIRE SPECIFICATION)

Sewer/Water Utility - Trace Wire Specification

Materials

General

All trace wire and trace wire products shall be domestically manufactured in the U.S.A.

All trace wire shall have HDPE insulation intended for direct bury, color coated per APWA standard for the specific utility being marked.

All trace wire shall conform to ASTM B1010 standards.

Trace wire

- **Open Trench -** Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- **Directional Drilling/Boring -** Trace wire shall be #12 AWG Copper Clad Steel, Extra High Strength with minimum 1,150 lb. break load, with minimum 30 mil HDPE insulation thickness.
- **Trace wire – Pipe Bursting/Slip Lining -** Trace wire shall be 7 x 7 Stranded Copper Clad Steel, Extreme Strength with 4,700 lb. break load, with minimum 50 ml HDPE insulation thickness.

Connectors

- All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.
- **Direct bury wire connectors** – shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- Non locking friction fit, twist on or taped connectors are prohibited.

Termination/Access

- All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
- All grade level/in-ground access boxes shall be appropriately identified with “sewer” or “water” cast into the cap and be color coded.
- A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
- Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.

- **Service Laterals on public property** - Trace wire must terminate at an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.
- **Service Laterals on private property** - Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- **Hydrants** – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)
- **Long-runs, in excess of 500 linear feet without service laterals or hydrants** - Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.

Grounding

- Trace wire must be properly grounded at all dead ends/stubs
- Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #12 red HDPE insulated copper clad steel wire connected to anode (minimum 1.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
- When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
- When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
- Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

<u>Installation</u>

General

- The tracer wire installer is required to schedule and attend a pre-activity meeting with the Engineer and a Copperhead representative at least one day prior to any tracer wire work being performed.
- Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
- Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

- Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
- Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.
- Trace wire must be properly grounded as specified.
- Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)
- At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. (See Grounding)
- Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.
- All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
- In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

Sanitary Sewer System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structures on the North or East side.
- Trace wire on all sanitary service laterals must terminate at an approved trace wire access box color coded green and located directly above the service lateral at the edge of road right of way.

Water System

- A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
- Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
- Trace wire on all water service laterals must terminate at an approved trace wire access box color coded blue and located directly above the service lateral at the edge of road right of way.
- Above-ground tracer wire access boxes will be installed on all fire hydrants.
- All conductive and non-conductive service lines shall include tracer wire.

Sewer/Water Utility - Trace Wire Specification

Storm Sewer System

- If the storm sewer system includes service laterals for connection of private drains and tile lines, it shall be specified the same as a sanitary sewer application.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structure on the North or East side.

Prohibited Products and Methods

The following products and methods shall not be allowed or acceptable

- Uninsulated trace wire
- Trace wire insulations other than HDPE
- Trace wires not domestically manufactured
- Non locking, friction fit, twist on or taped connectors
- Brass or copper ground rods
- Wire connections utilizing taping or spray-on waterproofing
- Looped wire or continuous wire installations, that has multiple wires laid side-by-side or in close proximity to one another
- Trace wire wrapped around the corresponding utility
- Brass fittings with trace wire connection lugs
- Wire terminations within the roadway, i.e. in valve boxes, cleanouts, manholes, etc.
- **Connecting trace wire to existing conductive utilities**

Testing

All new tracer wire installations shall be located using typical low frequency (**512Hz**) line tracing equipment. Quality Control: The first continuity test shall be performed by the Contractor and witnessed by the Engineer or Owner's Representative. Quality Assurance: The final continuity test should be performed by the City and found fully functioning prior to acceptance of ownership.

The Quality Control test shall be performed upon completion of rough grading. The Quality Assurance test shall be coordinated with the City one week in advance by the Contractor but must be performed prior to final acceptance of the project by the City. This is a requirement for any City owned or potentially maintained watermain, sewer or other utility, or any within the Right of Way or as directed by the City Engineer.

Continuity testing in lieu of actual line tracing shall not be accepted.

Record Plans and Asbuilts:

The entire tracer wire system shall be recorded and submitted to the City on a Field Verification Set of Record Plans specific to the continuity testing which show the direction that the continuity testing performed during the QC test goes to the Grounding Rods from each Tracer Wire Box. These plans shall be incorporated within that Project's Final Record Plan Set.

Sewer/Water Utility - Trace Wire Specification

Products

The following products have been deemed acceptable and appropriate. These products are a guide only to help you choose the correct applications for your tracer wire project.

- Copper clad Steel (CCS) trace wire
    - Open Trench – Copperhead #12 High Strength part # 1230*-HS**
    - Directional Drilling/Boring - Copperhead Extra High Strength part # 1245*-EHS**
    - Pipe Bursting/Slip Lining – Copperhead SoloShot Extreme Strength 7 x 7 Stranded part # PBX-50*-**
        - * Denotes color: B=Blue, G-Green, P=Purple
        - **Denotes spool size. 500’ 1000’ 2500’
- Connectors
    - Copperhead 3-way locking connector part # LSC1230*
    - DryConn 3- way Direct Bury Lug: Copperhead Part # 3WB-01
- Termination/Access
    - Non-Roadway access boxes applications: Trace wire access boxes Grade level Copperhead adjustable lite duty Part # LD14*2T-SW
    - Concrete / Driveway access box applications: Trace wire access boxes Grade level Copperhead Part # CD14*2T-SW
    - Fire hydrant trace wire access box applications: Above ground two terminal Cobra Test Station, part# T2-*-FLPKG
- Grounding
    - Drive in Magnesium Anode: Copperhead Part # ANO-12 (1.5 lb)

Manufacture product options:

The information provided by Copperhead Industries gives you product options to help you choose the correct wire – termination/access points – connectors and grounding products. Other manufacturers provide these products; this information is only a guide.

APPENDIX D

NATURAL HERITAGE REVIEW
THREATENED/ENDANGERED SPECIES INFORMATION

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

October 22, 2025

John Nelson
Bolton & Menk, Inc.

RE: Natural Heritage Review of the proposed Arden Hills 2026 Street & Utility Improvements,
T30N R23W Section 22; Ramsey County

Dear John Nelson,

For all correspondence regarding the Natural Heritage Review of this project please include the project ID **MCE-2025-00502** in the email subject line.

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

State-listed Species

- Blanding's turtles (*Emydoidea blandingii*), a state-listed threatened species, have been documented in the vicinity of the proposed project. Blanding's turtles use upland areas up to and over a mile distant from wetlands, waterbodies, and watercourses. Uplands are used for nesting, basking, periods of dormancy, and traveling between wetlands. Factors believed to contribute to the decline of this species include collisions with vehicles, wetland drainage and degradation, and the development of upland habitat. Any added mortality can be detrimental to populations of Blanding's turtles, as these turtles have a low reproduction rate that depends upon a high survival rate to maintain population levels.

  This project has the potential to impact this rare turtle through direct fatalities and habitat disturbance/destruction due to activities associated with the proposed project. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of threatened or endangered species without a permit. **As such, please contact** Review.NHIS@state.mn.us **to confirm that the following measures will be implemented:**
  - Avoid wetland and aquatic impacts during hibernation season, between September 15 and April 15, if the area is suitable for hibernation.
  - When installing riprap, design a turtle-friendly layout to avoid entrapping turtles and to maintain connectivity between aquatic and upland habitat.

        - Permanent riprap should have voids filled with gravel, soil, or other material between large stones. Reference vegetated riprap in Species Protection from the Best Practices Manual | Minnesota DNR (Ch. 1, P. 33).
    - Limit erosion and sediment control to wildlife friendly erosion control.
    - Check bare ground within construction areas for turtles before the use of heavy equipment or any ground disturbance.
    - The Blanding's turtle flyer must be given to all contractors working in the area.
    - Report any sightings using the DNR Plant and Animal Observation Form.
    - If turtles are in imminent danger, move them by hand out of harm's way; otherwise, they are to be left undisturbed. Directions on how to move turtles safely can be found at Helping Turtles Across the Road.

  If the above measures are not feasible, please contact Review.NHIS@state.mn.us as a project-specific avoidance plan will likely be needed to demonstrate avoidance.

  Additional Blanding's turtle avoidance measures may include, but are not limited to, the following recommendations:
    - Recommendations from List 1 of the Blanding's turtle fact sheet. If greater protection for turtles is desired, implement recommendations from List 2.
    - Avoid hydro-mulch products that contain any materials with synthetic (plastic) fiber additives, as the fibers can re-suspend and flow into waterbodies.
    - Install wildlife friendly curbs to allow turtles to leave the road. Stormwater inlets should be designed to prevent turtles from falling into the storm sewer. For an example, reference "Curb Design and Small Animals" (Chapter 1, P. 24) in Best Practices Manual | Minnesota DNR.

- The little brown myotis (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*), both state-listed as special concern, have been documented in the vicinity of the proposed project. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, **the DNR recommends that tree removal be avoided from June 1 through August 15.**

- Please visit the DNR Rare Species Guide for more information on the habitat use of these species and recommended measures to avoid or minimize impacts.

Federally Protected Species

- The area of interest overlaps with a U.S Fish and Wildlife Service (USFWS) Rusty Patched Bumble Bee High Potential Zone. The rusty patched bumble bee *(Bombus affinis)* is federally listed as endangered and is likely to be present in suitable habitat within High Potential Zones. From April through October this species uses underground nests in upland grasslands, shrublands, and forest edges, and forages where nectar and pollen are available. From October through April the species overwinters under tree litter in upland forests and woodlands. The rusty patched bumble bee may be

impacted by a variety of land management activities including, but not limited to, prescribed fire, tree-removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance or compaction, or use of non-native bees. If applicable, **the DNR recommends reseeding disturbed soils with native species of grasses and forbs using BWSR Seed Mixes or MnDOT Seed Mixes.**

To ensure compliance with federal law, please conduct a federal regulatory review using the U.S. Fish and Wildlife Service's online Information for Planning and Consultation (IPaC) tool. Please note that all projects, regardless of whether there is a federal nexus, are subject to federal take prohibitions. The IPaC review will determine if prohibited take is likely to occur and, if not, will generate an automated letter. The USFWS RPBB guidance provides guidance on avoiding impacts to rusty patched bumble bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix.

Environmental Review and Permitting

- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's native plant communities, rare species, and other rare features. However, the NHIS is not an exhaustive inventory and does not contain the locations of all rare features in the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.** Resubmit by selecting *Clone Project as Draft* on the project page in MCE.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit Natural Heritage Review for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, please contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

James Drake

Digitally signed by James Drake
Date: 2025.10.22 10:24:49 -05'00'

Natural Heritage Review Specialist
james.f.drake@state.mn.us

Cc: Melissa Collins

APPENDIX E

GEOWEB PRODUCT SPECIFICATION & INSTALLATION GUIDE

Product Specification - GEOWEB® GW30V6 Geocell

GENERAL

The GEOWEB A1geocell product is manufactured from textured, perforated strips of high density polyethylene that are bonded together to create a network of interconnected cells. The cells can be filled with topsoil, aggregate, concrete, recycled materials, or other infill material for geotechnical applications such as: 1) load support for unpaved and paved roads, railways, ports, heavy-duty pavements, container yard, and pads; 2) gravity and reinforced walls, reinforced slopes and fascia walls; and, 3) slope, channel, and geomembrane protection.

DIMENSIONS

Parameter	Units	Value
Cell Depth	Inches (mm)	6 (150)
Cell Size (Length x Width +/- 10%)	Inches (mm)	11.3 x 12.6 (287 x 320)
Expanded Section Width	Cells	8
	Feet (m)	Varies: 7.7 to 9.2 (2.3 to 2.8)
Expanded Section Length	Cells	18, 21, 25, 29, or 34
	Feet (m)	Varies: 15.4 to 35.1 (4.7 to 10.7)

STRUCTURAL INTEGRITY AND SYSTEM PERFORMANCE

Parameter	Units	Value
Minimum Short-Term Seam Peel Strength	lb (N)	480 (2,130)
Long-Term Seam Peel Strength (standard 4-inch sample width)[1]	lb (N)	160 (710)
Internal Junction Efficiency[2]	%	≥ 100
Mechanical Junction Efficiency (ATRA Key Connection)[2]	%	≥ 100
Peak Friction Angle Ratio (δ/Ø)[3]	Unitless	0.95

MATERIAL PROPERTIES

Parameter	Test Method	Units	Value
Polymer Density	ASTM D1505 or D792	lbs/ft^3 (g/cm^3)	58.4 - 60.2 (0.935 - 0.965)
Flexural Storage Modulus	ISO 6721	Mpa	≥ 800
Carbon Black Content[4]	ASTM D1603	%	1.5 - 2.0
Sheet Thickness Prior to Texture	ASTM D5199	mil (mm)	50 (1.27), -5% +10%
Sheet Thickness After Texture	ASTM D5199	mil (mm)	60 (1.52), -5% +10%
Texture Surface Density	--	per/in2 (per/m^2)	140 - 200 (22 - 31)

DURABILITY

Parameter	Test Method	Units	Value
Environmental Stress Crack Resistance	ASTM D1693	hrs	> 5,000
Environmental Stress Crack Resistance (Accelerated Test)	ASTM D5397	hrs	≥ 400
Resistance to Oxidation[5]	EN ISO 13438	yrs	≥ 100
Resistance to Weathering[6]	EN 12224	%	100

Notes:

1) A 4 in. (100-mm) wide seam sample shall support a 160 lb (72.5 kg) load for a period of 7 days minimum in a temperature-controlled environment undergoing a temperature change on a 10 hour cycle from ambient room to 130° F (54°). Ambient room temperature is per ASTM E 41.

2) Junction efficiency (shear, peeling and splitting) determined as a percentage of junction performance (EN ISO 13426-1) to perforated strip performance (EN ISO 10319).

3) Typical design value for granular infill material. Consult with manufacturer to confirm value for other types of infill materials.

4) Standard black HDPE strips. For tan/green GEOWEB, hindered amine light stabilizer (HALS) content will be 2.0% by weight of carrier.

5) Predicted to be durable for a minimum of 100 years in natural soil with a pH between 4 and 9 and at a soil temperature ≤ 25°C.

6) 100% of original tensile strength retained following exposure to 370 hours of ultraviolet light and accelerated weathering in accordance with EN 12224.

CE 2895 | 23 UKCA 0338 | 23

ISO 9001:2015 Certified

PRESTO GEOSYSTEMS | Appleton, WI | P: 800-548-3424 920-738-1328 | E: info@prestogeo.com | www.prestogeo.com

ATRA® KEY
GEOWEB® CONNECTION DEVICE
SPECIFICATION

Description:

The ATRA Key is designed to connect GEOWEB Geocell sections either end-to-end or side-to-side through the GEOWEB material slots (I-slots). The ATRA Key features a structurally reinforced handle and frictional barbs to enhance interlock with the GEOWEB surface texture, providing protection against the three primary modes of mechanical junction failure: shearing, splitting, and peeling. The ATRA Key is inserted through aligned I-slots of two adjoining GEOWEB sections and turned 90 degrees to lock the key in position. If removal is required, turn the ATRA Key 90 degrees from the locked position and remove the ATRA Key from the I-slots.

Material: Polymeric Composite Material

Construction: Injection Molded

Color: Black

Dimensions:

Length: 1.31 in. (33.15 mm)

Width: 2.05 in. (52.07 mm)

Thickness: 0.38 in. (9.65 mm)

Pull-Through Strength: 275 lbs. (1.3 kN)

Mechanical Junction Efficiency (Shear, Peel & Separation): 100%

Chemical Resistance: Comprised of nonreactive, chemically inert material

Other Properties: Mildew Resistant, Non-Corrosive

Conductivity: Non-Conductive



Figure 1 ATRA Key



Figure 2 ATRA Key Connection through cell wall I-slot

PRESTO GEOSYSTEMS
670 N PERKINS STREET, APPLETON, WISCONSIN, USA 54914
920-738-1328 or 800-548-3424 | INFO@PRESTOGEO.COM | WWW.PRESTOGEO.COM
FEBRUARY 2025

ATRA® TENDON CLIP
GEOWEB® LOAD TRANSFER DEVICE
SPECIFICATION

Description:

The ATRA® Tendon Clip is a molded, high strength load transfer device with a locking member and post.

The ATRA® Tendon Clip is used to transfer driving gravitational forces from the GEOWEB® cell walls to the tendon and crest anchorage system. The device includes a structurally reinforced post and locking member with frictional barbs for improved interlock with GEOWEB® surface texture. The ATRA® Tendon Clip is inserted through the I-slot and turned 90 degrees to lock the device into place. Once locked into place, the ATRA® Tendon Clip is positioned to facilitate the intended load transfer effect. If removal is required, the ATRA® Tendon Clip may be unlocked and removed by turning 90 degrees from the locked position and removing the device from the I-slots.

When the ATRA Tendon Clip load transfer devices are connected, the complete tendoned GEOWEB system may be efficiently pre-assembled at the crest before expanding the sections down the slope.

Material: Polymeric Composite Material

Construction: Injected Molded

Color: Black

Dimensions:

Length: 3.0 in. (76.2 mm)

Width: 2.75 in. (69.85 mm)

Thickness: 0.5 in. (12.7 mm)

Pull-Thru Resistance: 420 lbs. (1.87 kN)

Chemical Resistance: Comprised of nonreactive, chemically-inert material

Other Properties: Mildew Resistant, Non-Corrosive

Conductivity: Non-Conductive

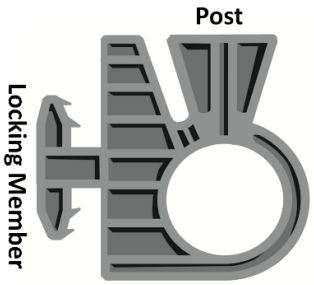


Figure 1. ATRA® Tendon Clip Load Transfer Device.



Figure 2. Inserting the ATRA® Tendon Clip through the GEOWEB Cell Wall I-Slot.

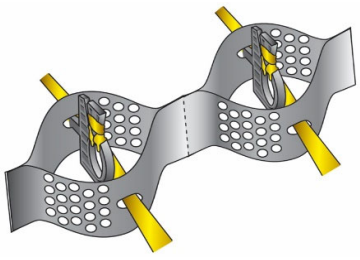


Figure 3. ATRA® Tendon Clip Locked through the GEOWEB Cell I-Slot and Properly Wrapped Tendon to Complete the Load Transfer.

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JANUARY 2023

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ATRA® TENDON CLIP

GEOWEB® Load Transfer Device



ATRA Tendon Clips are load transfer devices to transfer driving gravity forces from the GEOWEB cell wall to the tendon and crest anchorage system.

The ATRA Tendon Clip includes structurally reinforced post and locking member with frictional barbs to enhance interlock with the GEOWEB cell wall.

ATRA Tendon Clips can be pre-assembled at the crest of the slope on flat ground improving safety and efficiency.

5 Easy Installation Steps



STEP 1: Locate the cells where the ATRA Tendon Clips will be installed. Insert the locking member of the ATRA Tendon Clip through the slot in the GEOWEB cell wall. Turn the clip 90 degrees to lock.



STEP 2: Pull a few inches of the tendon through the circular opening in the ATRA Tendon clip.



STEP 3: Pull up on the tendon and twist, forming a loop. Allow enough tendon to fit over the post.



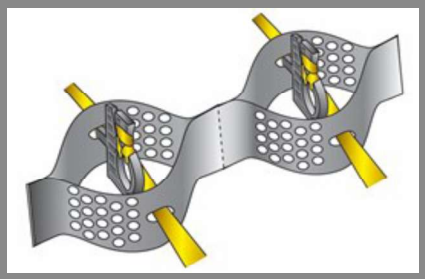
STEP 4: Pull the tendon loop back down over the post.



STEP 5: Pull the tendon so the slack is eliminated and it is tightly secured to the clip.



COMPLETED. ATRA Tendon Clip Load Transfer Connection





PRESTO GEOSYSTEMS®, Appleton, Wisconsin, USA
Ph: 800-548-3424 | 1-920-738-1328 www.prestogeo.com

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INSTALLATION GUIDE

■ simplified

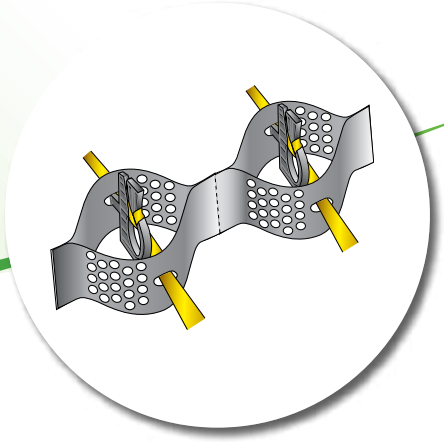




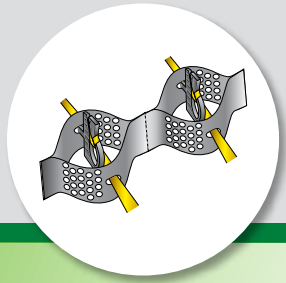


GEOWEB® Slope Protection System

■ Tendons & ATRA® Tendon Clips

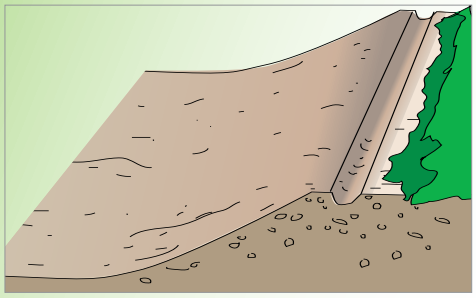


INSTALLATION GUIDE
simplified version

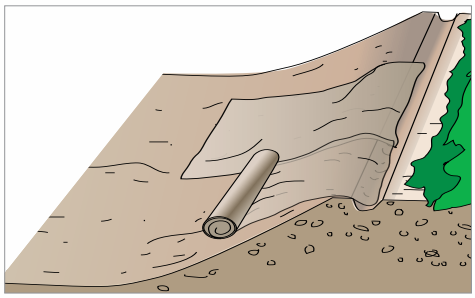


GEOWEB® Slope Protection System
■ Tendons & ATRA® Tendon Clips

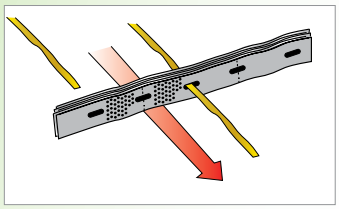
1 Prepare subgrade. Remove debris, rocks.



2 Install geotextile with overlaps *(per manufacturer's recommendations if required)*

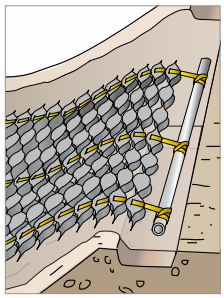


3 Thread tendons through cell wall slots per design.



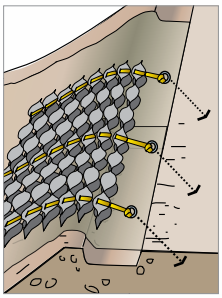
4 Secure tendoned GEOWEB sections at the top of the slope with the *specified anchor system*. See Options A, B, C.

A



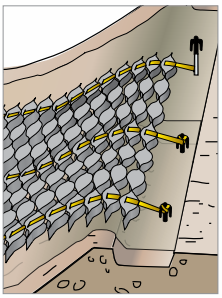
"Deadman" pipe

B



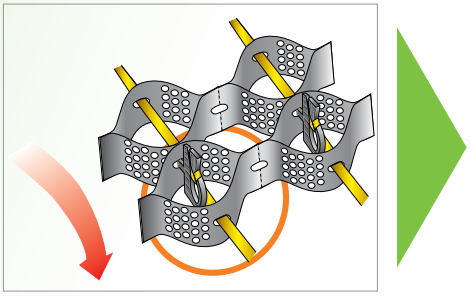
Earth anchors

C

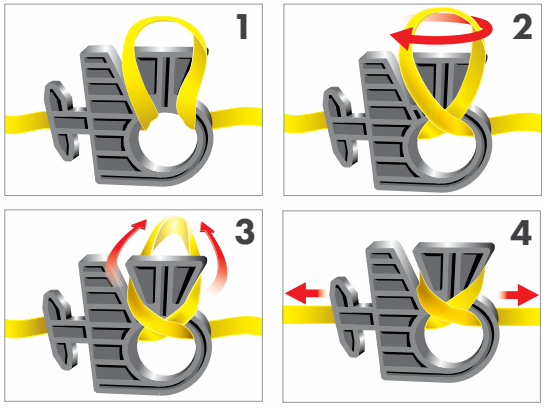


ATRA® Anchors

5 Install ATRA Tendon Clips per design.

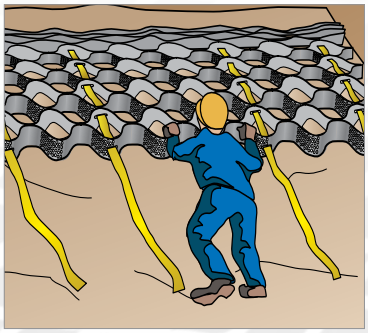


5a Wrap tendon with ATRA Tendon Clips as shown.

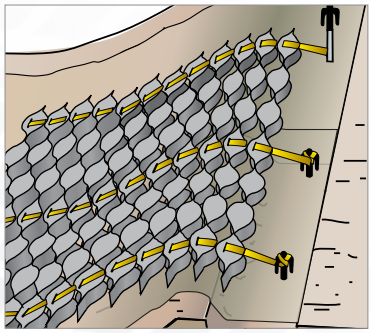


TIP: *Install at top of slope with GEOWEB sections partially expanded several sections at a time.*

6 Expand sections down the slope.



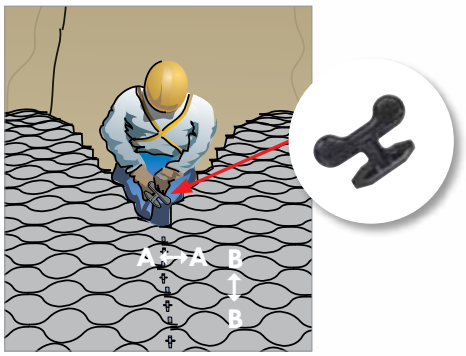
7 Expanded GEOWEB section.



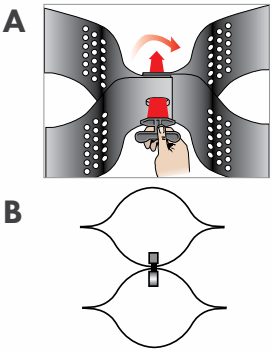
IMPORTANT NOTE:

The simplified installation guide provided by Presto Geosystems is intended as a general guideline only. The contractor should follow contract plans and specifications and refer to detailed installation guidelines for more information: See **www.prestogeo.com/installation**

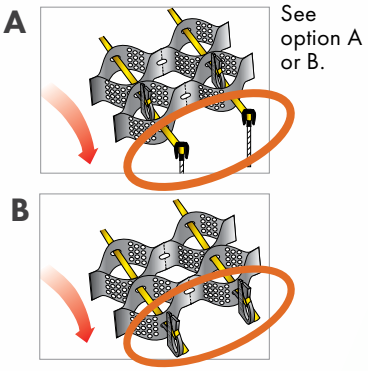
8 Connect GEOWEB® sections with ATRA® Keys.



Connect side to side (A) and end to end (B).

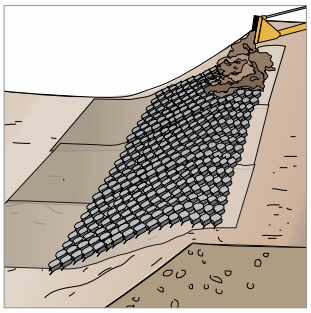


9 Anchor the bottom (toe) of the slope.

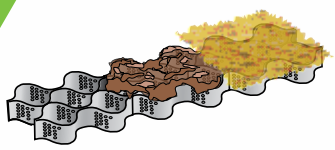


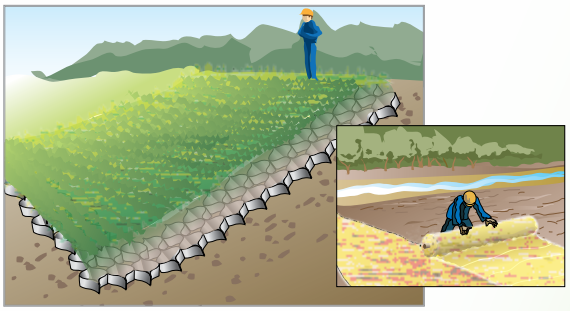
10 Place infill from the top of the slope. Use equipment suitable for infill placement. See options A, B, C.

A

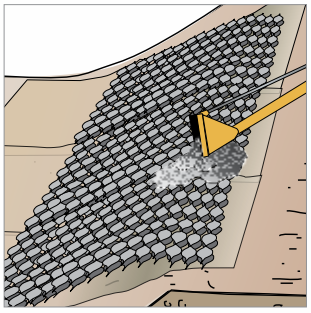


Topsoil & Erosion Control Blanket

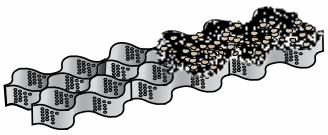


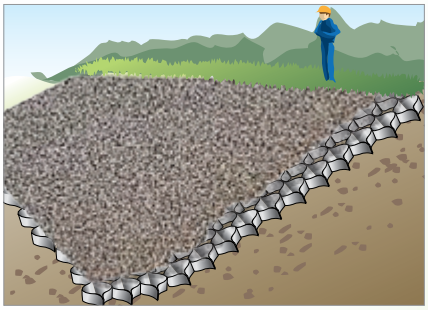


B

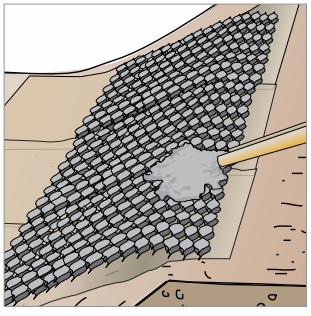


Aggregate



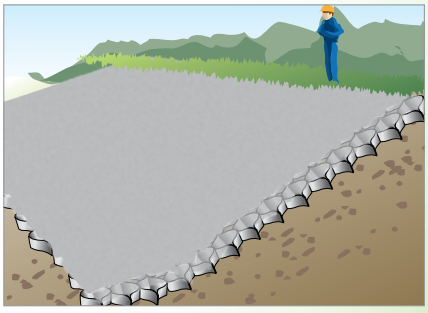


C



Concrete



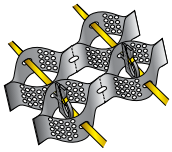


Detailed installation guidelines at: **www.prestogeo.com/installation**

PRESTO GEOSYSTEMS®
STRENGTH. FROM THE GROUND UP.
Since 1979

MATERIAL LIST

ATRA® ANCHOR 

TENDONS 

ATRA TENDON CLIP 

ATRA KEY 

LIMITED WARRANTY

Presto Geosystems warrants each GEOWEB® section which it ships to be free from defects in materials and workmanship at the time of manufacture. Presto's exclusive liability under this warranty or otherwise will be to furnish without charge to Presto's customer at the original f.o.b. point a replacement for any section which proves to be defective under normal use and service during the 10-year period which begins on the date of shipment by Presto. Presto reserves the right to inspect any allegedly defective section in order to verify the defect and ascertain its cause.

This warranty does not cover defects attributable to causes or occurrences beyond Presto's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation, improper alteration or improper application.

PRESTO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, IN CONNECTION WITH THE GEOWEB SYSTEM. IN NO EVENT SHALL PRESTO BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY OR FOR ANY OTHER REASON, INCLUDING NEGLIGENCE, IN CONNECTION WITH THE GEOWEB SYSTEM.

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STRENGTH. FROM THE GROUND UP.
Since 1979

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CITY OF ARDEN HILLS

CONSTRUCTION PLANS FOR

2026 PMP STREET & UTILITY IMPROVEMENTS

WATERMAIN, STORM SEWER, UTILITY REHABILITATIONS, LAKE PUMP SYSTEM IMPROVEMENTS, TRAIL REHABILITATION,
CONCRETE PEDESTRIAN RAMPS & SPOT CURB & GUTTER REPLACEMENT, STREET PAVEMENT REHABILITATION

FEBRUARY, 2026

RESOURCE LIST

CITY OF ARDEN HILLS

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1245 W HIGHWAY 96,
ARDEN HILLS, MN 55112
651-792-7800

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JESSICA JAGOE

MAYOR:
DAVID GRANT

CITY COUNCIL MEMBERS:
EMILY ROUSSEAU
BRENDA HOLDEN
TENA MONSON
KURT WEBER

PUBLIC WORKS DIRECTOR/CITY ENGINEER:
DAVID SWEARINGEN, P.E.

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651-262-6600

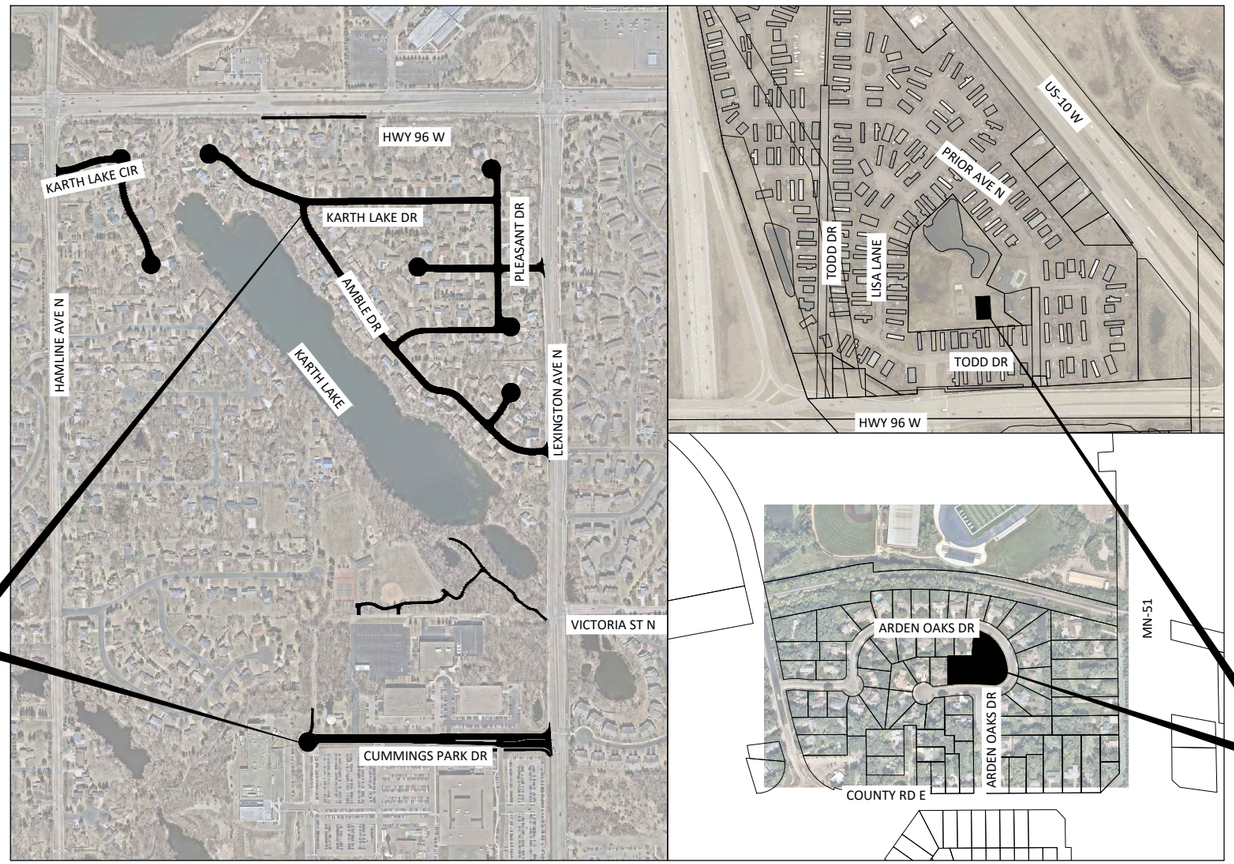
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STEVE SENGER
STEVEN.SENGER@ZAYO.COM

RAMSEY COUNTY PUBLIC WORKS
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JOSEPH.GROTHJAN@CO.RAMSEY.MN.US

ELECTRIC
XCEL
SCOTT TOMFORD
SCOTT.TOMFORD@XCELENERGY.COM
762-439-3418

NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY GOPHER STATE ONE CALL, 1-800-252-1166 OR 651-454-0002.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL "D". THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-22, ENTITLED "STANDARD GUIDELINES FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES."



MAP OF THE
CITY OF ARDEN HILLS
RAMSEY COUNTY, MN

N

0 400 800
SCALE FEET

SHEET NUMBER	SHEET TITLE
GENERAL	
G0.01 - G0.03	TITLE SHEET, LEGEND, GENERAL NOTES
G1.01	STATEMENT OF ESTIMATED QUANTITIES
CIVIL	
C0.00 - C0.10	EXISTING CONDITIONS, REMOVALS PLAN
C1.01 - C1.16	TABLES, DETAILS, TYPICAL SECTIONS, PHASING PLAN
C2.01 - C2.13	EROSION CONTROL PLAN, SWPPP
C3.01	GRADING PLAN
C4.00 - C4.09	SANITARY SEWER & WATER PLAN & PROFILE
C5.00 - C5.04	STORM SEWER PLAN & PROFILE
C6.01 - C6.13	STREET PLAN & PROFILE, INTERSECTION DETAILS
C7.01 - C7.07	TRAFFIC CONTROL, SIGNING & STRIPING, SIGNALS
C8.01 - C8.07	CROSS SECTIONS
ELECTRICAL	
E1.01 - E1.04	STORM PUMP STATION ELECTRIC PLANS
E2.01	SIGNAL PLAN
PARKS	
L1.00 - L1.06	ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
L2.00 - L2.05	ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS

THIS PLAN SET CONTAINS 105 SHEETS.

MAP LEGEND

PROJECT LIMITS

REVIEWED & APPROVED _____ DATE: 2/3/2026
PUBLIC WORKS DIRECTOR

⌖ BM=1006.05
TOP NUT HYDRANT
NORTH OF INNOVATION
WAY & CUMMINGS
PARK DR INTERSECTION

PROJECT DATUM:
HORIZONTAL: RAMSEY COUNTY COORDINATE SYSTEM (NAD83 (2011 ADJ.)
VERTICAL: NAVD88

RECORD DRAWING INFORMATION
OBSERVER:
CONTRACTOR:
DATE:

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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12224 NICOLLET AVENUE
BURNSVILLE, MN 55337
Phone: (952) 890-0509
Email: Burnsville@bolton-menk.com
www.bolton-menk.com

ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
JJJ/BAP		BID	02/09/2026
DRAWN BAP			
CHECKED BJF			
CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
TITLE SHEET

SHEET G0.01

EXISTING TOPOGRAPHIC SYMBOLS

- ACCESS GRATE
- AIR CONDITION UNIT
- ANTENNA
- AUTO SPRINKLER CONNECTION
- BARRICADE PERMANENT
- BASKETBALL POST
- BENCH
- BIRD FEEDER
- BOLLARD
- BUSH
- CATCH BASIN RECTANGULAR CASTING
- CATCH BASIN CIRCULAR CASTING
- CURB STOP
- CLEAN OUT
- CULVERT END
- DRINKING FOUNTAIN
- DOWN SPOUT
- ELECTRIC CAR CHARGE STATION
- FILL PIPE
- FIRE HYDRANT
- FLAG POLE
- FLARED END / APRON
- FUEL PUMP
- GRILL
- GUY WIRE ANCHOR
- HANDHOLE
- HANDICAP SPACE
- IRRIGATION SPRINKLER HEAD
- IRRIGATION VALVE BOX
- LIFT STATION CONTROL PANEL
- LIFT STATION
- LIGHT POLE
- MAILBOX
- MANHOLE-COMMUNICATION
- MANHOLE-ELECTRIC
- MANHOLE-GAS
- MANHOLE-HEAT
- MANHOLE-RECLAIMED WATER
- MANHOLE-SANITARY SEWER
- MANHOLE-STORM SEWER
- MANHOLE-UTILITY
- MANHOLE-WATER
- METER
- DRIVE-THRU MICROPHONE
- PARKING METER
- PAVEMENT MARKING
- PEDESTAL-COMMUNICATION
- PEDESTAL-ELECTRIC
- PEDESTRIAN PUSH BUTTON
- PICNIC TABLE
- POLE-UTILITY
- POST
- RAILROAD SIGNAL POLE
- REGULATION STATION GAS
- SATELLITE DISH
- SIGN TRAFFIC
- SIGNAL CONTROL CABINET
- SOIL BORING
- SIREN
- TELEPHONE BOOTH
- TILE INLET
- TILE OUTLET
- TILE RISER
- TRANSFORMER-ELECTRIC
- TREE-CONIFEROUS
- TREE-DEAD
- TREE-DECIDUOUS
- TREE STUMP
- TRAFFIC ARM BARRIER
- TRAFFIC SIGNAL
- TRASH CAN
- UTILITY MARKER
- VALVE
- VALVE POST INDICATOR
- VALVE VAULT
- VAULT
- VENT PIPE
- WATER SPIGOT
- WELL
- WETLAND DELINEATED MARKER
- WETLAND
- WET WELL
- YARD HYDRANT

PROPOSED TOPOGRAPHIC SYMBOLS

- CLEANOUT
- MANHOLE
- LIFT STATION
- STORM SEWER CIRCULAR CASTING
- STORM SEWER RECTANGULAR CASTING
- STORM SEWER FLARED END / APRON
- STORM SEWER OUTLET STRUCTURE
- STORM SEWER OVERFLOW STRUCTURE
- CURB BOX
- FIRE HYDRANT
- WATER VALVE
- WATER REDUCER
- WATER BEND
- WATER TEE
- WATER CROSS
- WATER SLEEVE
- WATER CAP / PLUG
- RIP RAP
- DRAINAGE FLOW
- TRAFFIC SIGNS

SURVEY SYMBOLS

- BENCHMARK LOCATION
- CONTROL POINT
- MONUMENT FOUND
- CAST IRON MONUMENT
- STONE MONUMENT

EXISTING TOPOGRAPHIC LINES

- RETAINING WALL
- FENCE
- FENCE-DECORATIVE
- GUARD RAIL
- TREE LINE
- BUSH LINE

SURVEY LINES

- CONTROLLED ACCESS
- BOUNDARY
- CENTERLINE
- EXISTING EASEMENT LINE
- PROPOSED EASEMENT LINE
- EXISTING LOT LINE
- PROPOSED LOT LINE
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- SETBACK LINE
- SECTION LINE
- QUARTER LINE
- SIXTEENTH LINE
- TEMPORARY EASEMENT

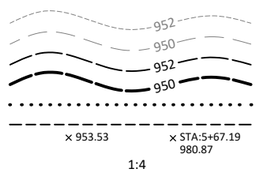
EXISTING UTILITY LINES

- FORCEMAIN
- SANITARY SEWER
- SANITARY SERVICE
- STORM SEWER
- STORM SEWER DRAIN TILE
- WATERMAIN
- WATER SERVICE
- RECLAIMED WATER

PROPOSED UTILITY LINES

- FORCEMAIN
- SANITARY SEWER
- SANITARY SERVICE
- STORM SEWER
- STORM SEWER DRAIN TILE
- WATERMAIN
- WATER SERVICE
- PIPE CASING
- TRENCHLESS PIPE (PLAN VIEW)
- TRENCHLESS PIPE (PROFILE VIEW)

GRADING INFORMATION



- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR
- PROPOSED GRADING LIMITS / SLOPE LIMITS
- PROJECT LIMITS
- PROPOSED SPOT ELEVATION
- RISE:RUN (SLOPE)

HATCH PATTERNS

- BITUMINOUS
- GRAVEL
- CONCRETE

EXISTING PRIVATE UTILITY LINES

NOTE:
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- UNDERGROUND FIBER OPTIC
- UNDERGROUND ELECTRIC
- UNDERGROUND GAS
- UNDERGROUND COMMUNICATION
- OVERHEAD ELECTRIC
- OVERHEAD COMMUNICATION
- OVERHEAD UTILITY

UTILITIES IDENTIFIED WITH A QUALITY LEVEL :

LINE TYPES FOLLOW THE FORMAT: UTILITY TYPE - QUALITY LEVEL
EXAMPLE: G-A G-A UNDERGROUND GAS, QUALITY LEVEL A
UTILITY QUALITY LEVEL (A,B,C,D) DEFINITIONS CAN BE FOUND IN CI/ASCE 38-22.

UTILITY QUALITY LEVELS:

QUALITY LEVEL D: PROVIDES THE MOST BASIC LEVEL OF INFORMATION. IT INVOLVES COLLECTING DATA FROM EXISTING UTILITY RECORDS. RECORDS MAY INCLUDE AS-BUILT DRAWINGS, DISTRIBUTION AND SERVICES MAPS, EXISTING GEOGRAPHIC INFORMATION SYSTEM DATABASES, CONSTRUCTION PLANS, ETC.

QUALITY LEVEL C: INVOLVES SURVEYING VISIBLE SUBSURFACE UTILITY STRUCTURES SUCH AS MANHOLES, HAND-HOLES, UTILITY VALVES AND METERS, FIRE HYDRANTS, PEDESTALS AND UTILITY MARKERS, AND THEN CORRELATING THE INFORMATION WITH EXISTING UTILITY RECORDS TO CREATE COMPOSITE DRAWINGS. INCLUDES QUALITY LEVEL D ACTIVITIES.

QUALITY LEVEL B: INVOLVES DESIGNATING THE HORIZONTAL POSITION OF SUBSURFACE UTILITIES THROUGH SURFACE DETECTION METHODS AND COLLECTING THE INFORMATION THROUGH A SURVEY METHOD. INCLUDES QUALITY LEVEL C AND D TASKS.

QUALITY LEVEL A: PROVIDES THE HIGHEST LEVEL OF ACCURACY. IT INVOLVES LOCATING OR POTHOLING UTILITIES AS WELL AS ACTIVITIES IN QUALITY LEVELS B, C, AND D. THE LOCATED FACILITY INFORMATION IS SURVEYED AND MAPPED AND THE DATA PROVIDES PRECISE PLAN AND PROFILE INFORMATION.

ABBREVIATIONS

A	ALGEBRAIC DIFFERENCE	GRAV	GRAVEL	RSC	RIGID STEEL CONDUIT
ADJ	ADJUST	GU	GUTTER	RT	RIGHT
ALT	ALTERNATE	GV	GATE VALVE	SAN	SANITARY SEWER
B-B	BACK TO BACK	HDPE	HIGH DENSITY POLYETHYLENE	SCH	SCHEDULE
BIT	BITUMINOUS	HH	HANDHOLE	SERV	SERVICE
BLDG	BUILDING	HP	HIGH POINT	SHLD	SHOULDER
BMP	BEST MANAGEMENT PRACTICE	HWL	HIGH WATER LEVEL	STA	STATION
BR	BEGIN RADIUS	HYD	HYDRANT	STD	STANDARD
BV	BUTTERFLY VALVE	I	INVERT	STM	STORM SEWER
CB	CATCH BASIN	K	CURVE COEFFICIENT	TC	TOP OF CURB
C&G	CURB AND GUTTER	L	LENGTH	TE	TEMPORARY EASEMENT
CIP	CAST IRON PIPE	LO	LOWEST OPENING	TEMP	TEMPORARY
CIPP	CURED-IN-PLACE PIPE	LP	LOW POINT	TNH	TOP NUT HYDRANT
CL	CENTER LINE	LT	LEFT	TP	TOP OF PIPE
CL.	CLASS	MAX	MAXIMUM	TYP	TYPICAL
CLVT	CULVERT	MH	MANHOLE	VCP	VITRIFIED CLAY PIPE
CMP	CORRUGATED METAL PIPE	MIN	MINIMUM	VERT	VERTICAL
C.O.	CHANGE ORDER	MR	MID RADIUS	VPC	VERTICAL POINT OF CURVE
COMM	COMMUNICATION	NIC	NOT IN CONTRACT	VPI	VERTICAL POINT OF INTERSECTION
CON	CONCRETE	NMC	NON-METALLIC CONDUIT	VPT	VERTICAL POINT OF TANGENT
CSP	CORRUGATED STEEL PIPE	NTS	NOT TO SCALE	WM	WATERMAIN
DIA	DIAMETER	NWL	NORMAL WATER LEVEL		
DIP	DUCTILE IRON PIPE	OHW	ORDINARY HIGH WATER LEVEL		
DWY	DRIVEWAY	PC	POINT OF CURVE	AC	ACRES
E	EXTERNAL CURVE DISTANCE	PCC	POINT OF COMPOUND CURVE	CF	CUBIC FEET
ELEC	ELECTRIC	PE	PERMANENT EASEMENT	CV	COMPACTED VOLUME
ELEV	ELEVATION	PED	PEDESTRIAN, PEDESTAL	CY	CUBIC YARD
EOF	EMERGENCY OVERFLOW	PERF	PERFORATED PIPE	EA	EACH
ER	END RADIUS	PERM	PERMANENT	EV	EXCAVATED VOLUME
ESMT	EASEMENT	PI	POINT OF INTERSECTION	LB	POUND
EX	EXISTING	PL	PROPERTY LINE	LF	LINEAR FEET
FES	FLARED END SECTION	PRC	POINT OF REVERSE CURVE	LS	LUMP SUM
F-F	FACE TO FACE	PT	POINT OF TANGENT	LV	LOOSE VOLUME
FF	FINISHED FLOOR	PVC	POLYVINYL CHLORIDE PIPE	SF	SQUARE FEET
F&I	FURNISH AND INSTALL	PVMT	PAVEMENT	SV	STOCKPILE VOLUME
FM	FORCEMAIN	R	RADIUS	SY	SQUARE YARD
FO	FIBER OPTIC	R/W	RIGHT-OF-WAY		
F.O.	FIELD ORDER	RCP	REINFORCED CONCRETE PIPE		
GRAN	GRANULAR	RET	RETAINING		

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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BURNSVILLE, MN 55337
Phone: (952) 890-0509
Email: Burnsville@bolton-menk.com
www.bolton-menk.com

ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
JJJ/BAP		BID	02/09/2026
DRAWN			
BAP			
CHECKED			
BJF			
CLIENT PROJ. NO.			
PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
LEGEND

SHEET
G0.02

REMOVAL NOTES

1. PRIOR TO REMOVALS, REQUIRED EROSION CONTROL DEVICES ARE TO BE INSTALLED.
2. REMOVALS MUST NOT OCCUR WITHOUT AUTHORIZATION FROM THE ENGINEER.
3. CONTRACTOR TO COORDINATE WITH ALL PRIVATE UTILITY OWNER TO PROTECT, SUPPORT, HOLD, DEENERGIZE OR OTHERWISE ACCOMODATE FOR CONSTRUCTION ACTIVITY. THIS WORK IS CONSIDERED INCIDENTAL FOR WHICH NO DIRECT COMPENSATION WILL BE MADE.
4. ALL ADJACENT BITUMINOUS AND CONCRETE SURFACES SHALL BE CLEANLY SAWCUT PRIOR TO REMOVAL.
5. REMOVALS SHALL BE LIMITED TO AREAS WITHIN THE DEFINED PROJECT LIMITS . RESTORATION OF AREAS OUTSIDE OF PROJECT LIMITS SHALL BE COMPLETED AT THE CONTRACTOR'S COST UNLESS OTHERWISE APPROVED.
6. WATER AND SANITARY SERVICE REMOVALS ARE NOT ALWAYS SHOWN IN ITS ENTIRETY. SERVICES WILL BE REMOVED AND REPLACED TO THE RIGHT OF WAY OR EXISTING CURB STOP UNLESS DIRECTED BY ENGINEER. CONTRACTOR IS RESPONSIBLE TO LOCATE THE EXISTING SEWER AND WATER SERVICES. SERVICE PIPE REMOVAL SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OF NEW SERVICE.
7. CONTRACTOR SHALL FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS IN DISPOSING OF MATERIALS REMOVED FROM THIS SITE.
8. DRIVEWAY REMOVAL LIMITS SHOWN ON THE PLAN ARE APPROXIMATE. REMOVAL LIMITS SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
9. ANY TREES, SHRUBS, AND PLANTINGS REMOVED MUST BE DESIGNATED IN ADVANCE BY THE ENGINEER.
10. ALL LIGHT POLES TO BE PROTECTED OR OTHERWISE DIRECTED BY ENGINEER
11. CONTRACTOR SHALL PROTECT ALL ITEMS DESIGNATED FOR SALVAGE AND PROVIDE APPROPRIATE STORAGE UNTIL RE-INSTALLATION. ANY ITEMS DESIGNATED TO BE SALVAGED WHICH ARE DAMAGED SHALL BE REPLACED WITH NEW AT NO COST TO THE OWNER. REPAIR OF DAMAGED ITEMS SHALL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER.
12. ANY LANDSCAPING MATERIALS REMOVED MUST BE DESIGNATED IN ADVANCE BY THE ENGINEER AND REMOVAL SHALL BE CONSIDERED INCIDENTAL. LANDSCAPING ITEMS SHALL BE PROTECTED TO EXTENT PRACTICAL DURING CONSTRUCTION.
13. ALL ITEMS NOT IDENTIFIED FOR REMOVAL SHALL BE PROTECTED DURING CONSTRUCTION.
14. REMOVAL OF CASTINGS SHALL BE CONSIDERED INCIDENTAL TO REMOVAL/ REPLACEMENT OF STRUCTURES.
15. REMOVAL OF EXISTING SERVICE PIPING IS INCIDENTAL TO THE NEW SERVICE INSTALLATION.
16. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. IT IS NOT GUARANTEED THAT ANY OR ALL EXISTING UTILITIES ARE SHOWN. THE CONTRACTOR MUST DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THEIR FAILURE TO EXACTLY LOCATE AND PROTECT ANY AND ALL UNDERGROUND UTILITIES.
17. CONTRACTOR SHALL TAKE CARE TO PROTECT ALL GATE VALVES, CASTINGS, ETC. DURING RECLAMATION AND MILLING OPERATIONS.
18. SEE PROJECT MANUAL FOR CONTRACTOR'S REQUIREMENTS TO PROVIDE TEMPORARY WATER SERVICE WITH AFFECTED USERS. TEMPORARY WATER SYSTEM MUST BE INSTALLED AND TESTED PRIOR TO COMMENCEMENT OF WATERMAIN CONSTRUCTION OPERATIONS.

UTILITY CONSTRUCTION NOTES

1. WATER AND SANITARY SERVICE LOCATIONS SHOWN ARE APPROXIMATE AND ALL SERVICES MAY NOT BE SHOWN.
2. NEW SERVICES SHALL MATCH EXISTING SERVICE SIZE EXCEPT MINIMUM SERVICE SIZE SHALL BE 1-INCH FOR WATER. PROVIDE FITTINGS AND COUPLERS AS REQUIRED TO CONNECT TO EXISTING SERVICES.
3. ROUTING OF NEW SERVICE LINES AROUND TREES AND DRIVEWAYS AS DIRECTED BY ENGINEER MAY BE REQUIRED AND SHALL BE CONSIDERED INCIDENTAL.
4. CONTRACTOR SHALL FIELD VERIFY THE SIZE, LOCATION, AND ELEVATION OF ALL SANITARY SEWER AND WATER SERVICES THAT ARE BEING REPLACED SUCH THAT THEY WILL FUNCTION PROPERLY UPON COMPLETION OF WORK. (INCIDENTAL)
5. MAINTAIN 10' MINIMUM HORIZONTAL SEPARATION OF WATERMAIN WITH SANITARY AND STORM SEWER MAINS, UNLESS OTHERWISE NOTED ON PLANS. WHERE FEASIBLE, MAINTAIN 18" VERTICAL CLEARANCE.
6. ALL CONNECTIONS TO EXISTING UTILITIES (WMN, SAN, STM, ETC.) SHALL BE FIELD VERIFIED FOR LOCATION AND ELEVATION. (INCIDENTAL)
7. WATER AND SANITARY SERVICE PIPE SHALL BE REMOVED TO SERVICE INSTALLATION LIMITS. REMOVAL OF EXISTING SERVICE PIPES AND CURB STOPS SHALL BE CONSIDERED INCIDENTAL TO NEW SERVICE INSTALLATION.
8. EXISTING WATERMAIN DEPTHS AS SHOWN ARE APPROXIMATE.
9. REPLACE ALL WATER SERVICES BETWEEN NEW MAIN AND CURB BOX WITH NEW 1" TYPE K COPPER WATER SERVICE, UNLESS EXISTING IS GREATER THAN 1", THEN MATCH EXISTING SIZE.
10. A TEMPORARY WATER SERVICE PLAN MUST BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL A MINIMUM OF 48 HOURS PRIOR TO PROPOSED TEMPORARY WATER SYSTEM INSTALLATION.
11. THE CONTRACTOR SHALL COORDINATE WATERMAIN WORK WITH THE FIRE DEPARTMENT AND THE CITY. THE CONTRACTOR WILL BE RESPONSIBLE FOR ARRANGING AND PROVIDING ANY REQUIRED WATERMAIN SHUT OFFS WITH THE CITY DURING CONSTRUCTION. ANY COSTS ASSOCIATED WITH WATERMAIN SHUTDOWNS SHALL BE CONSIDERED INCIDENTAL.
12. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH UTILITY OWNERS TO RELOCATE AND PROTECT PRIVATE UTILITIES AS NECESSARY TO CONSTRUCT STREET AND UTILITIES.
13. REFER TO PROJECT SPECIFICATIONS FOR STRUCTURE CASTING FRAME & COVER REQUIREMENTS.
14. A MINIMUM OF 24 HOURS AND MAXIMUM OF 48 HOURS NOTICE SHALL BE GIVEN TO ALL RESIDENTS AFFECTED BY THE TEMPORARY WATER OUTAGES. A MINIMUM OF 48 HOURS AND MAXIMUM OF 72 HOURS NOTICE SHALL BE GIVEN TO ALL MULTI-FAMILY AND COMMERCIAL PROPERTIES. A MINIMUM OF 1 WEEK NOTICE OF ANY SERVICE INTERRUPTIONS (OF ANY TYPE) SHALL BE GIVEN TO ANY DAYCARE ON SITE.
15. EXISTING VALVES MUST BE OPERATED BY CITY PUBLIC WORKS STAFF ONLY.
16. THE STATIONS & OFFSETS SHOWN ON THE STORM SEWER PLANS ARE TO THE CENTER OF STRUCTURES. WHEN NECESSARY, THE CONTRACTOR SHALL ADJUST THE CENTER OF ALL CATCH BASIN STRUCTURES SO THE COVER OPENINGS MATCH THE PROPOSED CURB & GUTTER.
17. ADJUST FRAME & RING CASTING FOR ALL SANITARY & STORM MANHOLE CASTINGS IN THE PROJECT AREA. THIS WORK SHALL INCLUDE THE REPLACEMENT OF ALL ADJUSTING RINGS.
18. ADDITIONAL CASTING REPLACEMENTS BEYOND THOSE SHOWN ON THE PLANS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER CASTING ADJUSTMENT SHALL BE INCLUDED WITH THE NEW CASTING.
19. INTERNAL EPOXY "PAINTED" CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW CASTINGS AND CASTING ADJUSTMENTS (BOTH SANITARY AND STORM).
20. EXTERNAL CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW SANITARY CASTINGS AND SANITARY CASTING ADJUSTMENTS.
21. ADJUST ALL VALVE BOXES IN THE PROJECT AREA, IF THEY ARE NOT PROPERLY SET FOR THE PROPOSED PAVEMENT GRADE.
22. VALVE BOX REPLACEMENTS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER.

GENERAL TRAFFIC CONTROL NOTES

1. ADVANCED NOTIFICATION SIGNAGE WITH A SCHEDULED START DATE IS REQUIRED TO BE PLACED AT EACH END OF THE STREET 7 DAYS PRIOR TO THE START OF PAVEMENT REMOVAL OR ANY SUBSTANTIAL WORK. ONCE THE SIGNAGE IS IN PLACE, THE SCHEDULE MUST BE MAINTAINED FOR THAT STREET/AVENUE BLOCK.
2. PEDESTRIAN ACCESS TO RESIDENCES SHALL BE MAINTAINED AT ALL TIMES THROUGHOUT CONSTRUCTION, UNLESS OTHERWISE APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL ALSO SUPPLY VEHICLE ACCESS TO AND FROM THE SITE FOR CONCURRENT CONSTRUCTION PROJECTS, PRIVATE UTILITY IMPROVEMENTS/RELOCATIONS, AND AS OTHERWISE PROVIDED FOR IN THE SPECIAL PROVISIONS.
3. THE CONTRACTOR SHALL MAINTAIN GARBAGE AND RECYCLING SERVICE ACCESS THROUGHOUT EXECUTION OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ACCESS FOR GARBAGE TRUCKS. WHEN INFEASIBLE TO MAINTAIN SUCH ACCESS, THE CONTRACTOR SHALL COLLECT CONTAINERS, RELOCATE THEM TO A LOCATION WHERE SUITABLE ACCESS CAN BE PROVIDED, AND RETURN CONTAINERS IN GOOD WORKING CONDITION TO THE SAME PROPERTY FROM WHICH THEY WERE TAKEN. ALL CONTAINERS MUST BE LABELED WITH THE HOUSE ADDRESS PRIOR TO MOVING. COSTS FOR PROVIDING ACCESS OR HAULING CONTAINERS TO AN ACCESSIBLE LOCATION SHALL BE INCIDENTAL.
4. THE 2020 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM AND BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MN MUTCD) AND INCLUDING THE LATEST FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS. TRAFFIC CONTROL NOT IN COMPLIANCE WITH MN MUTCD WILL BE SUBJECT TO VIOLATION IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
5. THE ITEM "TRAFFIC CONTROL" BID AS "LUMP SUM" SHALL INCLUDE ALL COSTS FOR PROVIDING TEMPORARY CONTROLS SPECIFIED IN THE PLAN AND OTHER TRAFFIC CONTROL REQUIRED PER THE MN MUTCD DUE TO THE CONTRACTORS OPERATIONS FOR COMPLETION OF THE PROJECT INCLUDING BUT NOT LIMITED TO, RECLAIMING & PAVING UNDER TRAFFIC, TEMPORARY ROAD CLOSURES IN FULL OR TO THRU TRAFFIC, TEMPORARY LANE CLOSURES, ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN FOR LARGE AND SMALL SCALE STAGING OPERATIONS, AND NECESSARY DETOURS FOR MOTORISTS, BICYCLISTS, AND/OR PEDESTRIANS. THE AMOUNT BID SHALL ALSO INCLUDE SUFFICIENT TRAFFIC CONTROL FOR WARNING OF POTENTIAL HAZARDS DURING CONSTRUCTION INCLUDING BUT NOT LIMITED TO FLASHING BARRICADES AROUND EQUIPMENT AND OBSTRUCTIONS.

CONSTRUCTION NOTES

1. SUITABLE GRADING MATERIAL ON THIS PROJECT SHALL CONSIST OF ALL SOILS ENCOUNTERED WITH THE EXCEPTION OF TOPSOIL, DEBRIS, ORGANIC MATERIAL, MUCK AND OTHER MATERIALS AS DETERMINED TO BE UNSUITABLE BY THE ENGINEER.
2. EXCESS EXCAVATED AND UNSUITABLE MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF IN ACCORDANCE WITH THE REQUIREMENTS OF MN/DOT SPEC 2105.
3. SUBGRADE PREPARATION IN ACCORDANCE WITH MN/DOT SPEC 2112 SHALL BE CONSIDERED INCIDENTAL IN AREAS OF FULL RECONSTRUCTION AND ONLY PAID IN RECLAIM AREAS . IN AREAS OF FULL RECONSTRUCTION, SUBGRADE SHALL BE DEFINED AS THE EXISTING GROUND SURFACE LOCATED IMMEDIATELY BENEATH THE PROPOSED AGGREGATE BASE OR SAND SECTION AS SPECIFIED IN THE PLAN.
4. SUBGRADE EXCAVATION AND CORRECTION SHALL BE APPLIED IF NECESSARY TO ACHIEVE SATISFACTORY SURFACE STABILITY AS DETERMINED BY THE ENGINEER. AREAS TO RECEIVE SUBGRADE EXCAVATION SHALL BE SPECIFIED BY THE ENGINEER IN THE FIELD FOLLOWING SUBGRADE PREPARATION AND A ROLL TEST. REPLACEMENT MATERIAL IN AREAS OF SUBGRADE PREPARATION SHALL SATISFY THE REQUIREMENTS OF STABILIZING AGGREGATE AS SPECIFIED IN THE SPECIAL PROVISIONS.
5. WHERE A PROPOSED ROADWAY BEGINS OR TERMINATES AT AN EXISTING ROADWAY, PROVIDE A VERTICAL NOTCH TO THE BOTTOM OF THE AGGREGATE OR BITUMINOUS BASE AND A 20h:1V TAPER.
6. PROVIDE 20h:1V TAPERS BETWEEN LONGITUDINAL CHANGES IN SUB-CUT DEPTHS, UNLESS OTHERWISE SPECIFIED IN THE FIELD BY THE ENGINEER.
7. PROVIDE FOR A SAW-CUT WHERE PLACING NEW PAVEMENT IS INSTALLED ADJACENT TO EXISTING PAVEMENT.
8. CONTRACTOR MUST ALLOW FOR ALL MATERIALS TESTING TO BE ACCOMPLISHED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
9. ALL USES OF THE WORD "INCIDENTAL" IN THESE CONSTRUCTION DOCUMENTS SHALL BE CONSTRUED TO MEAN INCIDENTAL WORK FOR WHICH NO DIRECT COMPENSATION SHALL BE MADE.
10. COORDINATE WITH THE ENGINEER IN THE FIELD FOR LOCATION OF REPLACEMENT TREES.
11. ADDITIONAL SPOT CONCRETE CURB & GUTTER REPLACEMENTS WILL BE MARKED DURING CONSTRUCTION IN THE FIELD BY THE ENGINEER. LIMITS SHOWN ON THE PLANS ARE KNOWN LOCATIONS ONLY AND FINAL LIMITS WILL BE MARKED IN THE FIELD BASED ON FIELD EVALUATIONS.
12. BITUMINOUS BASE PATCHING ADJACENT TO SPOT CURB REPLACEMENT AND SURROUNDING CASTING/VALVE BOX WORK SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED WORK.
13. ADDITIONAL BITUMINOUS PATCHING, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER AFTER COMPLETION OF PAVEMENT MILLING OPERATIONS.
14. BITUMINOUS PAVEMENT SHALL BE INSTALLED TO MATCH/IMPROVE EXISTING DRAINAGE PATTERNS.
15. PEDESTRIAN RAMPS AND TRAILS SHALL BE CONSTRUCTED TO MEET ALL ADA STANDARDS. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE ENGINEER IF ADA STANDARDS CANNOT BE ACHIEVED ON ANY ASPECT OF THE PROJECT. IF CONFIRMED INFEASIBLE BY THE ENGINEER, AT MINIMUM, THE PEDESTRIAN RAMPS SHALL BE CONSTRUCTED TO MEET ADA STANDARDS FROM THE CURB UP TO THE INITIAL LANDING; THE TRAIL BEYOND THE LANDING WILL THEN BE CONSTRUCTED TO MATCH THE EXISTING CONDITIONS.
16. TRAIL ALIGNMENTS, PROFILES, AND CROSS SECTIONS DISPLAYED FOR EXISTING TRAILS ARE A GUIDE FOR CONSTRUCTION TO SHOW A PROOF OF CONCEPT FOR GRADES. HOWEVER, IT IS NOT EXPECTED THAT THE DESIGN WILL BE FOLLOWED STRICTLY. THE CONTRACTOR SHALL MAKE FIELD ADJUSTMENTS TO MATCH THE ACTUAL EXISTING TRAIL ALIGNMENTS AND GRADES WHILE MAINTAINING EXISTING DRAINAGE PATTERNS AND TYING IN TO EXISTING GRADES AS QUICKLY AFTER THE EDGE OF TRAIL PAVEMENT ON EACH SIDE AS FEASIBLE, WITH ENGINEER APPROVAL. A 2-FT CLEAR ZONE SHALL BE MAINTAINED WHERE POSSIBLE, BUT IT IS UNDERSTOOD THAT EXISTING GRADES MAY NOT ALLOW FOR SUCH A CLEAR ZONE IN SOME AREAS.

NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW.
NOTIFY GOPHER STATE ONE-CALL 1-800-252-1166 OR 651-454-0002.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
JJJ/BAP		BID	02/09/2026
DRAWN BAP			
CHECKED BJF			
CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
GENERAL CONSTRUCTION NOTES

SHEET G0.03

STATEMENT OF ESTIMATED QUANTITIES

ITEM NO.	SPEC. REF	DESCRIPTION	NOTES	UNIT	TOTAL ESTIMATED QUANTITY
SCHEDULE "A" - BASE BID					
1	2021.501	MOBILIZATION		LUMP SUM	1.00
2	2101.502	CLEARING		EACH	6.00
3	2101.502	GRUBBING		EACH	6.00
4	2101.505	GRUBBING		ACRE	0.62
5	2104.502	REMOVE METAL APRON		EACH	1.00
6	2104.502	REMOVE CASTING	(1)	EACH	51.00
7	2104.502	REMOVE GATE VALVE & BOX		EACH	12.00
8	2104.502	REMOVE VALVE BOX	(1)	EACH	1.00
9	2104.502	REMOVE HYDRANT		EACH	6.00
10	2104.502	REMOVE DRAINAGE STRUCTURE		EACH	7.00
11	2104.502	REMOVE SIGN		EACH	8.00
12	2104.502	SALVAGE SIGN PANEL		EACH	1.00
13	2104.502	SALVAGE MAILBOX SUPPORT	(2)	EACH	5.00
14	2104.503	REMOVE WATERMAIN		LIN FT	142.00
15	2104.503	REMOVE SEWER PIPE (STORM)		LIN FT	56.00
16	2104.503	REMOVE CURB & GUTTER	(3)	LIN FT	3414.00
17	2104.503	REMOVE RETAINING WALL		LIN FT	79.00
18	2104.503	SALVAGE FENCE		LIN FT	43.00
19	2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT		SQ YD	60.00
20	2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT		SQ YD	240.00
21	2104.518	REMOVE BITUMINOUS WALK	(P)	SQ FT	23674.00
22	2104.518	REMOVE CONCRETE WALK		SQ FT	420.00
23	2104.602	REMOVE CURB STOP BOX		EACH	1.00
24	2104.603	ABANDON WATERMAIN	(4)	LIN FT	650.00
25	2104.618	SALVAGE BRICK PAVERS	(5)	SQ FT	55.00
26	2106.507	EXCAVATION - CHANNEL AND POND	(EV) (P)	CU YD	1900.00
27	2106.507	COMMON EMBANKMENT (POND)	(CV) (P)	CU YD	200.00
28	2106.604	CEMENT STABILIZED SUBGRADE	(5)	SQ YD	6130.00
29	2112.604	SUBGRADE PREPARATION (TRAIL)	(P) (6)	SQ YD	2850.00
30	2123.610	EXPLORATORY EXCAVATION	(5)	HOUR	45.00
31	2215.504	FULL DEPTH RECLAMATION	(P)	SQ YD	30939.00
32	2231.604	REMOVE AND PATCH BITUMINOUS PAVEMENT	(7)	SQ YD	437.00
33	2232.504	MILL BITUMINOUS SURFACE (2.5")	(P)	SQ YD	4373.00
34	2357.506	BITUMINOUS MATERIAL FOR TACK COAT		GAL	2100.00
35	2360.504	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B) 3.0" THICK	(8)	SQ YD	293.00
36	2360.509	TYPE SP 9.5 WEARING COURSE MIXTURE (3,C)		TON	7623.00
37	2501.502	12" HDPE PIPE APRON	(9)	EACH	2.00
38	2501.502	36" RC PIPE APRON	(9)	EACH	2.00
39	2501.602	ADJUST APRON		EACH	4.00
40	2503.503	12" RC PIPE SEWER		LIN FT	24.00
41	2503.503	15" RC PIPE SEWER		LIN FT	24.00
42	2503.503	24" RC PIPE SEWER		LIN FT	16.00
43	2503.503	27" RC PIPE SEWER		LIN FT	8.00
44	2503.503	36" RC PIPE SEWER		LIN FT	34.00
45	2503.602	CONNECT TO EXISTING STORM SEWER		EACH	14.00
46	2503.602	SANITARY SEWER SPOT REPAIR		EACH	1.00
47	2503.602	JOINT SEALING SANITARY MANHOLE		EACH	1.00
48	2503.602	REINSTATE LATERALS		EACH	1.00
49	2503.602	CIPP SHORT LINER (12" SEWER PIPE - STORM)		EACH	3.00
50	2503.602	CIPP SHORT LINER (15" SEWER PIPE - STORM)		EACH	1.00
51	2503.602	CIPP SHORT LINER (24" SEWER PIPE - STORM)		EACH	3.00
52	2503.602	CIPP SHORT LINER (27" SEWER PIPE - STORM)		EACH	1.00
53	2503.602	CIPP SHORT LINER (8" SEWER PIPE - SAN)		EACH	1.00
54	2503.603	LINING SEWER PIPE 8" (SAN)		LIN FT	285.00
55	2504.601	TEMPORARY WATER SERVICE		LUMP SUM	1.00
56	2504.602	CONNECT TO EXISTING WATERMAIN		EACH	20.00
57	2504.602	HYDRANT		EACH	8.00
58	2504.602	VALVE BOX	(1) (10)	EACH	1.00
59	2504.602	1" CORPORATION STOP	(11)	EACH	5.00
60	2504.602	6" GATE VALVE & BOX		EACH	11.00
61	2504.602	8" GATE VALVE & BOX		EACH	5.00
62	2504.602	ADJUST CURB BOX		EACH	54.00
63	2504.602	CURB STOP BOX		EACH	1.00
64	2504.603	6" WATERMAIN DUCTILE IRON CL 52		LIN FT	749.00
65	2504.603	8" WATERMAIN DUCTILE IRON CL 52		LIN FT	36.00
66	2504.604	4" POLYSTYRENE INSULATION	(5)	SQ YD	21.00
67	2504.608	DUCTILE IRON FITTINGS		LB	757.00
68	2505.602	ADJUST VALVE BOX	(10)	EACH	22.00
69	2506.502	CASTING ASSEMBLY (SANITARY)	(10) (12)	EACH	31.00
70	2506.502	CASTING ASSEMBLY (STORM)	(10) (13)	EACH	27.00
71	2506.502	ADJUST FRAME & RING CASTING (STORM)	(10) (13)	EACH	7.00
72	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL (2'X3' CB)	(14)	LIN FT	7.10
73	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020		LIN FT	7.90
74	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4022	(15)	LIN FT	7.60
75	2506.503	RECONSTRUCT DRAINAGE STRUCTURE (SANITARY)		LIN FT	9.00

STATEMENT OF ESTIMATED QUANTITIES

ITEM NO.	SPEC. REF	DESCRIPTION	NOTES	UNIT	ESTIMATED QUANTITY
76	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 1 (SUMP & SAFL BAFFLE)		EACH	1.00
77	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 2 (SUMP & SAFL BAFFLE)		EACH	1.00
78	2506.602	CONCTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL 4 (OCS)		EACH	1.00
79	2506.602	GROUT CATCH BASIN OR MANHOLE		EACH	6.00
80	2506.602	CASTING ASSEMBLY SPECIAL (FORD TYPE A-1)	(5)	EACH	7.00
81	2511.507	RANDOM RIPRAP CLASS III	(16)	CU YD	72.00
82	2521.518	6" CONCRETE WALK	(8)	SQ FT	913.00
83	2521.518	3" BITUMINOUS WALK		SQ FT	25678.00
84	2521.602	DRILL & GROUT REINF BAR (EPOXY COATED)		EACH	96.00
85	2531.503	CONCRETE CURB & GUTTER DESIGN SPECIAL SURMOUNTABLE (SPOT)	(3)	LIN FT	1615.00
86	2531.503	CONCRETE CURB & GUTTER DESIGN B618 (SPOT)	(3)	LIN FT	1799.00
87	2531.503	CONCRETE CURB DESIGN V	(5)	LIN FT	20.00
88	2531.504	6" CONCRETE DRIVEWAY PAVEMENT	(8)	SQ YD	60.00
89	2531.618	TRUNCATED DOMES		SQ FT	131.00
90	2540.602	INSTALL MAILBOX SUPPORT	(2)	EACH	5.00
91	2540.618	INSTALL BRICK PAVERS	(5)	SQ FT	55.00
92	2557.603	INSTALL FENCE		LIN FT	43.00
93	2563.601	TRAFFIC CONTROL		LUMP SUM	1.00
94	2564.502	INSTALL SIGN PANEL	(17)	EACH	1.00
95	2564.518	SIGN PANEL	(17)	SQ FT	16.50
96	2564.602	SIGN PANELS TYPE SPECIAL (STREET NAME BLADES)	(17)	EACH	18.00
97	2565.602	RIGID PVC LOOP DETECTOR 6' X 6'		EACH	9.00
98	2571.502	DECIDUOUS TREE 2.5" CAL B&B	(5)	EACH	14.00
99	2572.602	TREE PRUNING	(5)	HOUR	20.00
100	2573.501	STABILIZED CONSTRUCTION EXIT		LUMP SUM	1.00
101	2573.502	STORM DRAIN INLET PROTECTION		EACH	43.00
102	2573.503	SILT FENCE, TYPE MS		LIN FT	502.00
103	2573.503	FLOTATION SILT CURTAIN TYPE STILL WATER		LIN FT	133.00
104	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER		LIN FT	4018.00
105	2574.507	COMMON TOPSOIL BORROW	(LV)	CU YD	480.00
106	2574.607	CLAY LINER	(CV) (P)	CU YD	186.00
107	2575.504	ROLLED EROSION PREVENTION CATEGORY 20 W/ SEED MIXTURE (XX-XXX)	(18)	SQ YD	3699.00
108	2575.504	ROLLED EROSION PREVENTION CATEGORY 30 W/ SEED MIXTURE (XX-XXX)	(18)	SQ YD	4016.00
109	2575.504	SHORELINE STABILIZATION (GEOWEB BY PRESTO)		SQ YD	110.00
110	2582.503	4" SOLID LINE MULTI-COMPONENT		LIN FT	490.00
111	2582.503	4" BROKEN LINE MULTI-COMPONENT		LIN FT	701.00
112	2582.503	4" DOUBLE SOLID LINE MULTI-COMPONENT		LIN FT	973.00
113	2582.518	PAVEMENT MESSAGE MULTI-COMPONENT		SQ FT	140.00
114	2582.518	CROSSWALK MULTI-COMPONENT		SQ FT	900.00
SCHEDULE "B" - ALTERNATE 1 (BASE PUMP SYSTEM IMPROVEMENTS)					
115	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 1		LUMP SUM	1.00
SCHEDULE "C" - ALTERNATE 2 (PUMP SYSTEM IMPROVEMENTS W/ REMOTE MONITORING)					
116	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 2		LUMP SUM	1.00
SCHEDULE "D" - ALTERNATE 3 (PUMP SYSTEM IMPROVEMENTS W/ REMOTE MONITORING & CONTROLS)					
117	2545.601	STORM LIFT STATION LUMP SUM ALTERNATE 3		LUMP SUM	1.00
SCHEDULE "E" - ALTERNATE 4 (REPLACE CONDUIT & WIRE TO NEW PUMP SYSTEM)					
118	2545.601	REPLACE CONDUIT AND WIRE TO STORM LIFT STATION LUMP SUM ALTERNATE 4		LUMP SUM	1.00
SCHEDULE "F" - ALTERNATE 5 (ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS)					
119	2540.601	ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS LUMP SUM ALTERNATE 5		LUMP SUM	1.00
SCHEDULE "G" - ALTERNATE 6 (ARDEN MANOR PARK BASKETBALL COURT IMPROVEMENTS)					
120	2540.601	ARDEN MANOR PARK BASKETBALL COURT IMPROVEMENTS LUMP SUM ALTERNATE 6		LUMP SUM	1.00

NOTES:

(1) CASTING & VALVE BOX REPLACEMENTS WILL BE AS DIRECTED BY THE ENGINEER IN THE FIELD. TOKEN QUANTITY FOR POTENTIALLY BROKEN/ DAMAGED EXISTING CASTINGS & VALVE BOXES.

(2) MAILBOXES SHALL BE PROTECTED DURING STORAGE, TEMPORARY MAILBOXES SHALL BE INSTALLED DURING CONSTRUCTION (INCIDENTAL), AND FINAL REINSTALLATION LOCATION SHALL BE IDENTIFIED BY THE ENGINEER.

(3) CONCRETE CURB AND GUTTER SPOT REPLACEMENT WILL BE REQUIRED AROUND ALL CATCH BASIN CASTING REPLACEMENTS, PEDESTRIAN RAMP IMPROVEMENTS, AND FOR DEFICIENT CURB AS MARKED IN THE FIELD BY THE ENGINEER.

(4) INCLUDES SAND FILLING OF THE ABANDONED INFRASTRUCTURE AND BULKHEADING EACH END WITH CONCRETE & BLOCKS, AS SPECIFIED.

(5) TOKEN QUANTITY, TO BE USED AS DIRECTED BY THE ENGINEER.

(6) SUBGRADE PREPARATION IS FOR TRAIL REHABILITATION AREAS ONLY AND INCLUDES THE RE-GRADING, HAULING, PLACEMENT, SUPPLEMENTING, AND PREPARATION OF THE EXISTING AGGREGATE BASE, OR CONSTRUCTION OF A NEW AGGREGATE BASE WITH EXCESS RECLAIM MATERIAL, FOR BITUMINOUS TRAIL CONSTRUCTION.

(7) PATCH BITUMINOUS PAVEMENT SHALL BE USED FOR BASE PAVEMENT REPLACEMENT IN THE MILL & OVERLAY AREA, AS DIRECTED BY THE ENGINEER AFTER COMPLETION OF THE MILLING OPERATION.

(8) BID ITEM INCLUDES REQUIRED EXCAVATION FOR AND THE FURNISHING & INSTALLATION OF AGGREGATE BASE MATERIAL, AS SPECIFIED.

(9) INCLUDES FURNISHING & INSTALLATION OF TRASH GUARD ON INLET APRONS (NOT OUTLETS) AS INDICATED IN THE DETAILS.

(10) FINAL CASTING/ VALVE BOX ADJUSTMENT SHALL BE INCLUDED IN THE PRICE BID FOR NEW CASTING ASSEMBLIES/ VALVE BOXES OR CASTING/VALVE BOX ADJUSTMENTS. ADJUSTMENTS SHALL INCLUDE THE REMOVAL/ REPLACEMENT OF ALL ADJUSTING RINGS AND SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED WORK.

(11) CONNECTION TO EXISTING SERVICE PIPES SHALL BE INCIDENTAL, REGARDLESS OF THE EXISTING PIPE SIZE OR MATERIAL, INCLUDING THE NECESSARY FITTINGS AND LABOR AS REQUIRED.

(12) EXTERNAL CHIMNEY SEALS & INTERNAL CHIMNEY SEALS (AS INDICATED IN THE SPECIFICATIONS) SHALL BE INSTALLED WITH ALL NEW SANITARY MH CASTINGS OR SANITARY CASTING ADJUSTMENTS AND SHALL BE INCLUDED IN THE PRICE BID FOR THE ASSOCIATED BID ITEM.

(13) INTERNAL CHIMNEY SEALS (AS INDICATED IN THE SPECIFICATIONS) SHALL BE INSTALLED WITH ALL NEW STORM MH/CB CASTINGS OR STORM CASTING ADJUSTMENTS AND SHALL BE INCLUDED IN THE PRICE BID FOR THE ASSOCIATED BIT ITEM.

(14) CONSTRUCT STORM SEWER 2'X3' CATCHBASINS AS SHOWN IN THE DETAILS.

(15) CONSTRUCT STORM SEWER CATCHBASIN MANHOLES WITH A 2'X3' TOP SLAB OPENING AS SHOWN IN THE DETAILS.

(16) INCLUDES THE FURNISHING AND INSTALLATION OF GEOTEXTILE FABRIC, AS SPECIFIED.

(17) SIGN PANELS SHALL INCLUDE NEW SIGN POSTS, HARDWARE, AND INSTALLATION AS REQUIRED AND SHALL BE INCLUDED IN THE PRICE BID.

(18) INCLUDES THE FURNISHING AND INSTALLATION OF FERTILIZER AND SEED MIXTURE, AS SPECIFIED.

(A) COMPACTED VOLUME

(EV) EXCAVATED VOLUME

(LV) LOOSE VOLUME

(P) PLAN QUANTITY

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

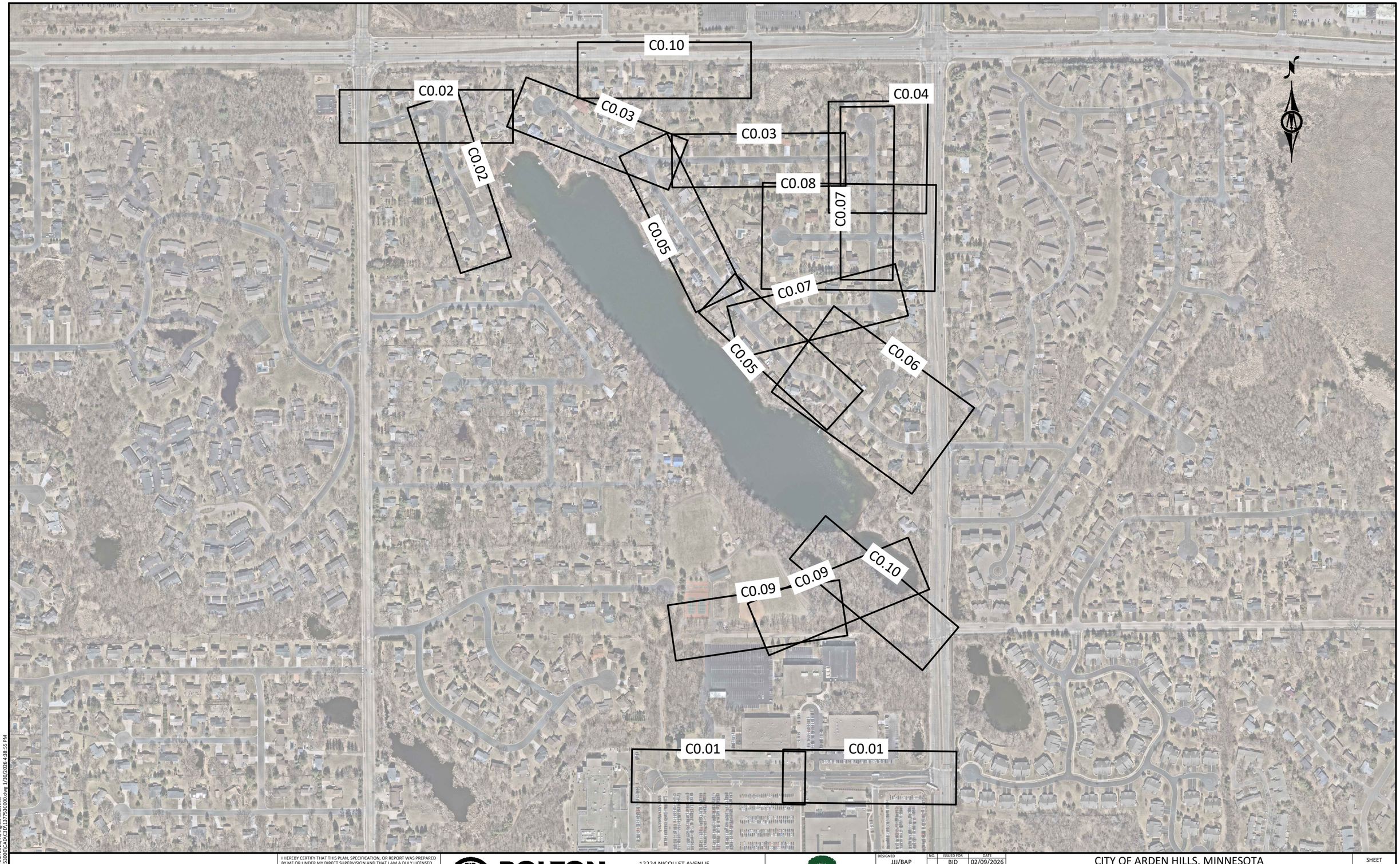
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PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STATEMENT OF ESTIMATED QUANTITIES

SHEET G1.01



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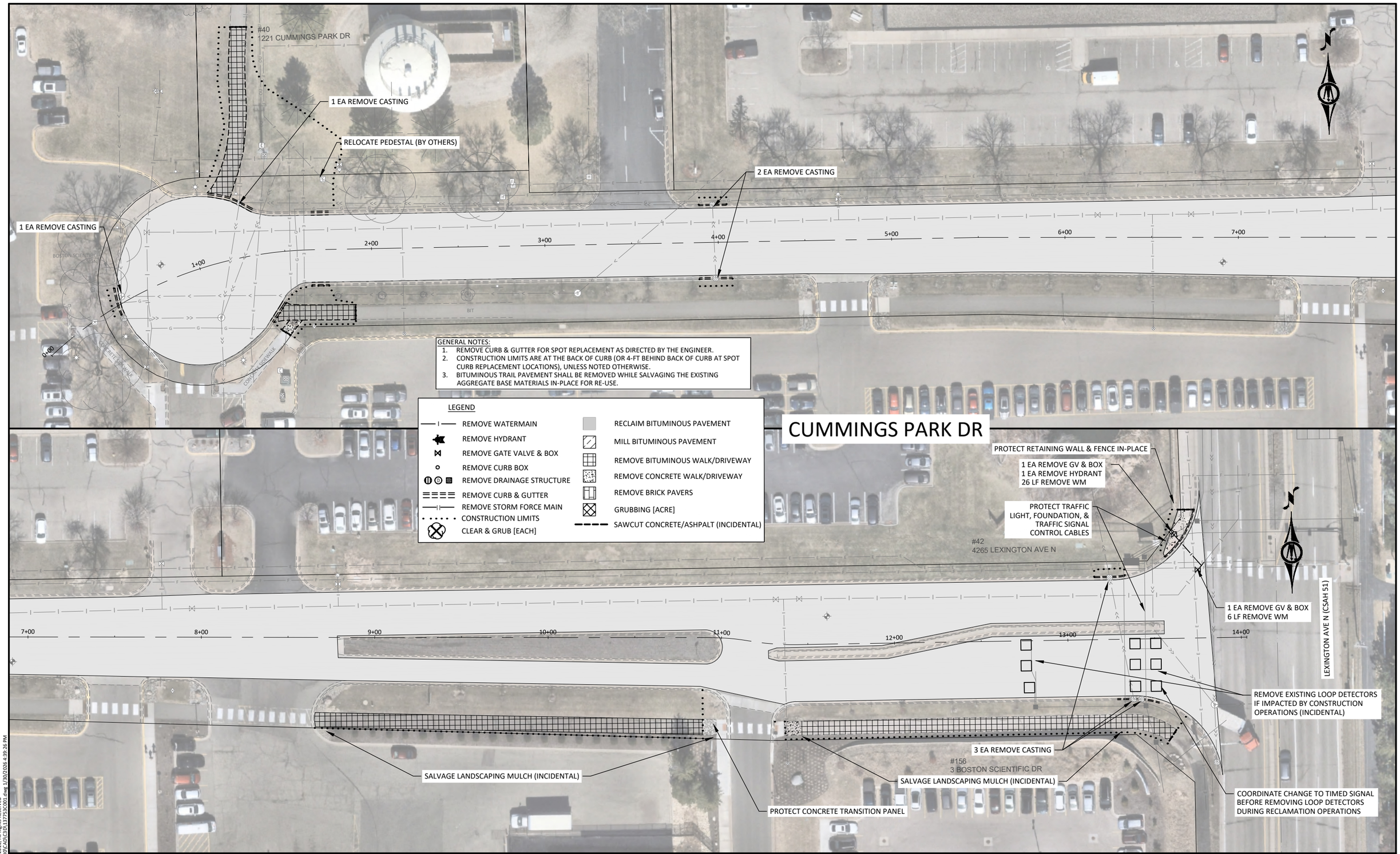
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN INDEX

SHEET C0.00



GENERAL NOTES:

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2. CONSTRUCTION LIMITS ARE AT THE BACK OF CURB (OR 4-FT BEHIND BACK OF CURB AT SPOT CURB REPLACEMENT LOCATIONS), UNLESS NOTED OTHERWISE.
3. BITUMINOUS TRAIL PAVEMENT SHALL BE REMOVED WHILE SALVAGING THE EXISTING AGGREGATE BASE MATERIALS IN-PLACE FOR RE-USE.

LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

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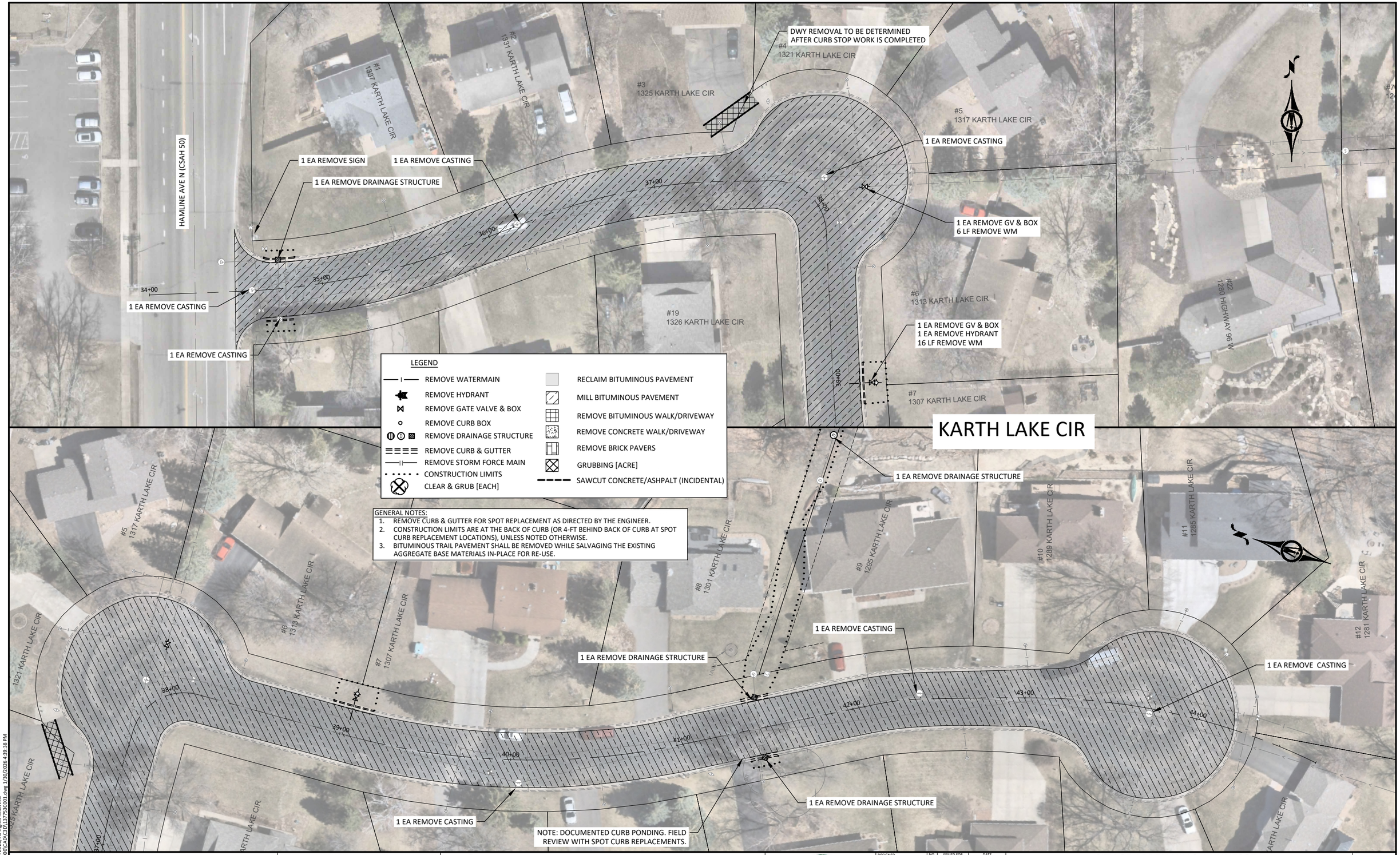
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
CUMMINGS PARK DR

SHEET C0.01



LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

GENERAL NOTES:

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2. CONSTRUCTION LIMITS ARE AT THE BACK OF CURB (OR 4-FT BEHIND BACK OF CURB AT SPOT CURB REPLACEMENT LOCATIONS), UNLESS NOTED OTHERWISE.
3. BITUMINOUS TRAIL PAVEMENT SHALL BE REMOVED WHILE SALVAGING THE EXISTING AGGREGATE BASE MATERIALS IN-PLACE FOR RE-USE.

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
KARTH LAKE CIR

SHEET C0.02

KARTH LAKE DR

1 EA REMOVE CASTING
1 EA REMOVE CASTING
1 EA REMOVE CASTING
1 EA REMOVE CURB STOP BOX
1 EA REMOVE CASTING
1 EA REMOVE GV & BOX
1 EA REMOVE HYDRANT
16 LF REMOVE WM
1 EA REMOVE SIGN
1 EA REMOVE GV & BOX
6 LF REMOVE WM
1 EA REMOVE CASTING
PROTECT TREE (TYP.)
9 LF SALVAGE FENCE
23 LF SALVAGE FENCE
11 LF SALVAGE FENCE
PROTECT TREE & LANDSCAPING (TYP.)
CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AT THE END OF EACH WORKING DAY TO CONTAIN PETS, AS REQUESTED BY THE PROPERTY OWNER (INCIDENTAL)
PROTECT TREE (TYP.)
1 EA REMOVE DRAINAGE STRUCTURE
1 EA REMOVE CASTING
2 EA REMOVE CASTING

#72 1241 KARTH LAKE DR
#73 1233 KARTH LAKE DR
#74 1226 KARTH LAKE DR
#76 1209 KARTH LAKE DR
#77 1201 KARTH LAKE DR
#78 1191 KARTH LAKE DR
#69 1250 KARTH LAKE DR
#68 1244 KARTH LAKE DR
#67 1236 KARTH LAKE DR
#66 1228 KARTH LAKE DR
#79 1181 KARTH LAKE DR
#80 1173 KARTH LAKE DR
#81 1163 KARTH LAKE DR
#82 1155 KARTH LAKE DR
#83 1147 KARTH LAKE DR
#84 1139 KARTH LAKE DR
#85 1131 KARTH LAKE DR
#86 4533 PLEASANT DR
#63 1180 KARTH LAKE DR
AMBLE DR

45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 60+00 64+00

GENERAL NOTES:
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2. CONSTRUCTION LIMITS ARE AT THE BACK OF CURB (OR 4-FT BEHIND BACK OF CURB AT SPOT CURB REPLACEMENT LOCATIONS), UNLESS NOTED OTHERWISE.
3. BITUMINOUS TRAIL PAVEMENT SHALL BE REMOVED WHILE SALVAGING THE EXISTING AGGREGATE BASE MATERIALS IN-PLACE FOR RE-USE.

LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
KARTH LAKE DR

SHEET C0.03

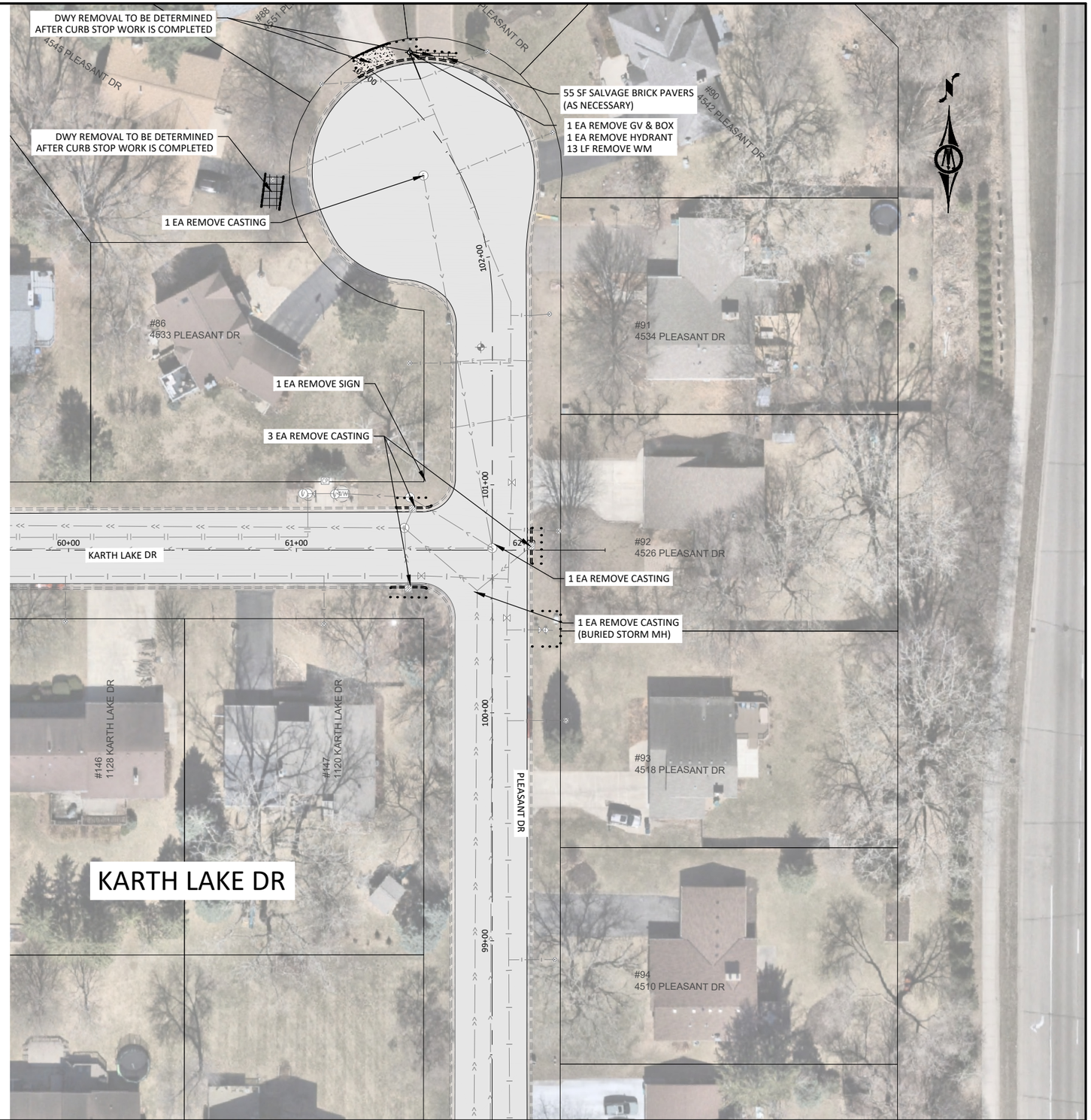
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- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
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- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)



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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
KARTH LAKE DR

SHEET C0.04

AMBLE DR

LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
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1 EA REMOVE CASTING
1 EA REMOVE DRAINAGE STRUCTURE
15 LF REMOVE WM
1 EA REMOVE SIGN
1 EA REMOVE VALVE BOX
NOTE: DOCUMENTED CURB PONDING. FIELD REVIEW WITH SPOT CURB REPLACEMENTS.

KARTH LAKE DR
PLEASANT DR

#78 1191 KARTH LAKE DR
#77 1201 KARTH LAKE DR
#139 1175 AMBLE DR
#138 1169 AMBLE DR
#137 1165
#136 1161 AMBLE DR
#135 1157 AMBLE DR
#134 1153 AMBLE DR
#133 1149 AMBLE DR
#132 1145 AMBLE DR
#57 1156 AMBLE DR
#56 1152 AMBLE DR
#55 1148 AMBLE DR
#54 1144 AMBLE DR
#53 1142 AMBLE DR
#105 4422 PLEASANT DR
#106 1137 AMBLE DR
#107 1131 AMBLE DR
#108 1127 AMBLE DR
#109 1121 AMBLE

51+00 53+00 63+00 64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00 78+00 88+00 89+00

HORZ. SCALE 0 25 50 FEET

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BJF			
CLIENT PROJ. NO.			
PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
AMBLE DR

SHEET C0.05

GENERAL NOTES:

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3. BITUMINOUS TRAIL PAVEMENT SHALL BE REMOVED WHILE SALVAGING THE EXISTING AGGREGATE BASE MATERIALS IN-PLACE FOR RE-USE.

1 EA REMOVE GV & BOX
1 EA REMOVE HYDRANT
14 LF REMOVE WM

DWY REMOVAL TO BE DETERMINED AFTER CURB STOP WORK IS COMPLETED

NOTE: DOCUMENTED CURB PONDING. FIELD REVIEW WITH SPOT CURB REPLACEMENTS.

1 EA REMOVE CASTING

1 EA REMOVE GV & BOX
6 LF REMOVE WM

1 EA REMOVE CASTING

1 EA REMOVE SIGN

1 EA REMOVE CASTING

1 EA REMOVE CASTING

1 EA REMOVE CASTING

1 EA REMOVE SIGN

1 EA REMOVE GV & BOX
12 LF REMOVE WM

1 EA REMOVE GV & BOX
6 LF REMOVE WM

DWY REMOVAL TO BE DETERMINED AFTER CURB STOP WORK IS COMPLETED

LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

#111 4419 AMBLE CIR
#110 4415 AMBLE CIR
#109 1121 AMBLE DR
#108 1127 AMBLE DR
#107 1131 AMBLE DR
#114 4408 AMBLE CIR
#113 4414 AMBLE CIR
#116 1113 AMBLE DR
#115 1105 AMBLE DR
#47 1120 AMBLE DR
#46 1116 AMBLE DR
#45 1112 AMBLE DR
#44 1108 AMBLE DR
#43 1104 AMBLE DR
#49 1128 AMBLE DR
#48 1124 AMBLE DR

AMBLE DR
AMBLE CIR
LEXINGTON AVE N (CSAH 51)

76+00 77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00

HORZ. SCALE 0 25 50 FEET

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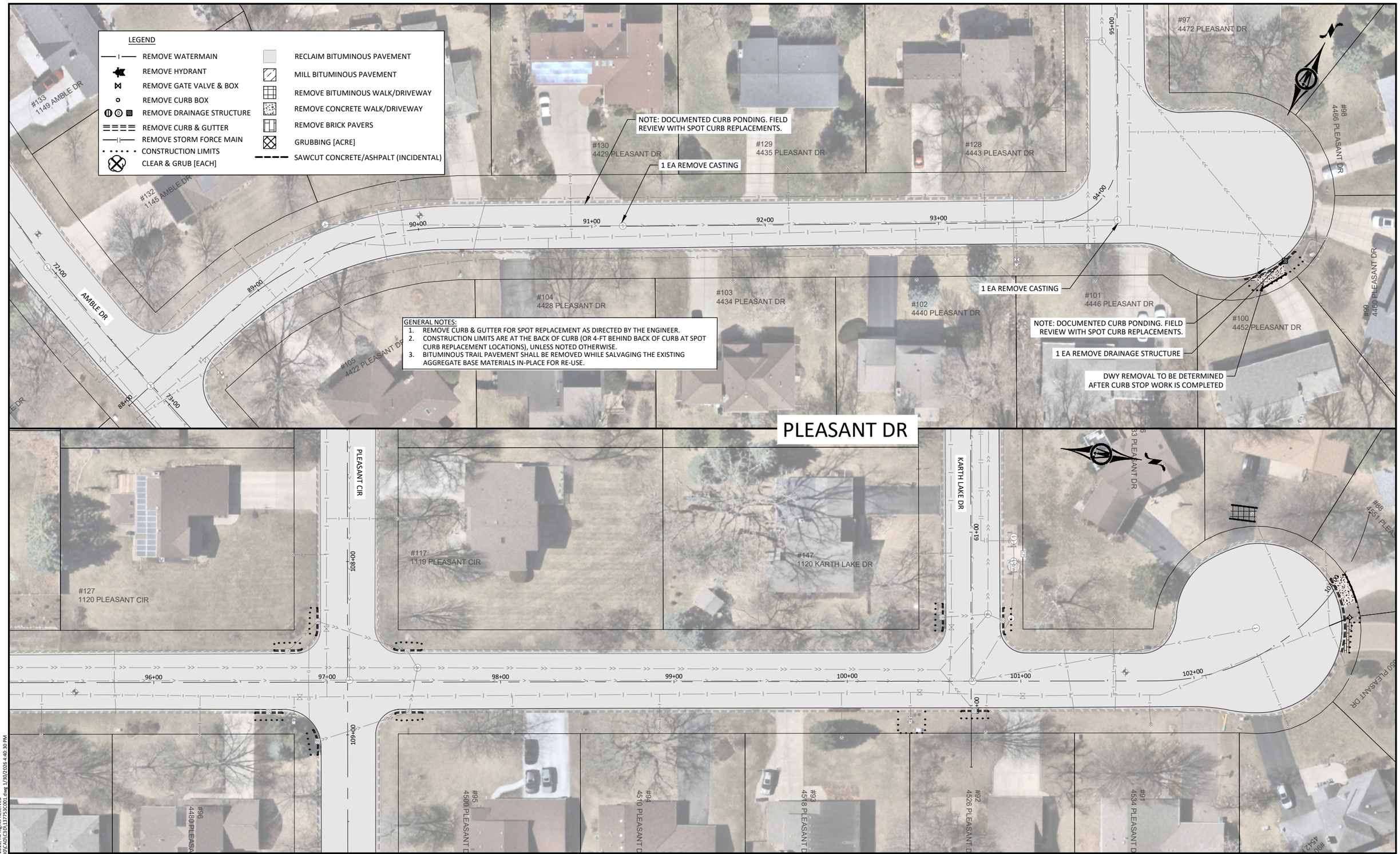
ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
JJJ/BAP		BID	02/09/2026
DRAWN BAP			
CHECKED BJF			
CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
AMBLE DR & AMBLE CIR

SHEET C0.06

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HORZ. SCALE 0 25 50 FEET

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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ARDEN HILLS

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
PLEASANT DR

SHEET C0.07

GENERAL NOTES:
1. REMOVE CURB & GUTTER FOR SPOT REPLACEMENT AS DIRECTED BY THE ENGINEER.
2. CONSTRUCTION LIMITS ARE AT THE BACK OF CURB (OR 4-FT BEHIND BACK OF CURB AT SPOT CURB REPLACEMENT LOCATIONS), UNLESS NOTED OTHERWISE.
3. BITUMINOUS TRAIL PAVEMENT SHALL BE REMOVED WHILE SALVAGING THE EXISTING AGGREGATE BASE MATERIALS IN-PLACE FOR RE-USE.

LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

1 EA REMOVE CASTING
2 EA REMOVE CASTING
1 EA REMOVE SIGN
1 EA REMOVE CASTING
2 EA REMOVE CASTING
2 EA REMOVE CASTING
1 EA REMOVE SIGN
1 EA SALVAGE SPECIALTY SIGN PANEL (TIME RESTRICTIONS)
DWY REMOVAL TO BE DETERMINED AFTER CURB STOP WORK IS COMPLETED

PLEASANT CIR
PLEASANT DR
LEXINGTON AVE N (CSAH 51)

#94 4510 PLEASANT DR
#95 4500 PLEASANT DR
#96 4480 PLEASANT DR
#97 4472 PLEASANT DR
#120 1149 PLEASANT CIR
#119 1139 PLEASANT CIR
#118 1129 PLEASANT CIR
#117 1119 PLEASANT CIR
#124 1150 PLEASANT CIR
#125 1140 PLEASANT CIR
#126 1130 PLEASANT CIR
#127 1120 PLEASANT CIR
#131 PLEASANT DR

104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00
99+00 98+00 97+00 96+00 95+00

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
PLEASANT CIR

SHEET C0.08

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GENERAL NOTES:

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LEGEND

- REMOVE WATERMAIN
- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

PROTECT EX GRAVEL FOR RE-USE AS AGGREGATE BASE

HORZ. SCALE 0 25 50 FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
KARTH LAKE PARK TRAIL SW & MIDDLE

SHEET C0.09

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71 LF REMOVE WOOD RETAINING WALL

ALTERNATE 1 OR 2 OR 3
SALVAGE EXISTING PUMP.
SALVAGE EXISTING FLOATING PUMP RAFT TO CITY.
COORDINATE W/ CITY TO HAVE ANY ADDITIONAL ITEMS SALVAGED IN ADVANCE OF DEMOLITION.
DEMOLISH EXISTING CONTROL PANEL & CONCRETE PANEL.

PROTECT EX GRAVEL FOR RE-USE AS AGGREGATE BASE

0.15 ACRES GRUBBING (CLEARING COMPLETED BY OTHERS PRIOR TO PROJECT)

ALTERNATE 1 OR 2 OR 3
23 LF REMOVE FM

1 EA REMOVE METAL APRON

WETLAND BOUNDARY AND OHWL

0.47 ACRES GRUBBING (CLEARING COMPLETED BY OTHERS PRIOR TO PROJECT)

PROTECT CULVERT

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- REMOVE HYDRANT
- REMOVE GATE VALVE & BOX
- REMOVE CURB BOX
- REMOVE DRAINAGE STRUCTURE
- REMOVE CURB & GUTTER
- REMOVE STORM FORCE MAIN
- CONSTRUCTION LIMITS
- CLEAR & GRUB [EACH]
- RECLAIM BITUMINOUS PAVEMENT
- MILL BITUMINOUS PAVEMENT
- REMOVE BITUMINOUS WALK/DRIVEWAY
- REMOVE CONCRETE WALK/DRIVEWAY
- REMOVE BRICK PAVERS
- GRUBBING [ACRE]
- SAWCUT CONCRETE/ASHPALT (INCIDENTAL)

653 LF ABANDON WATERMAIN (IN PLACE)

1 EA SALVAGE MAILBOX SUPPORT

1 EA SALVAGE MAILBOX SUPPORT

1 EA SALVAGE MAILBOX SUPPORT

1 EA SALVAGE MAILBOX SUPPORT

1 EA SALVAGE MAILBOX SUPPORT

DWY REMOVAL TO BE DETERMINED AFTER CURB STOP WORK IS COMPLETED

1 EA REMOVE HYDRANT
1 EA REMOVE GV & BOX
27 LF REMOVE WM

#148
1246 HIGHWAY 96 W

#149
1238 HIGHWAY 96 W

#150
1230 HIGHWAY 96 W

#151
1212 HIGHWAY 96 W

#152
1200 HIGHWAY 96 W

#153
1184 HIGHWAY 96 W

HORZ. SCALE 0 25 50 FEET

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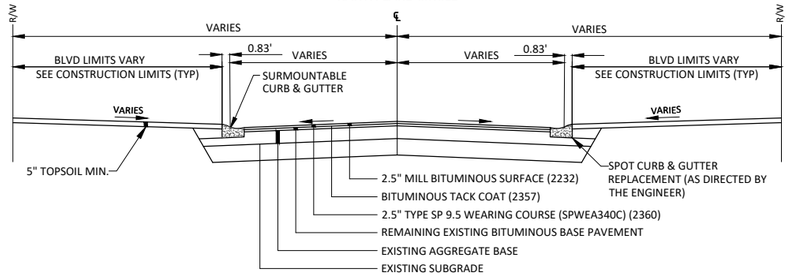
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS PLAN
KARTH LAKE TRAIL NORTH & HWY 96 TRAIL

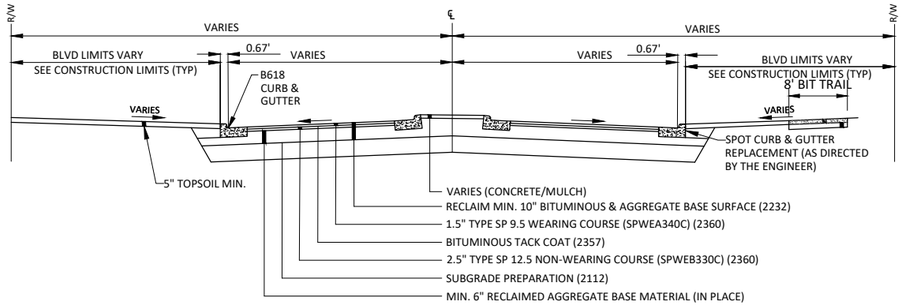
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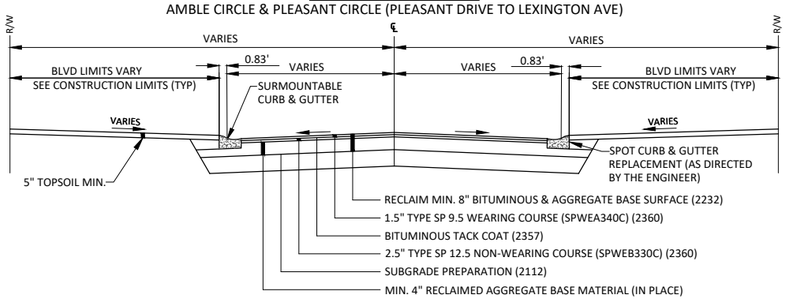
2.5" MILL & OVERLAY
KARTH LAKE CIRCLE



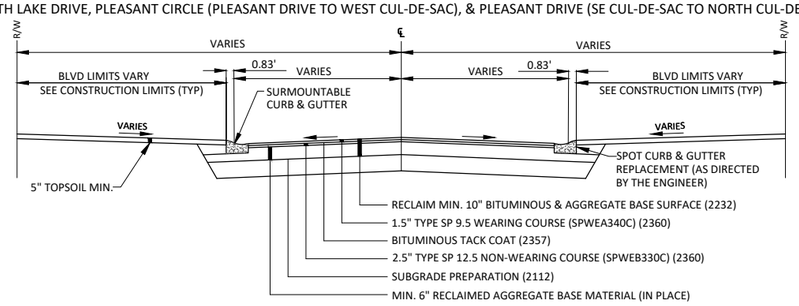
FULL DEPTH RECLAMATION
CUMMINGS PARK DR



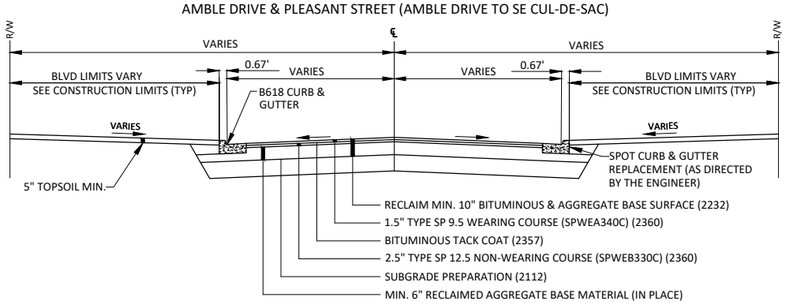
FULL DEPTH RECLAMATION
AMBLE CIRCLE & PLEASANT CIRCLE (PLEASANT DRIVE TO LEXINGTON AVE)

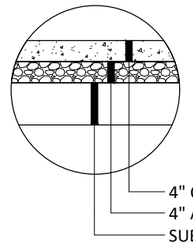


FULL DEPTH RECLAMATION
KARTH LAKE DRIVE, PLEASANT CIRCLE (PLEASANT DRIVE TO WEST CUL-DE-SAC), & PLEASANT DRIVE (SE CUL-DE-SAC TO NORTH CUL-DE SAC)

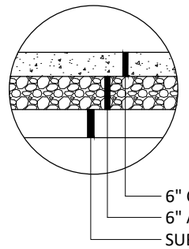


FULL DEPTH RECLAMATION
AMBLE DRIVE & PLEASANT STREET (AMBLE DRIVE TO SE CUL-DE-SAC)

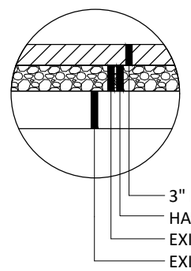




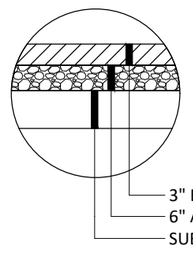
4" CONCRETE SIDEWALK
NOT TO SCALE



6" CONCRETE PEDESTRIAN RAMP/DRIVEWAY PAVEMENT
NOT TO SCALE



3" BITUMINOUS WALK
NOT TO SCALE



BITUMINOUS DRIVEWAY PAVEMENT
NOT TO SCALE

TYPICAL SECTION NOTES:
1. ANY VARIATIONS FROM THE TYPICAL SECTION DIMENSIONS ARE SHOWN ON THE PLAN DRAWINGS
2. PAVEMENT SLOPES AT INTERSECTION LOCATIONS MAY VARY FROM THOSE SHOWN ON THE TYPICAL SECTION
3. GRADE ALL TOPSOIL MATERIAL TO 1" DEPTH BELOW CONCRETE SURFACES PRIOR TO PLACING SOD
4. ELEVATIONS SHOWN ARE RELATIVE TO C/L AND DO NOT RELATE TO ACTUAL CONSTRUCTION GRADES

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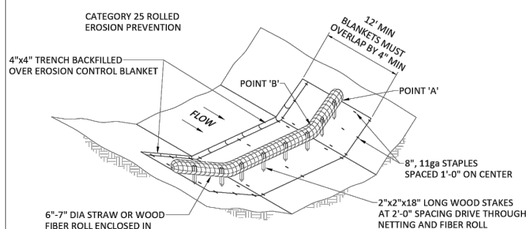
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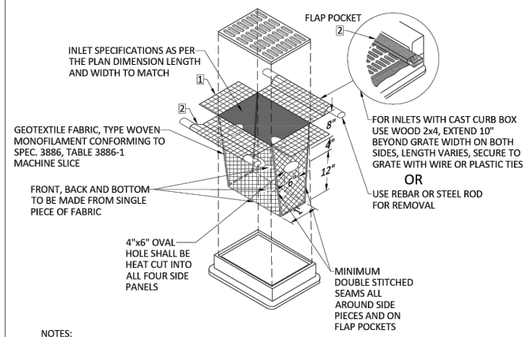
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
TYPICAL SECTIONS

SHEET C1.01



NOTE:
POINT 'A' MUST BE 1'-0" MIN HIGHER THAN POINT 'B' TO ENSURE THAT WATER FLOWS OVER THE DITCH CHECK AND NOT AROUND THE ENDS

ARDEN HILLS	DITCH CHECK - BIOROLL	REVISION PUBLISHED 03/2025 PLATE NO. EROS-02



NOTES:
1 INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER. MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENTS EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL IN THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

2 FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

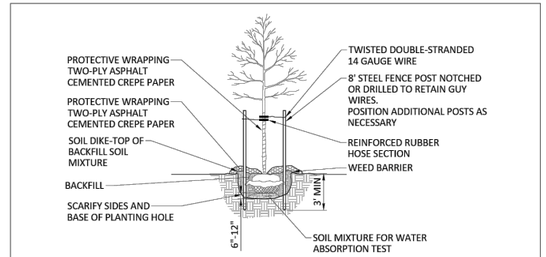
FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2x4.

INSTALLATION NOTES:
DO NOT INSTALL PROTECTION IN INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CLINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

ARDEN HILLS	INLET PROTECTION GEOTEXTILE BAG	REVISION PUBLISHED 03/2025 PLATE NO. EROS-09



DECIDUOUS TREE PLANTING

NOT TO SCALE

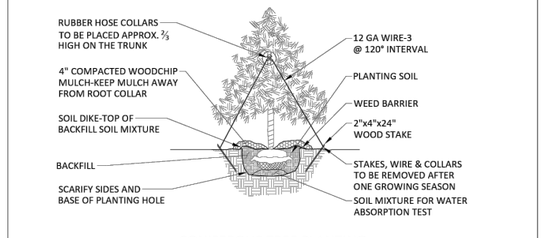
BAG & BALL PLANTING NOTE:
1. REMOVE WRAPPING AND ALL TIES OR STRAPS. IF ROOT BALL IS WRAPPED IN BURLAP THE LOWER ½ PORTION OF THE FABRIC MAY BE LEFT AT THE BOTTOM OF THE HOLE. SYNTHETIC WRAP MUST BE REMOVED AND PROPERLY DISPOSED.
2. LOOSEN ROOTS TO ENSURE THEY ARE NOT GIRDLING THE ROOT BALL.
3. SALVAGE AND REUSE ALL SOIL THAT CAME WITH THE ROOT BALL.
4. IF ROOT BALL IS EXTREMELY DRY WATER IT PRIOR TO PLACING IT IN THE HOLE.
5. IF TREE IS CONTAINER GROWN, SALVAGE ALL SOIL AND MIX WITH SUPPLEMENTED SOIL FOR BACK FILL.

BARE ROOT PLANTING NOTE:
IF BARE ROOT MATERIAL IS SPECIFIED THESE ADDITIONAL REQUIREMENTS MUST BE MET:

1. ROOTS MUST BE SOAKED OVERNIGHT THE NIGHT BEFORE PLANTING.
2. ROOTS MUST BE PROTECTED FROM DRYING OUT DURING THE INSTALLATION PROCESS.
3. ALL DAMAGED, DISEASED OR DESIGNATED ROOTS AND ROOT ENDS MUST BE CLEANLY PRUNED. TREE SHALL NOT HAVE GIRDLING ROOTS.

1. PROVIDE AND INSTALL HEALTHY PLANT MATERIALS THAT MEET ALL SPECIFICATIONS AND ARE OF THE SIZE, TYPE AND SPECIES NAMED ON THE PLANT SCHEDULE AND SHOWN ON THE PLANS.
2. DIG PLANT HOLE 1'-0" MINIMUM LARGER ON ALL SIDES THAN ROOT BALL.
3. PRIOR TO PLACING TREE, SCARIFY BOTTOM AND SIDES OF THE PLANTING HOLE.
4. TEST SOIL ABSORPTION. FILL HOLE PARTIALLY WITH SUPPLEMENTED SOIL MIXTURE, ADD WATER AND ALLOW TO PUDDLE AND SETTLE PRIOR TO SETTING TREE.
5. AFTER PUDDLING HAS SETTLED, SET TREE AND BACK FILL WITH SUPPLEMENTED SOIL MIXTURE.
6. WATER THOROUGHLY AND ADD BACK FILL AS NEEDED AFTER MOISTURE IS ABSORBED.
7. BUILD SOIL DIKE AROUND PERIPHERY OF TREE TO HOLD WATER.
8. AFTER SETTLEMENT, MULCH WITH MINIMUM 4" LAYER SHREDDED BARK, WOOD CHIPS OR AS OTHERWISE SPECIFIED. DO NOT MULCH UP AGAINST THE TRUNK.
9. REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF THE TREE.

ARDEN HILLS	DECIDUOUS TREE PLANTING	REVISION PUBLISHED 03/2025 PLATE NO. MISC-01



CONIFEROUS TREE PLANTING

NOT TO SCALE

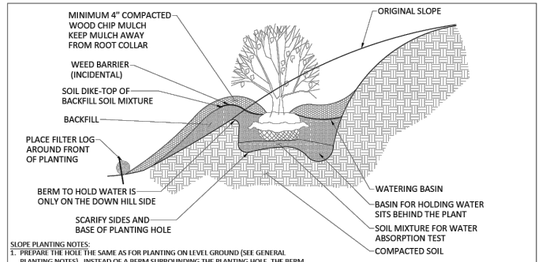
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7. BUILD SOIL DIKE AROUND PERIPHERY OF TREE TO HOLD WATER.
8. AFTER SETTLEMENT, MULCH WITH MINIMUM 4" LAYER SHREDDED BARK, WOOD CHIPS OR AS OTHERWISE SPECIFIED. DO NOT MULCH UP AGAINST THE TRUNK.
9. REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF THE TREE.

ARDEN HILLS	CONIFEROUS TREE PLANTING	REVISION PUBLISHED 03/2025 MISC-02



SLOPE PLANTING NOTES:
1. PREPARE THE HOLE THE SAME AS FOR PLANTING ON LEVEL GROUND [SEE GENERAL PLANTING NOTES]. INSTEAD OF A BERM SURROUNDING THE PLANTING HOLE, THE BERM WILL BE ONLY ON THE DOWNHILL SIDE OF THE HOLE AND A BASIN FOR HOLDING WATER WILL SIT BEHIND THE PLANT ON THE HILL.
2. LEVEL A TERRACE IN THE HILLSIDE, CARVE AWAY THE SLOPE ABOVE THE PLANTING HOLE AND USE THE DISPLACED SOIL TO BUILD THE TERRACE AREA LEVEL FOR THE PLANTING HOLE. THE TERRACE SHOULD BE AT LEAST TWICE AS WIDE AS THE ROOT BALL. IF A CONIFEROUS TREE IS BEING PLANTED CONSIDER THE MATURE SIZE OF THE SPREAD WHEN BUILDING THE HILLSIDE TERRACE. COMPACT THE WORKING AREA.
3. DIG THE HOLE FOR THE ROOT BALL AND THE WATERING BASIN AND BUILD THE BERM ON THE DOWNHILL SIDE OF THE HOLE. COMPACT THE BERM AND THE SLOPE SIDE OF THE HOLE.
4. TEST SOIL ABSORPTION [SEE NO. 4 GENERAL PLANTING NOTES].
5. SET THE ROOT BALL SLIGHTLY FORWARD IN THE HOLE. POSITION THE PLANT SO EROSION OVER TIME NEITHER EXPOSES THE ROOT BALL NOR COVERS THE ROOT COLLAR.
6. BACKFILL AND COMPACT. USE ADDITIONAL AMENDED SOIL TO STRENGTHEN AND ENLARGE THE EARTH BERM IN FRONT OF THE PLANT. SMOOTH INTO SURROUNDING SLOPE.
7. MULCH WITH WOOD CHIPS TO KEEP SOIL BERM FROM ERODING. KEEP MULCH A MINIMUM OF 3" FROM THE ROOT COLLAR. FOLLOW INSTRUCTIONS FOR STAKING. FILTER LOG SHALL BE INSTALLED ON THE FRONT OF THE PLANTING TO SECURE THE WOOD CHIPS IF SLOPE IS STEEP.
8. MONITOR CONDITION OF THE PLANTS SET IN SLOPE FOR A MINIMUM OF 2 MONTHS AFTER PLANTING TO INSURE THAT THE CONTOUR OF THE LAND IS CAPTURING THE RAINWATER AND THE SLOPE IS NOT ERODING ONTO THE BASE OF THE PLANT. PLANTINGS SHOULD BE CHECKED AFTER HEAVY RAINS THE FIRST SEASON AND AFTER THE FIRST WINTER IN PLACE.

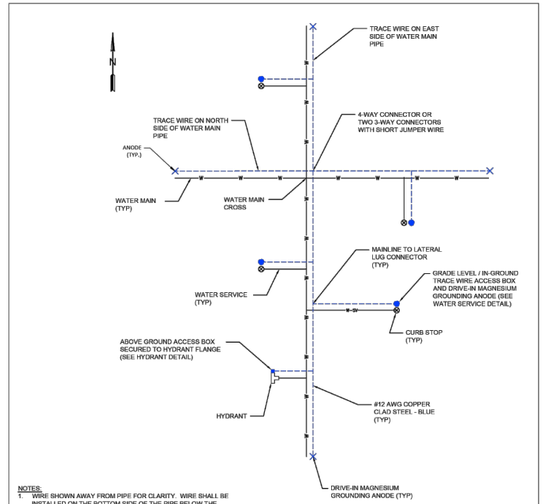
GENERAL PLANTING NOTES:
1. PROVIDE AND INSTALL HEALTHY PLANT MATERIALS THAT MEET ALL SPECIFICATIONS AND ARE OF THE SIZE, TYPE AND SPECIES NAMED ON THE PLANT SCHEDULE AND SHOWN ON THE PLANS.
2. DIG PLANT HOLE 1'-0" MINIMUM LARGER ON ALL SIDES THAN ROOT BALL.
3. PRIOR TO PLACING TREE, SCARIFY BOTTOM AND SIDES OF THE PLANTING HOLE.
4. TEST SOIL ABSORPTION. FILL HOLE PARTIALLY WITH SUPPLEMENTED SOIL MIXTURE, ADD WATER AND ALLOW TO PUDDLE AND SETTLE PRIOR TO SETTING TREE.
5. AFTER PUDDLING HAS SETTLED, SET TREE AND BACK FILL WITH SUPPLEMENTED SOIL MIXTURE.
6. WATER THOROUGHLY AND ADD BACK FILL AS NEEDED AFTER MOISTURE IS ABSORBED.
7. BUILD SOIL DIKE AROUND PERIPHERY OF TREE TO HOLD WATER.
8. AFTER SETTLEMENT, MULCH WITH MINIMUM 4" LAYER SHREDDED BARK, WOOD CHIPS OR AS OTHERWISE SPECIFIED. DO NOT MULCH UP AGAINST THE TRUNK.
9. REMOVE DEAD OR DAMAGED BRANCHES. RETAIN THE NATURAL FORM OF THE TREE.

BAG & BALL PLANTING NOTE:
1. REMOVE WRAPPING AND ALL TIES OR STRAPS. IF ROOT BALL IS WRAPPED IN BURLAP THE LOWER ½ PORTION OF THE FABRIC MAY BE LEFT AT THE BOTTOM OF THE HOLE. SYNTHETIC WRAP MUST BE REMOVED AND PROPERLY DISPOSED.
2. LOOSEN ROOTS TO ENSURE THEY ARE NOT GIRDLING THE ROOT BALL.
3. SALVAGE AND REUSE ALL SOIL THAT CAME WITH THE ROOT BALL.
4. IF ROOT BALL IS EXTREMELY DRY WATER IT PRIOR TO PLACING IT IN THE HOLE.
5. IF TREE IS CONTAINER GROWN, SALVAGE ALL SOIL AND MIX WITH SUPPLEMENTED SOIL FOR BACK FILL.

BARE ROOT PLANTING NOTE:
IF BARE ROOT MATERIAL IS SPECIFIED THESE ADDITIONAL REQUIREMENTS MUST BE MET:

1. ROOTS MUST BE SOAKED OVERNIGHT THE NIGHT BEFORE PLANTING.
2. ROOTS MUST BE PROTECTED FROM DRYING OUT DURING THE INSTALLATION PROCESS.
3. ALL DAMAGED, DISEASED OR DESIGNATED ROOTS AND ROOT ENDS MUST BE CLEANLY PRUNED. TREE SHALL NOT HAVE GIRDLING ROOTS.

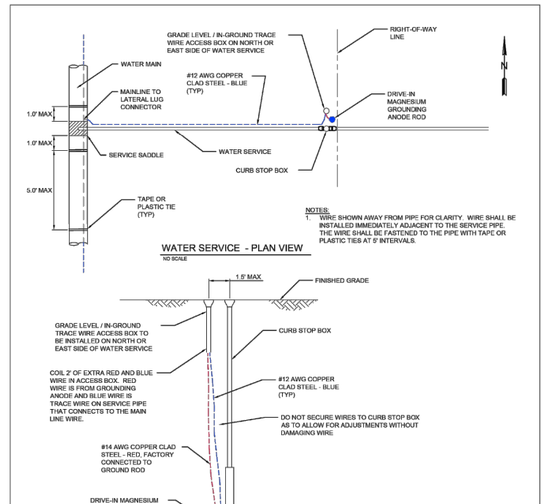
ARDEN HILLS	TREE OR SHRUB PLANTED ON A SLOPE	REVISION PUBLISHED 03/2025 PLATE NO. MISC-03



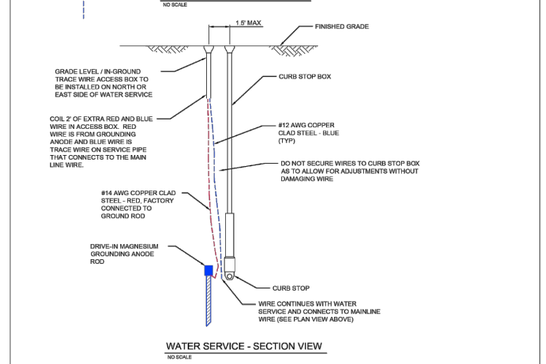
NOTES:
1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACE WIRE PLAN (WATER)
NO SCALE

ARDEN HILLS	TRACE WIRE - WATER	REVISION PUBLISHED 03/2025 PLATE NO. MISC-04

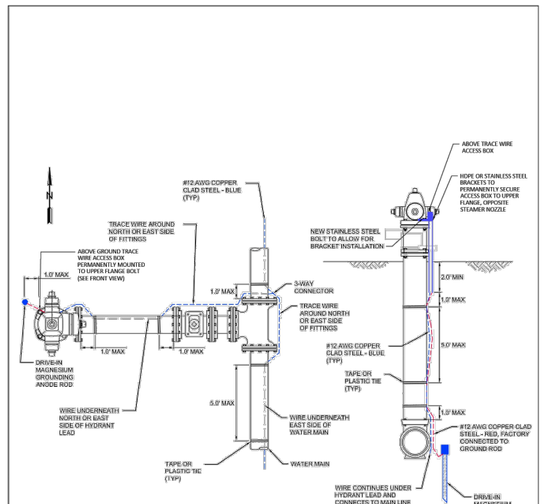


WATER SERVICE - PLAN VIEW
NO SCALE



WATER SERVICE - SECTION VIEW
NO SCALE

ARDEN HILLS	TRACE WIRE - WATER	REVISION PUBLISHED 03/2025 PLATE NO. MISC-05



HYDRANT - PLAN VIEW
NO SCALE

HYDRANT - SECTION VIEW
NO SCALE

ARDEN HILLS	TRACE WIRE - HYDRANT	REVISION PUBLISHED 03/2025 PLATE NO. MISC-06

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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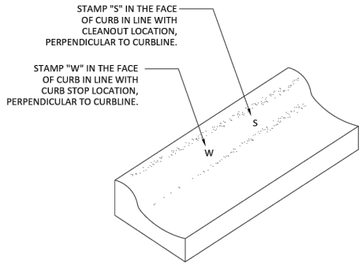
ARDEN HILLS

DESIGNED	JJJ/BAP
DRAWN	BAP
CHECKED	BJF
CLIENT PROJ. NO.	PW-26-0100

NO.	ISSUED FOR	DATE
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
DETAILS

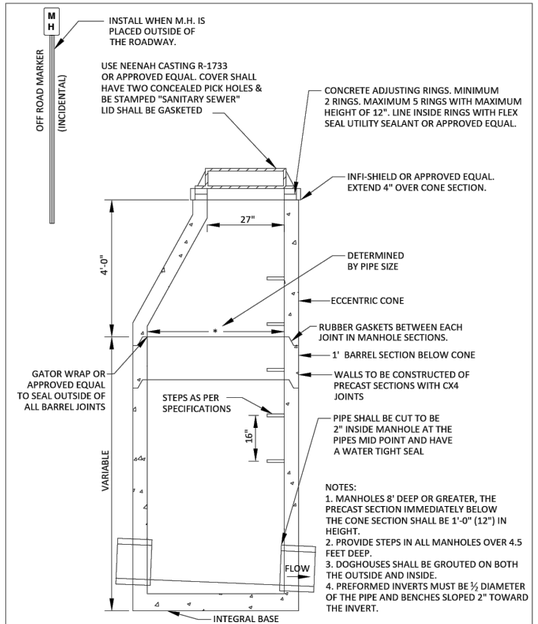
SHEET C1.02



NOTES:

1. ALL NEW AND EXISTING WATER AND SEWER SERVICE LOCATIONS SHALL BE MARKED IN CURB AS SHOWN. STAMPING OF SERVICE LOCATIONS SHALL BE CONSIDERED INCIDENTAL TO THE PRICE OF CURB.
2. W'S AND S'S NOT PLACED BY SPECIFIED STAMP WILL NOT BE ACCEPTED AND THAT SECTION OF CURB MUST BE REMOVED AND REPLACED.

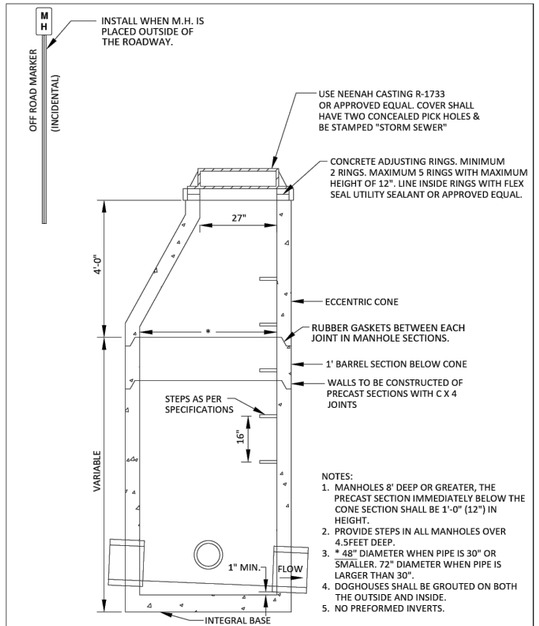
ARDEN HILLS	CURB NOTATION	REVISION PUBLISHED 03/2025 PLATE NO. SAN-01



NOTES:

1. MANHOLES 8' DEEP OR GREATER, THE PRECAST SECTION IMMEDIATELY BELOW THE CONE SECTION SHALL BE 1'-0" (12") IN HEIGHT.
2. PROVIDE STEPS IN ALL MANHOLES OVER 4.5 FEET DEEP.
3. DOGHOUSES SHALL BE GROUTED ON BOTH THE OUTSIDE AND INSIDE.
4. PREFORMED INVERTS MUST BE ½ DIAMETER OF THE PIPE AND BENCHES SLOPED 2" TOWARD THE INVERT.

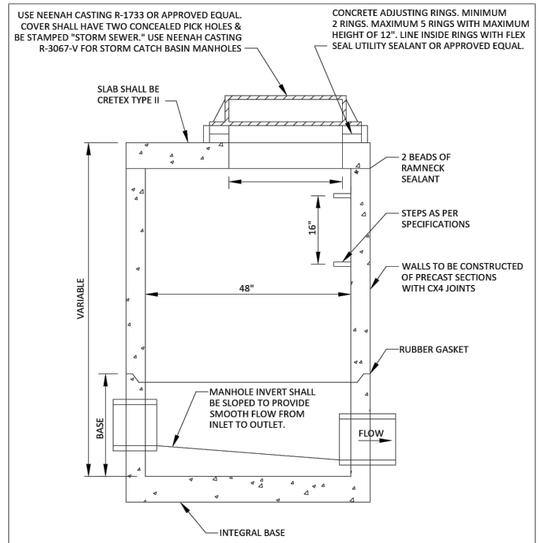
ARDEN HILLS	SANITARY STANDARD MANHOLE	REVISION PUBLISHED 03/2025 PLATE NO. SAN-02



NOTES:

1. MANHOLES 8' DEEP OR GREATER, THE PRECAST SECTION IMMEDIATELY BELOW THE CONE SECTION SHALL BE 1'-0" (12") IN HEIGHT.
2. PROVIDE STEPS IN ALL MANHOLES OVER 4.5FEET DEEP.
3. * 48" DIAMETER WHEN PIPE IS 30" OR SMALLER. 72" DIAMETER WHEN PIPE IS LARGER THAN 30".
4. DOGHOUSES SHALL BE GROUTED ON BOTH THE OUTSIDE AND INSIDE.
5. NO PREFORMED INVERTS.

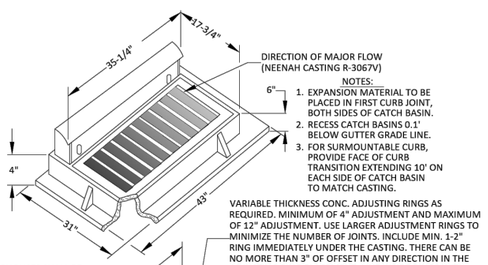
ARDEN HILLS	STORM MANHOLE	REVISION PUBLISHED 03/2025 PLATE NO. STRM-01



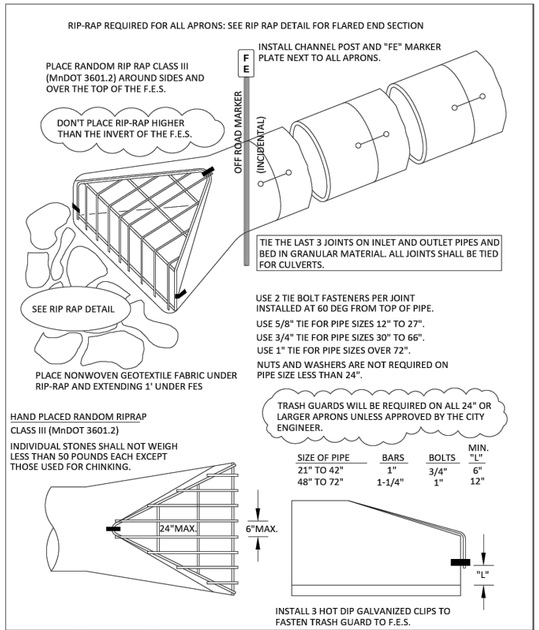
NOTES:

1. THIS TYPE MANHOLE SHALL BE USED WHEN SPECIFIED OR WHEN THE MANHOLE DEPTH IS LESS THAN EIGHT FEET.
2. NO PREFORMED INVERTS.

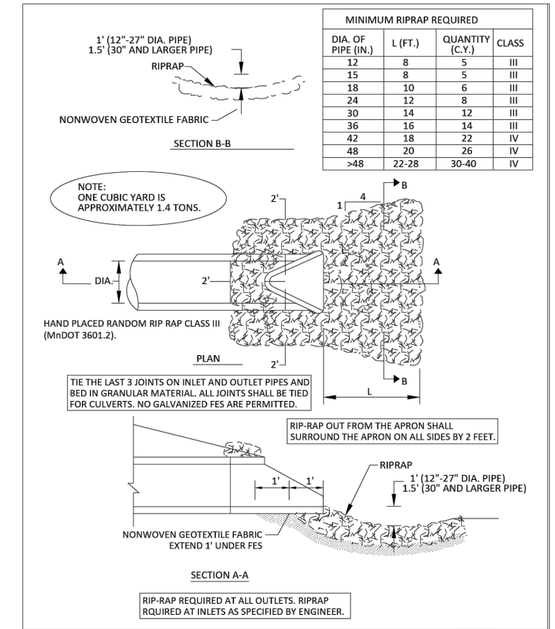
ARDEN HILLS	STORM SLAB TOP MANHOLE CATCH BASIN MANHOLE	REVISION PUBLISHED 03/2025 PLATE NO. STRM-02



ARDEN HILLS	CATCH BASIN 2' X 3'	REVISION PUBLISHED 03/2025 PLATE NO. STRM-04



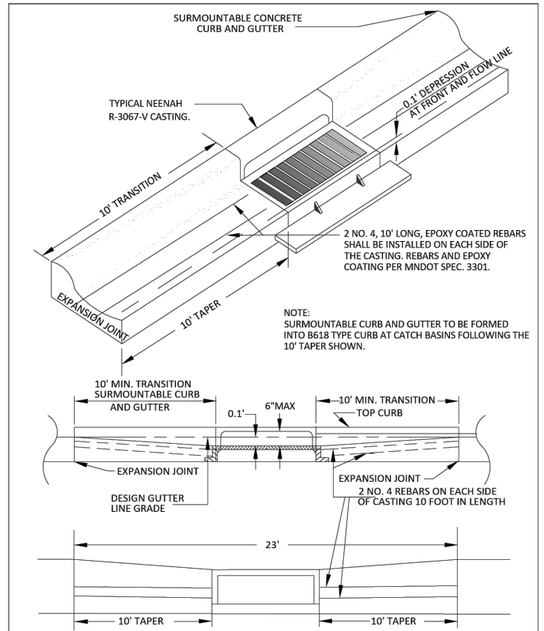
ARDEN HILLS	INLET & OUTLET F.E.S WITH TRASH GUARD	REVISION PUBLISHED 03/2025 PLATE NO. STRM-05



MINIMUM RIPRAP REQUIRED

DIA. OF PIPE (IN.)	L (FT.)	QUANTITY (C.Y.)	CLASS
12	8	5	III
15	8	5	III
18	10	6	III
24	12	8	III
30	14	12	III
36	16	14	III
42	18	22	IV
48	20	26	IV
>48	22-28	30-40	IV

ARDEN HILLS	RIPRAP DETAIL FOR FLARED END SECTION	REVISION PUBLISHED 03/2025 PLATE NO. STRM-06



ARDEN HILLS	CATCH BASIN CASTING INSTALLATION DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. STRM-07

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ARDEN HILLS

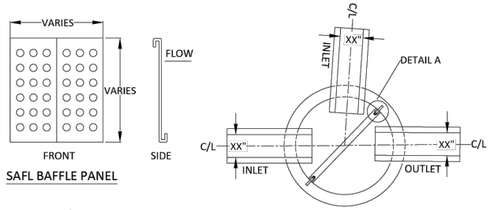
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DRAWN	BAP
CHECKED	BJF
CLIENT PROJ. NO.	PW-26-0100

NO.	ISSUED FOR	DATE
	BID	02/09/2026

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
DETAILS

SHEET C1.03

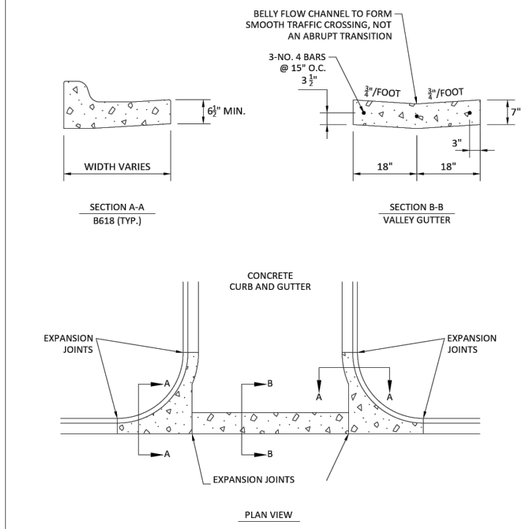
DRAINAGE STRUCTURE DESIGN SPECIAL



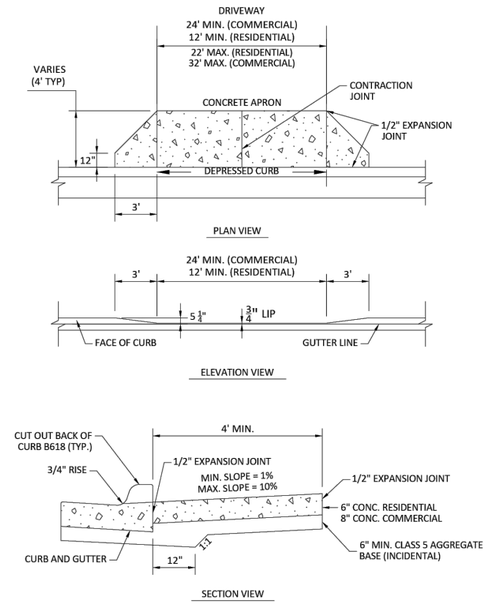
NOTES:

* UPSTREAM TECHNOLOGIES INC. IS THE EXCLUSIVE LICENSEE OF THE SAFL BAFFLE.
* CONTRACTOR MUST VERIFY LOCATION OF CASTING AND STEPS PRIOR TO INSTALLATION OF STRUCTURE.

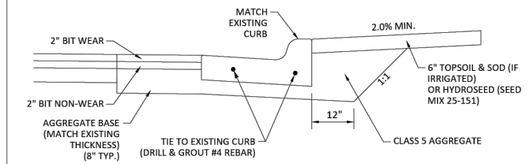
ARDEN HILLS	SAFL BAFFLE STORM STRUCTURE	REVISION PUBLISHED 03/2025 PLATE NO. STRM-09



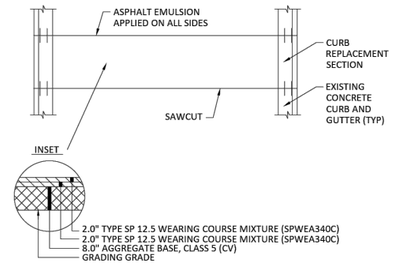
ARDEN HILLS	CONCRETE "V" GUTTER	REVISION PUBLISHED 03/2025 PLATE NO. STRT-01



ARDEN HILLS	DEPRESSED CURB WITH DRIVEWAY APRON	REVISION PUBLISHED 03/2025 PLATE NO. STRT-02



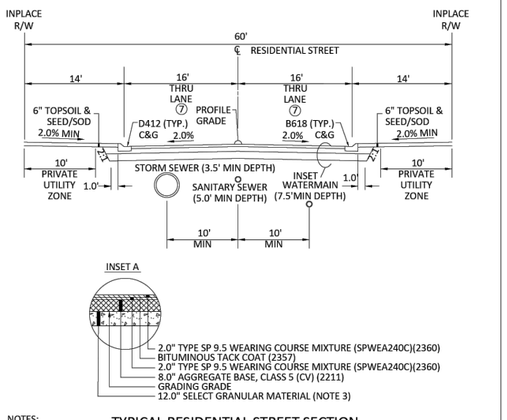
CURB REPLACEMENT WITH BITUMINOUS PATCH



BITUMINOUS PATCH

NOTE:
1) TOPSOIL SHALL MEET MNDOT SPEC 3877 FOR PULVERIZED TOPSOIL
2) WATER SEED OR SOD UNTIL ESTABLISHED & ACCEPTED BY THE CITY OR REPRESENTATIVE

ARDEN HILLS	BITUMINOUS PATCHING DETAILS	REVISION PUBLISHED 03/2025 PLATE NO. STRT-03



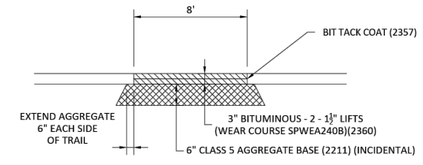
NOTES:

1. STREET PAVEMENT SECTION SHALL BE DESIGNED BY A QUALIFIED ENGINEER BASED ON ACTUAL SOIL CONDITIONS. THE PAVEMENT SECTION (INSET A) REPRESENTS THE MINIMUM SECTION ALLOWED.
2. PAVEMENT DESIGN CRITERIA MINIMUM SHALL INCLUDE THE FOLLOWING: 1000 ADT, 20 YEAR LIFE, 2% GROWTH.
3. INCORPORATION OF GRANULAR SUBBASE AND SUBDRAINS SHALL BE BASED ON GEOTECHNICAL ENGINEERING RECOMMENDATION.
4. B618 CURB AND GUTTER SHALL BE PLACED AROUND RADII AND ADJACENT TO STORM SEWER CATCH BASINS.
5. PRIVATE UTILITIES AND IRRIGATION SHALL NOT BE PLACED UNDER THE ROADWAY SECTION EXCEPT FOR CROSSINGS IN LOCATIONS APPROVED BY THE CITY ENGINEER.
6. REFER TO ARDEN HILLS DESIGN STANDARDS MANUAL FOR ADDITIONAL REQUIREMENTS RELATED TO ROADWAY PROFILES, CURVATURE INTERSECTIONS ETC.
7. MAINTAIN EXISTING STREET WIDTHS FOR RECONSTRUCTION PROJECTS.
8. TOPSOIL SHALL MEET MNDOT SPEC 3877 FOR PULVERIZED TOPSOIL.
9. NO CORES FOR DENSITY PERMITTED FOR FINAL WEAR.

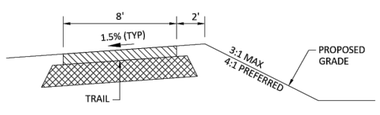
TYPICAL RESIDENTIAL STREET SECTION

ARDEN HILLS	TYPICAL RESIDENTIAL STREET SECTION	REVISION PUBLISHED 03/2025 PLATE NO. STRT-04

RESTORE DISTURBED AREA WITH 2" PULVERIZED BLACK DIRT (MINIMUM), SEEDING, FERTILIZING, AND PLACEMENT OF EROSION CONTROL BLANKET. SEED MIX TO BE TYPE 25-151 WITH APPLICATION RATE OF 50 LBS/ACRE OF RYE SEED



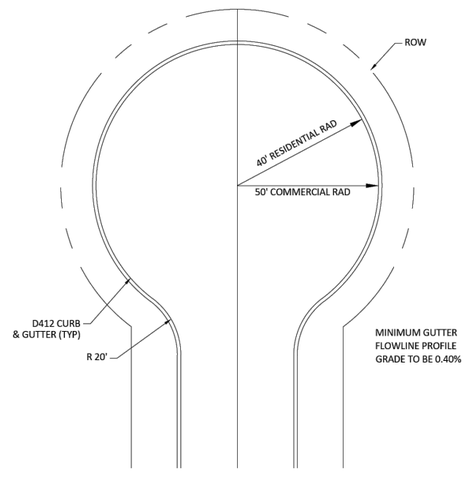
TRAIL TYPICAL CROSS SECTION



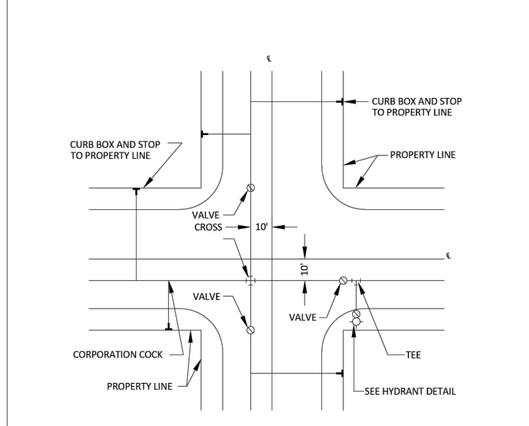
TRAIL TYPICAL SECTION

NOTE: FOLLOW MNDOT ADA DESIGN STANDARDS.
NOTE: NO CORES FOR DENSITY PERMITTED FOR FINAL WEAR.

ARDEN HILLS	BITUMINOUS TRAIL TYPICAL SECTION	REVISION PUBLISHED 03/2025 PLATE NO. STRT-06



ARDEN HILLS	CUL-DE-SAC	REVISION PUBLISHED 03/2025 PLATE NO. STRT-07



ARDEN HILLS	TYPICAL WATER LAYOUT	REVISION PUBLISHED 03/2025 PLATE NO. WATR-01

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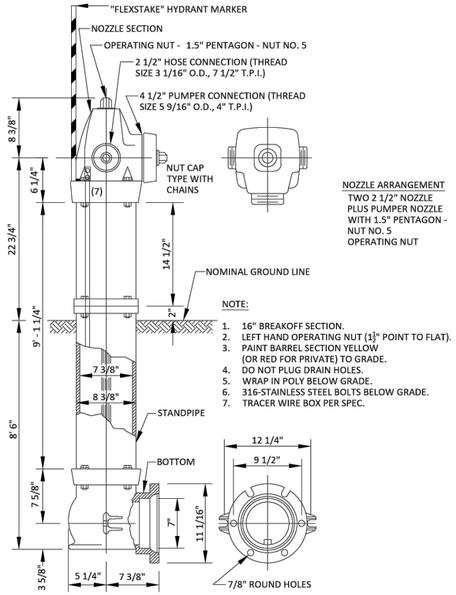
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DETAILS

SHEET C1.04

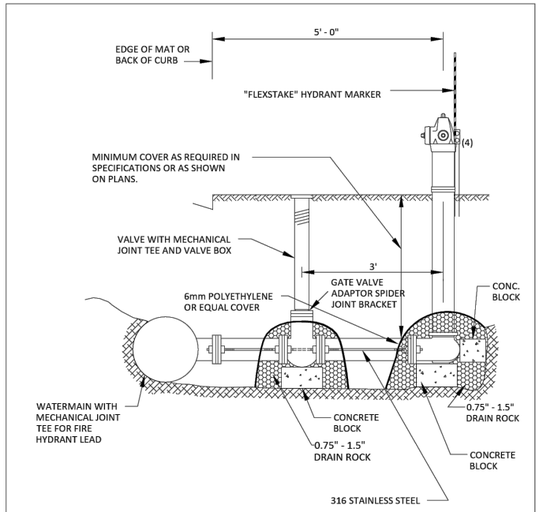


NOZZLE ARRANGEMENT
TWO 2 1/2" NOZZLE PLUS PUMPER NOZZLE WITH 1.5" PENTAGON - NUT NO. 5 OPERATING NUT

NOTE:
1. 16" BREAKOFF SECTION.
2. LEFT HAND OPERATING NUT ($1\frac{1}{2}$" POINT TO FLAT).
3. PAINT BARREL SECTION YELLOW (OR RED FOR PRIVATE) TO GRADE.
4. DO NOT PLUG DRAIN HOLES.
5. WRAP IN POLY BELOW GRADE.
6. 316-STAINLESS STEEL BOLTS BELOW GRADE.
7. TRACER WIRE BOX PER SPEC.

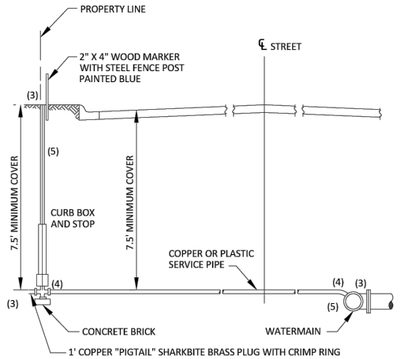
NOTE: HYDRANT LOCATION DEVICES REQUIRED - SEE SPECIFICATIONS
HYDRANT COLOR YELLOW FOR PUBLIC / HYDRANT COLOR RED FOR PRIVATE

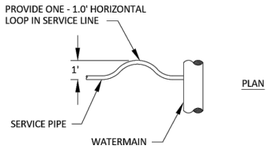
ARDEN HILLS	PACER HYDRANT DETAIL MODEL WB-67	REVISION PUBLISHED 03/2025 PLATE NO. WATR-02



NOTES:
1. ALL HYDRANT LEADS SHALL BE RESTRAINED FROM THE MAIN TO THE HYDRANT THROUGH THE USE OF $\frac{3}{4}$" THREADED RODS 316 STAINLESS STEEL OR MEGALUGS AS RESTRAINTS IN ACCORDANCE WITH THE STANDARD DETAIL PLATES
2. WRAP ALL DIP & FITTINGS IN POLY.
3. CONCRETE BLOCKS TO BE PLACED AGAINST UNDISTURBED GROUND.
4. TRACER WIRE PER SPECS.

ARDEN HILLS	HYDRANT RESTRAINT DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-03

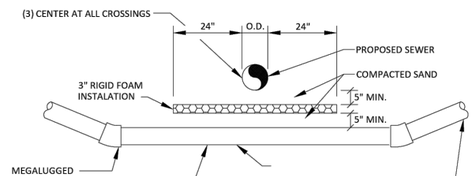




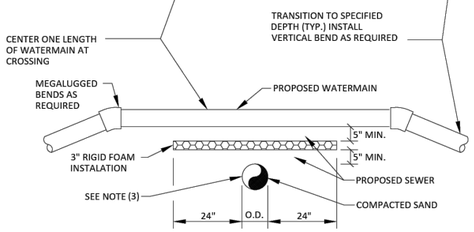
PLAN

NOTES:
1. PLACE CURB BOX 1FT BEYOND ROW WHEN SIDEWALK IS PRESENT.
2. PLACE STAMP IN CURB WHEN CONCRETE CURB IS PRESENT.
3. ADD TRACER WIRE PER SPECIFICATIONS.
4. COMPRESSION OR FLARED FITTING PER SPECIFICATIONS.
5. CORPORATION, CURBSTOP & BOX PER SPECIFICATIONS.
6. CURBSTOPS SHALL HAVE EXTENSION RODS (PINNED).

ARDEN HILLS	TYPICAL WATER SERVICE DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-04



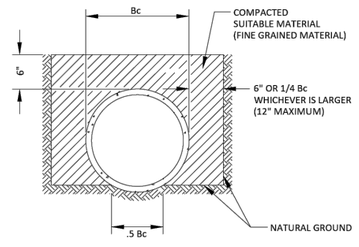
WATERMAIN INSTALLATION UNDER SANITARY OR STORM SEWER



WATERMAIN INSTALLATION OVER SANITARY OR STORM SEWER

NOTES:
1. WHEN WATERMAIN AND SANITARY SEWER CROSSING HAVE LESS THAN 18" VERTICAL SEPARATION, INSTALL CROSSING AS SHOWN.
2. WHEN WATERMAIN COVER IS LESS THAN 7.5 FEET, INSTALL WATERMAIN UNDER SANITARY SEWER.
3. INSTALL ONE LENGTH OF WATERMAIN PIPE WITH THE APPROPRIATE MATERIAL ADAPTORS.

ARDEN HILLS	WATERMAIN CROSSING	REVISION PUBLISHED 03/2025 PLATE NO. WATR-05

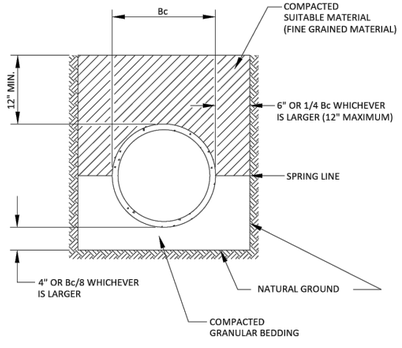


THE BOTTOM OF THE TRENCH SHALL BE SHAPED TO FIT THE PIPE BARREL FOR AT LEAST 50% OF THE OUTSIDE DIAMETER. THE REMAINDER OF THE PIPE IS SURROUNDED TO A HEIGHT OF AT LEAST 6" ABOVE ITS TOP BY SELECT FILL MATERIALS, PLACED BY HAND TOOLS AND COMPACTED TO COMPLETELY FILL ALL SPACES UNDER AND ADJACENT TO THE PIPE.

NOTE:

ALL COSTS OF EXCAVATION BELOW GRADE AND PLACEMENT OF GRANULAR BEDDING SHALL BE INCLUDED IN THE BID PRICES FOR PIPE ITEMS.

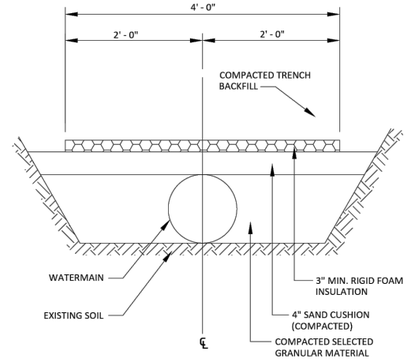
ARDEN HILLS	CLASS C PIPE BEDDING	REVISION PUBLISHED 03/2025 PLATE NO. WATR-06



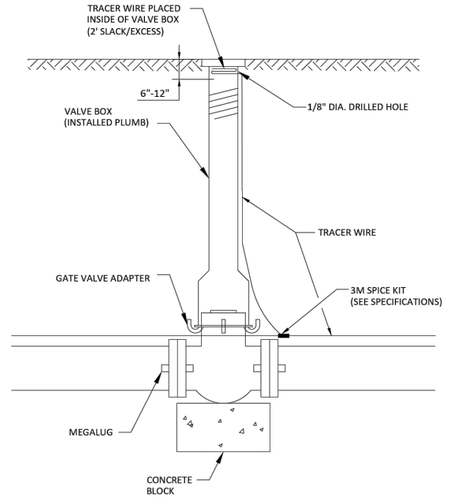
NOTE:

ALL COSTS OF EXCAVATION BELOW GRADE AND PLACEMENT OF GRANULAR BEDDING SHALL BE INCLUDED IN THE BID PRICES FOR PIPE ITEMS.

ARDEN HILLS	CLASS B PIPE BEDDING	REVISION PUBLISHED 03/2025 PLATE NO. WATR-07



ARDEN HILLS	PIPE INSTALLATION DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-08



GATE VALVE HARDWARD MUST CONSIST OF 316 STAINLESS STEEL

ARDEN HILLS	VALVE WITH TRACER WIRE DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-09

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

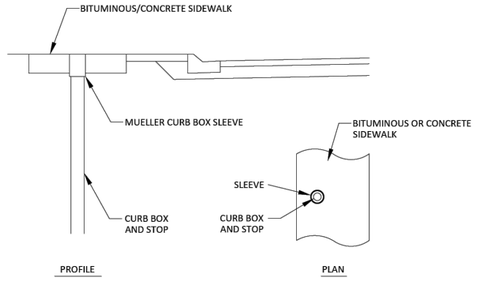
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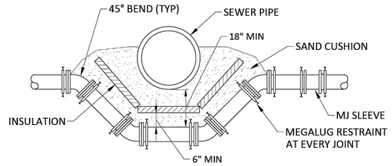
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JJJ/BAP		BID	02/09/2026
DRAWN BAP			
CHECKED BJF			
CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
DETAILS

SHEET C1.05

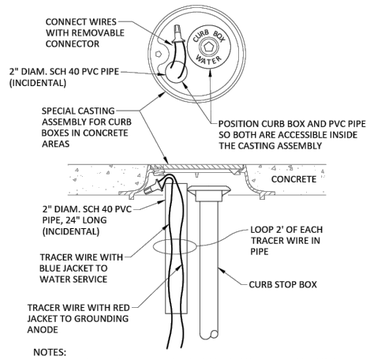


ARDEN HILLS	CURB STOP IN SIDEWALK OR DRIVEWAY DETAIL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-10



NOTES:
1. PROVIDE MEGALUG RESTRAINT AT JOINT ON BENDS AND AS SHOWN THIS DETAIL
2. COAT ALL ANCHORAGE AS PER SPECS
3. PROVIDE SAND CUSHION BETWEEN TOP OF WATERMAIN AND BOTTOM OF SEWER PIPE, MIN DIMENSIONS AS SHOWN THIS DETAIL (INCIDENTAL)
4. INSULATION TO BE 2" THICK POLYSTYRENE

ARDEN HILLS	WATERMAIN OFFSET	REVISION PUBLISHED 03/2025 PLATE NO. WATR-12

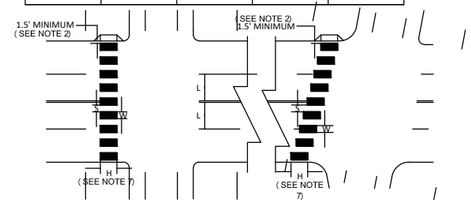


NOTES:
1. SPECIAL CASTING ASSEMBLIES ARE REQUIRED ON CURB STOP BOXES THAT ARE WITHIN CONCRETE OR BITUMINOUS SURFACING.
2. TRACER WIRE ACCESS BOXES ARE NOT REQUIRED WHERE A SPECIAL CASTING ASSEMBLY IS INSTALLED.

ARDEN HILLS	TRACER WIRE AT CURB BOX, INSIDE CASTING ASSEMBLY SPECIAL	REVISION PUBLISHED 03/2025 PLATE NO. WATR-15

PEDESTRIAN CROSSWALK MARKINGS

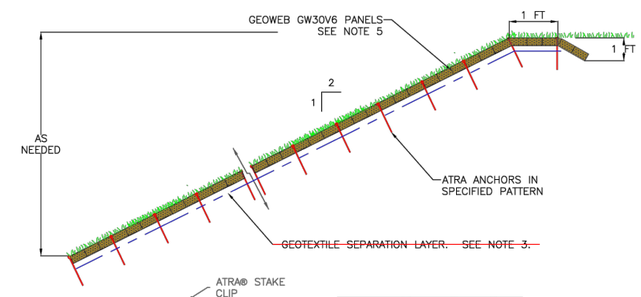
(L) WIDTH OF INSIDE LANE	(W) WIDTH OF PAINTED AREA	(S) WIDTH OF SPACE	ALTERNATE (W) WIDTH OF PAINTED AREA	ALTERNATE (S) WIDTH OF SPACE
9'	2.0'	2.5'	—	—
10'	2.5'	2.5'	2.0'	3.0'
11'	2.5'	3.0'	2.0'	3.5'
12'	3.0'	3.0'	2.5'	3.5'
13'	3.0'	3.5'	—	—



NOTES:
1. PAINTED AREAS TO BE CENTERED ON CENTERLINE AND LANE LINES.
2. A MINIMUM OF 1.5 FT. CLEAR DISTANCE SHALL BE LEFT ADJACENT TO THE CURB FACE. IF LAST PAINTED AREA FALLS INTO THIS DISTANCE IT MUST BE OMITTED.
3. ON TWO LANE TWO WAY STREETS, USE SPACING SHOWN FOR AN 11 FT. INSIDE LANE.
4. FOR DIVIDED ROADWAYS, ADJUSTMENTS IN SPACING OF THE BLOCKS SHOULD BE MADE IN THE MEDIAN SO THAT THE BLOCKS ARE MAINTAINED IN THEIR PROPER LOCATION ACROSS THE TRAVELED PORTION OF THE ROADWAY.
5. AT SKEWED CROSSWALKS, THE BLOCKS ARE TO REMAIN PARALLEL TO THE LANE LINES AS SHOWN.
6. THE BLOCKS SHALL BE PLACED SO THAT THEY ARE NOT LOCATED IN THE WHEEL PATH OF THE VEHICLES.
7. THE BLOCKS SHALL BE A MINIMUM OF 6' LONG AND AT LEAST AS LONG AS THE TRUNCATED DOMES, FOR FANNED TRUNCATED DOMES THE BLOCKS SHALL BE AT LEAST AS LONG AS THE APPROACHING SIDEWALK OR SHARED USE PATH.
8. THE ALTERNATE (W) AND (S) MAY BE USED WHEN BLOCKS LONGER THAN 6' (H) ARE USED.

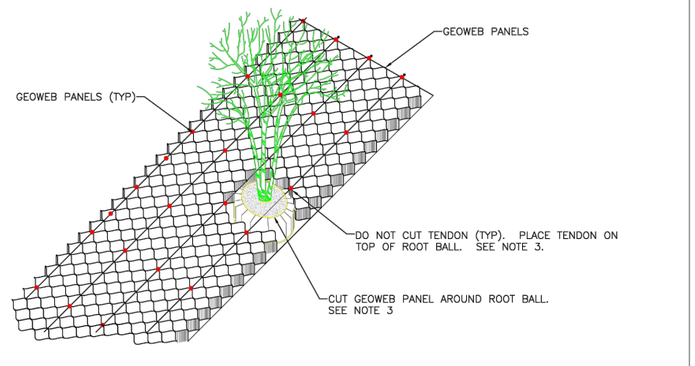
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2. The evaluation assumes that the slope is globally stable.
3. If required, provide a minimum 8 oz non-woven geotextile layer and install per Manufacturer recommendations including overlaps.
4. The GEOWEB panels shall be connected with ATRA® keys at each interleaf and end to end connection.
5. Infill shall be nutrient-rich, pulverized topsoil. Limit the drop of infill to prevent panel distortion.
6. Provide surface protection (hydroseed, ECB or TRM) sized for hydraulic and shear stress conditions to prevent cell wash-out prior to the establishment of vegetation.
7. Refer to the GEOWEB Slope Protection Installation Guide for installation procedures.

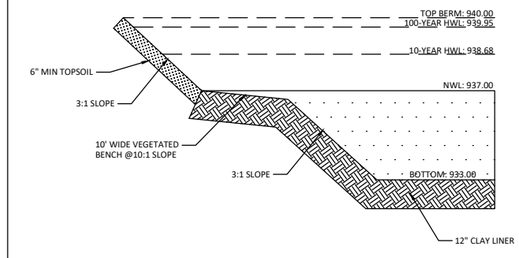


PRESTO GEOSYSTEMS — STRENGTH FROM THE GROUND UP	REYNOLDS PRESTO PRODUCTS, INC 670 NORTH PERKINS STREET APPLETON, WI 54914 800-770-1417 WWW.PRESTOGEO.COM
GEOWEB SHORELINE PROTECTION	
GEOSYSTEMS®, GEOWEB®, AND ATRA® ARE REGISTERED TRADEMARKS OF REYNOLDS PRESTO PRODUCTS, INC.	
DATE SEPTEMBER 2025	FILE NAME SHEET 1
SCALE NTS	SHEET 1 OF 1

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2. The evaluation assumes that the slope is globally stable.
3. Cut the GEOWEB panels to accomodate the root ball. Provide ATRA Tendon Clips on the cut cells with tendons. Zip tie cut cells to adjacent cells.
4. Refer to the Geoweb Slope Protection Installation Guide for installation procedures.



PRESTO GEOSYSTEMS — STRENGTH FROM THE GROUND UP	REYNOLDS PRESTO PRODUCTS, INC 670 NORTH PERKINS STREET APPLETON, WI 54914 800-770-1417 WWW.PRESTOGEO.COM
TREE INSTALLATION GEOWEB SLOPE PROTECTION	
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DATE JULY 14, 2025	FILE NAME SHEET
SCALE NTS	SHEET OF



WET POND DETAIL

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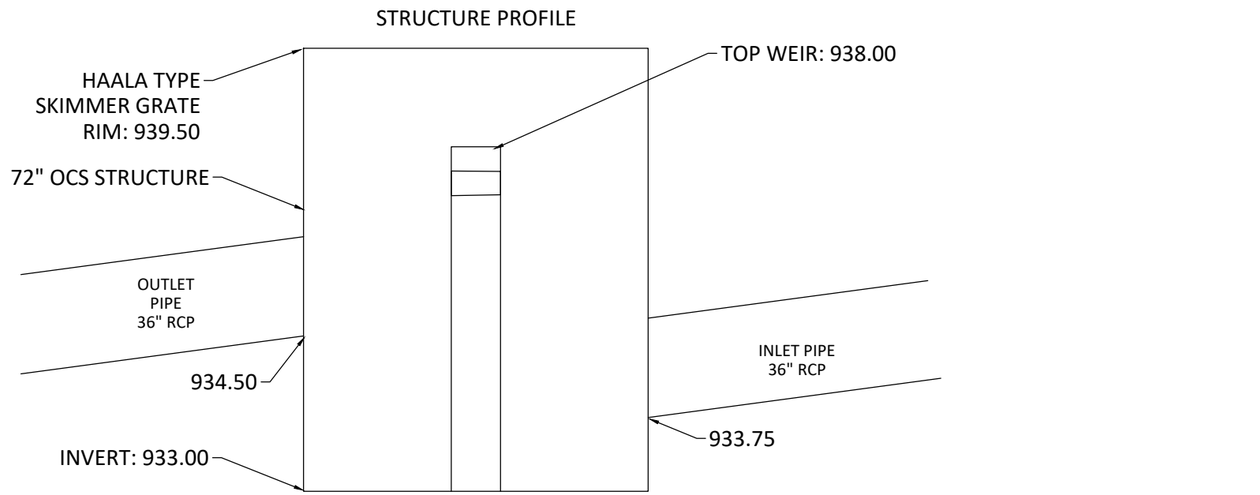
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2026 PMP STREET & UTILITY IMPROVEMENTS
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DRAINAGE STRUCTURE DESIGN SPECIAL 4 (OCS)

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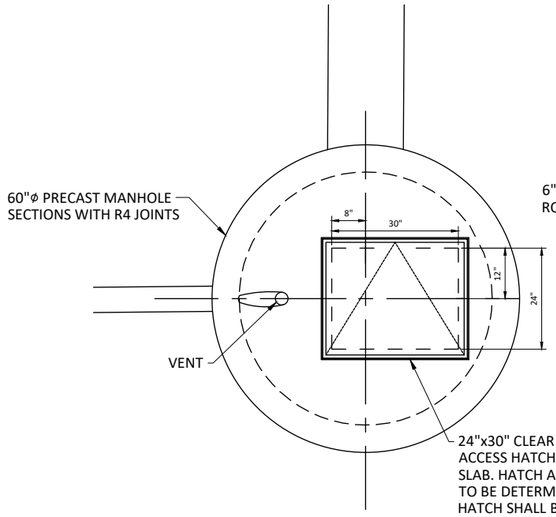
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2026 PMP STREET & UTILITY IMPROVEMENTS

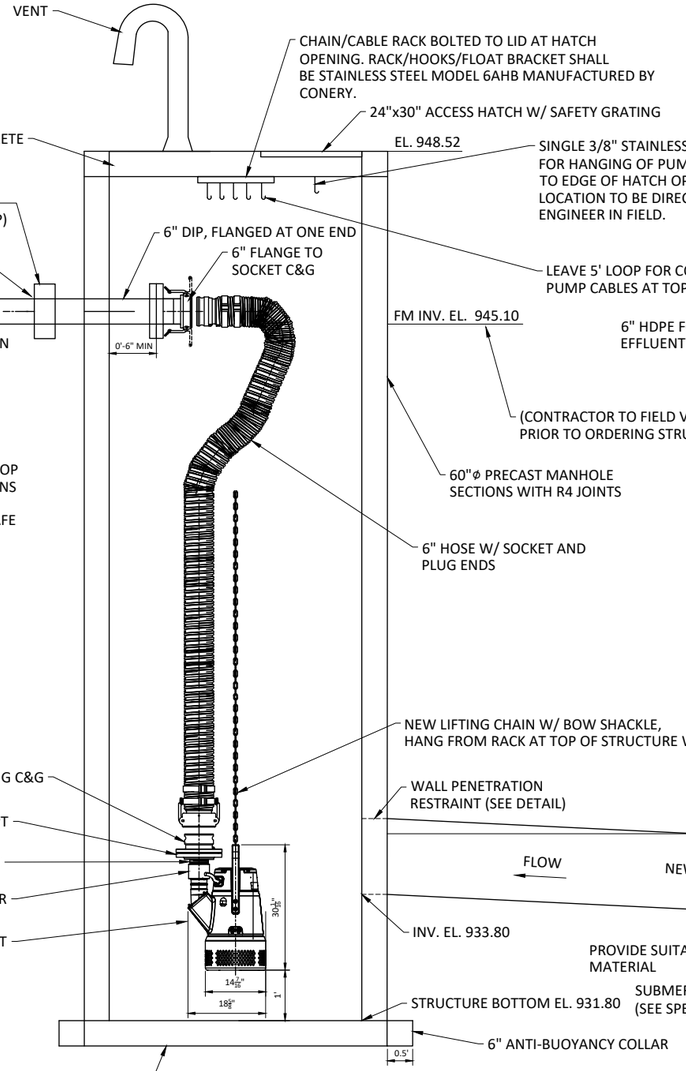
DETAILS

SHEET C1.07

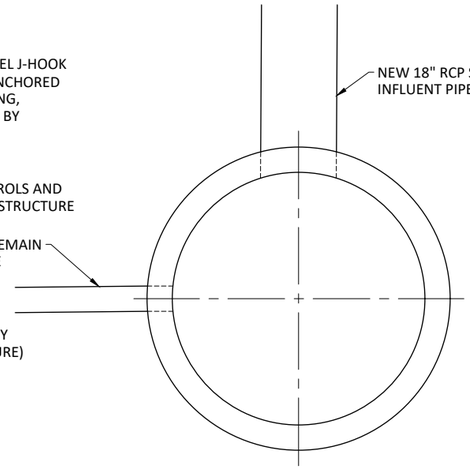


24"x30" CLEAR OPENING SINGLE DOOR 300-PSF ACCESS HATCH WITH SAFETY GRATING, CAST INTO TOP SLAB. HATCH AND SAFETY GRATING HINGE LOCATIONS TO BE DETERMINED DURING SUBMITTAL REVIEW. HATCH SHALL BE PEDESTRIAN RATED ALUMINUM SAFE HATCH AS MANUFACTURED BY EJ GROUP, INC.

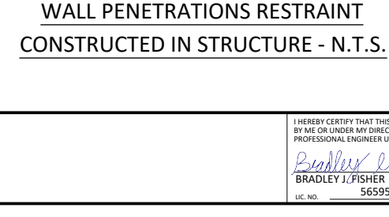
TOP SLAB PLAN



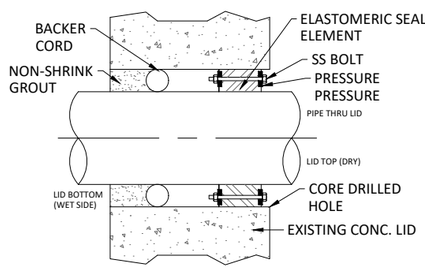
SECTION VIEW



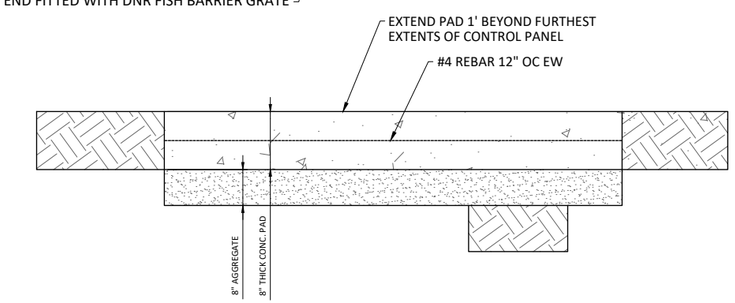
PLAN VIEW



VENT - N.T.S.



WALL PENETRATIONS RESTRAINT CONSTRUCTED IN STRUCTURE - N.T.S.



CONCRETE LIFT STATION CONTROL PANEL PAD - N.T.S.

1 / 1.08 DRAINAGE STRUCTURE DESIGN SPECIAL 3 (STORM LIFT STATION) - N.T.S.

NOTES:
1. ALL PIPE JOINTS SHALL BE TIED.
2. FIELD VERIFY LOCATION AND ELEVATION OF EXISTING FORCEMAIN.
3. REFER TO ELECTRIC PLANS FOR LIFT STATION ELECTRIC DETAILS.
4. ALL WORK IN THIS DETAIL/ON THIS PLAN SHEET IS INCLUDED WITH ALTERNATE 1 OR 2 OR 3.

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LIFT STATION DETAILS
ALTERNATE 1 OR 2 OR 3

SHEET C1.08

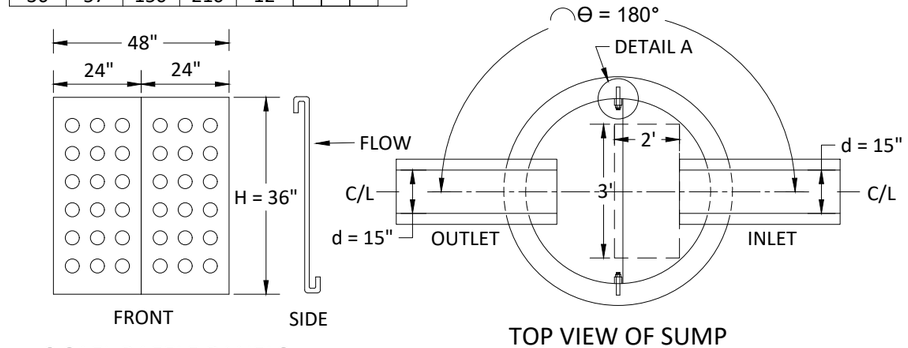
DRAINAGE STRUCTURE SPECIAL DESIGN 1

Rev C (07-24-2019)

d (IN.)	H (IN.)	Θ (DEG.) MIN.	Θ (DEG.) MAX.	y (IN.)	Ys	Yb	Yt	D
12	36	130	230	12	MIN. 4 FT.	MIN. 3 FT.	0" to 6"	VARIES
15	36	130	230	12				
18	36	130	230	12				
21	46	140	220	12				
24	46	140	220	12				
27	46	140	220	12				
30	57	150	210	12				
36	57	150	210	12				

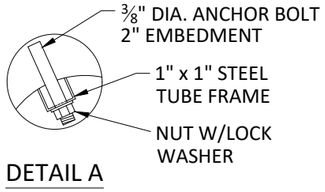
NOTES:

* Ideal Baffle height = distance from top of the highest Inlet pipe to the bottom of the outlet pipe plus 18" or greater
* Minimum acceptable Baffle Height = distance from top of the highest inlet pipe to the bottom of the outlet pipe plus 12"
* Heights greater than 57" require 2 Baffles stacked
* Contact Upstream Technologies for pipes larger than 48" I.D.
* For more information see our design guide
* View the complete list of Available Baffle Sizes

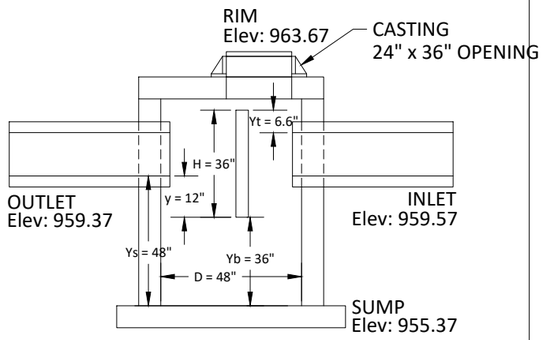


2 SAFL BAFFLE PANELS

TOP VIEW OF SUMP



DETAIL A



SIDE VIEW OF SUMP

PATENT PROTECTED

Patents: US #8663466B2 - US #8715507B2 - US #9506237B2 - CA #2742207

This generic detail does not encompass the sizing, fit, and applicability of the SAFL Baffle for this specific project. It is the ultimate responsibility of the design engineer to assure that the design is in compliance with all applicable laws and regulations. The SAFL Baffle is a patented technology of Upstream Technologies, Inc. and the University of Minnesota. Neither Upstream Technologies nor the University of Minnesota approves plans, sizing, or system designs.

SAFL BAFFLE STANDARD DETAIL
UPSTREAM TECHNOLOGIES INC.
600 COUNTY ROAD D WEST, STE 14
NEW BRIGHTON, MN 55112
651.237.5123

SAFL BAFFLE

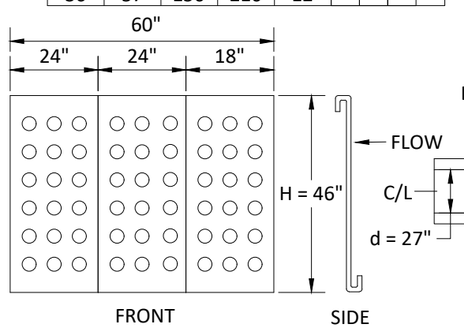
DRAINAGE STRUCTURE SPECIAL DESIGN 2

Rev C (07-24-2019)

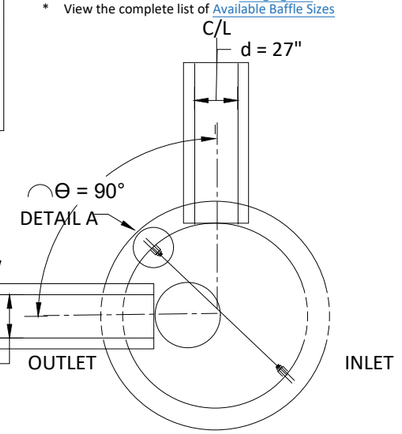
d (IN.)	H (IN.)	Θ (DEG.) MIN.	Θ (DEG.) MAX.	y (IN.)	Ys	Yb	Yt	D
12	36	130	230	12	MIN. 4 FT.	MIN. 3 FT.	0" to 6"	VARIES
15	36	130	230	12				
18	36	130	230	12				
21	46	140	220	12				
24	46	140	220	12				
27	46	140	220	12				
30	57	150	210	12				
36	57	150	210	12				

NOTES:

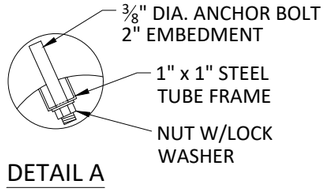
* Ideal Baffle height = distance from top of the highest Inlet pipe to the bottom of the outlet pipe plus 18" or greater
* Minimum acceptable Baffle Height = distance from top of the highest inlet pipe to the bottom of the outlet pipe plus 12"
* Heights greater than 57" require 2 Baffles stacked
* Contact Upstream Technologies for pipes larger than 48" I.D.
* For more information see our design guide
* View the complete list of Available Baffle Sizes



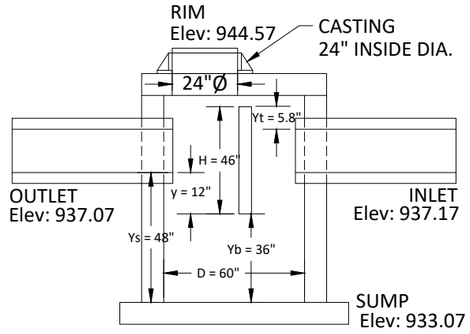
3 SAFL BAFFLE PANELS



TOP VIEW OF SUMP



DETAIL A



SIDE VIEW OF SUMP

PATENT PROTECTED

Patents: US #8663466B2 - US #8715507B2 - US #9506237B2 - CA #2742207

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SAFL BAFFLE STANDARD DETAIL
UPSTREAM TECHNOLOGIES INC.
600 COUNTY ROAD D WEST, STE 14
NEW BRIGHTON, MN 55112
651.237.5123

SAFL BAFFLE

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

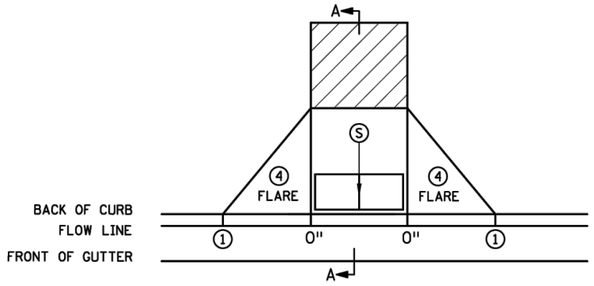
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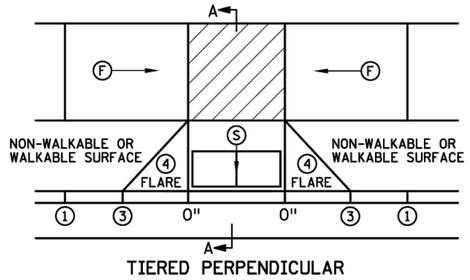
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JJJ/BAP		BID	02/09/2026
DRAWN BAP			
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CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
DETAILS

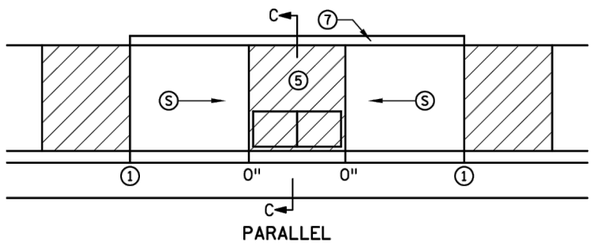
SHEET C1.09



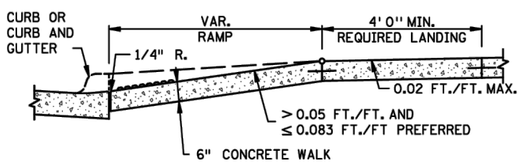
PERPENDICULAR



TIERED PERPENDICULAR

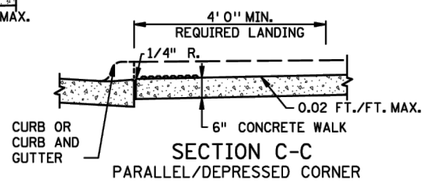


PARALLEL



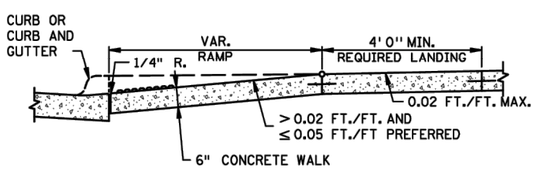
SECTION A-A

PERPENDICULAR/TIERED/DIAGONAL



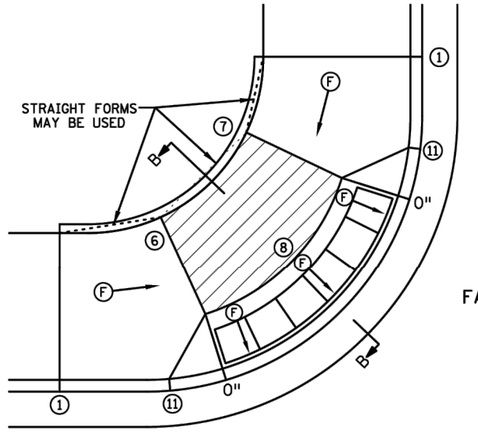
SECTION C-C

PARALLEL/DEPRESSED CORNER

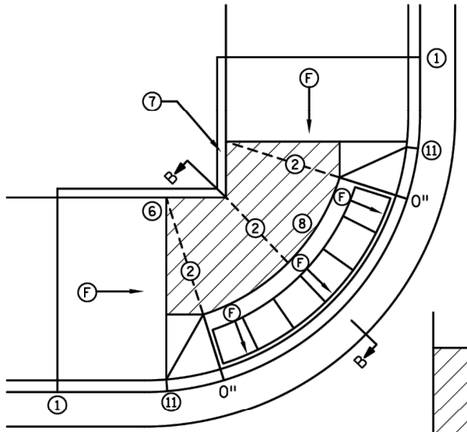


SECTION B-B

FAN

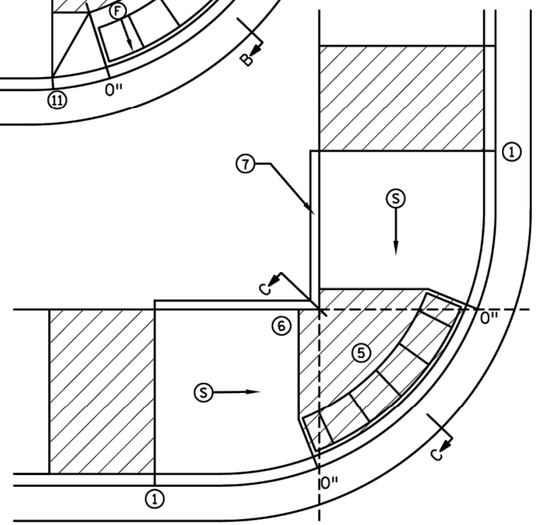


FAN ⑩

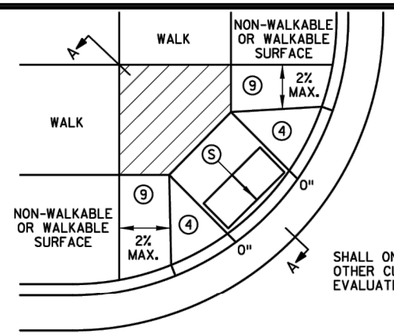


MODIFIED FAN ⑩

USED WHEN RIGHT-OF-WAY IS CONSTRAINED



DEPRESSED CORNER



DIAGONAL

SHALL ONLY BE USED AFTER ALL OTHER CURB RAMP TYPES HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL

NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION, AT THE TOP OF RAMPS THAT HAVE RUNNING SLOPES GREATER THAN 5.0%, AND IF THE APPROACHING WALK IS INVERSE GRADE GREATER THAN 2%.

INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN 15' FROM THE BACK OF CURB, WITH 6' FROM THE BACK OF CURB BEING THE PREFERRED DISTANCE, ONLY APPLICABLE WHEN THE INITIAL RAMP RUNNING SLOPE IS OVER 5.0%.

SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL RUNNING SLOPE IS GREATER THAN 5.0%.

CONTRACTION JOINTS SHALL BE CONSTRUCTED ALONG ALL GRADE BREAKS WITHIN THE PAR. 1/4" DEEP VISUAL JOINTS SHALL BE USED AT THE TOPS OF CONCRETE FLARES ADJACENT TO WALKABLE SURFACES.

ALL GRADE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL. THUS BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH. (EXCEPT AS STATED IN ⑥ BELOW.

TO ENSURE RAMPS AND LANDINGS ARE PROPERLY CONSTRUCTED, ALL INITIAL LANDINGS AT A TOP OF A RAMPED SURFACE (RUNNING SLOPE GREATER THAN 2%) SHALL BE FORMED AND PLACED SEPARATELY IN AN INDEPENDENT CONCRETE POUR. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON SHEET 6 OF 6 FOR ALL SEPARATELY POURED INITIAL LANDINGS.

WHEN SIDEWALK IS AT BACK OF CURB, TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE.

MAINTAIN POSITIVE BOULEVARD DRAINAGE TO TOP OF CURB.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 3' LONG RAMP LENGTH.

4' MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL. DETECTABLE WARNING TO COVER THE ENTIRE PAR WIDTH OF SHARED-USE PATHS AND THE ENTIRE PAR WIDTH OF THE WALK WITH THE EXCEPTION OF 3" MAXIMUM ON EACH OUTSIDE EDGE WHICH ENSURES THE DETECTABLE WARNINGS ARE ENCASED IN CONCRETE WHEN ADJACENT TO TURF. WHEN ADJACENT TO CONCRETE FLARES 0" - 3" OFFSET IS ALLOWED.

WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6" LESS THAN THE INCOMING PAR. ARC LENGTH OF THE RADIAL DETECTABLE WARNINGS SHOULD NOT BE GREATER THAN 20 FEET.

RECTANGULAR DETECTABLE WARNINGS SHALL BE SETBACK 3" FROM THE BACK OF CURB. RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3" MINIMUM TO 6" MAXIMUM FROM THE BACK OF CURB.

① MATCH FULL HEIGHT CURB.

② 4' MINIMUM DEPTH LANDING REQUIRED ACROSS TOP OF RAMP.

③ 3" HIGH CURB WHEN USING A 3' LONG RAMP, 4" HIGH CURB WHEN USING A 4' LONG RAMP.

④ SEE SHEET 4 OF 6, TYPICAL SIDE TREATMENT OPTIONS, FOR DETAILS ON FLARES AND RETURNED CURBS.

⑤ DETECTABLE WARNINGS MAY BE PART OF THE 4' X 4' MIN. LANDING AREA IF IT IS NOT FEASIBLE TO CONSTRUCT THE LANDING OUTSIDE OF THE DETECTABLE WARNING AREA.

⑥ THE GRADE BREAK SHALL BE PERPENDICULAR TO THE BACK OF WALK. THIS WILL ENSURE THAT THE GRADE BREAK IS PERPENDICULAR TO THE DIRECTION OF TRAVEL. (TYPICAL FOR ALL)

⑦ WHEN ADJACENT TO GRASS, GRADING SHALL ALWAYS BE USED WHEN FEASIBLE. V CURB, IF USED, SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS. WHEN ADJACENT TO PARKING LOTS, CONCRETE OR BITUMINOUS TAPERS LESS THAN 5% RUNNING SLOPE SHOULD BE USED OVER V CURB TO REDUCE TRIPPING HAZARDS AND FACILITATE SNOW & ICE REMOVAL.

⑧ A 7' MIN TOP RADIUS GRADE BREAK IS REQUIRED TO BE CONSTRUCTIBLE.

⑨ PAVE FULL WALK WIDTH.

⑩ "S" SLOPES ON FANS SHALL ONLY BE USED WHEN ALL OTHER FEASIBLE OPTIONS HAVE BEEN EVALUATED AND DEEMED IMPRACTICAL.

⑪ INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10% TO A MINIMUM 3" CURB HEIGHT. REDUCE INTERMEDIATE CURB HEIGHT TO 2+ INCHES IF NECESSARY TO MATCH ADJACENT BOULEVARD OR SIDEWALK GRADES.

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT. LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

(S) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

(F) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

X" CURB HEIGHT

REVISION:

APPROVED: 11-04-2021

JEFFREY PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.250 | 1 OF 6

APPROVED: 11-04-2021
REVISED:

THOMAS STYRBICKI
STATE DESIGN ENGINEER

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

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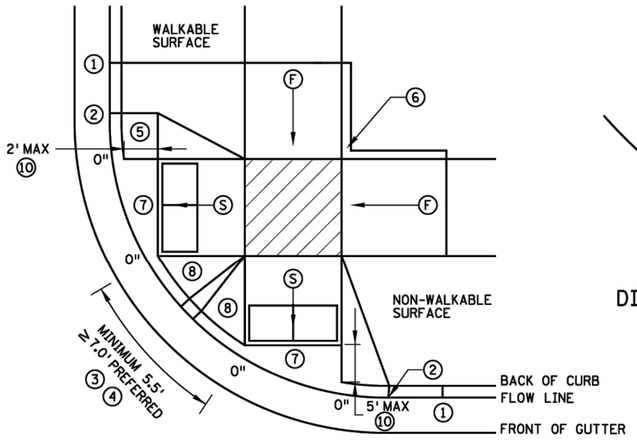
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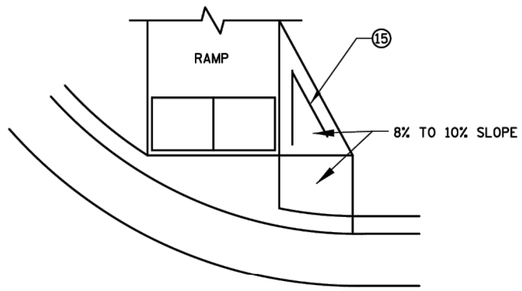
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2026 PMP STREET & UTILITY IMPROVEMENTS
STANDARD PLANS

SHEET C1.10

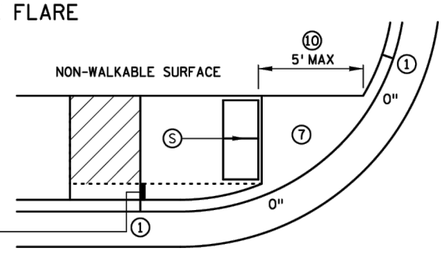


COMBINED DIRECTIONAL

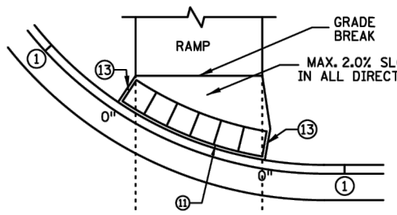


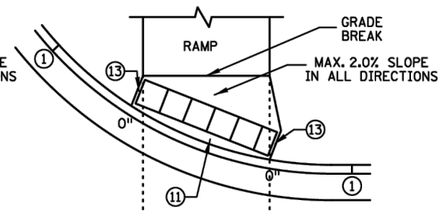
DIRECTIONAL RAMP WALKABLE FLARE

IF NON-CONCRETE BLVD. IS CONSTRUCTED AND IS LESS THAN 2' IN WIDTH AT TOP OF CURB TRANSITION, PAVE CONCRETE RAMP WIDTH TO ADJACENT BACK OF CURB.



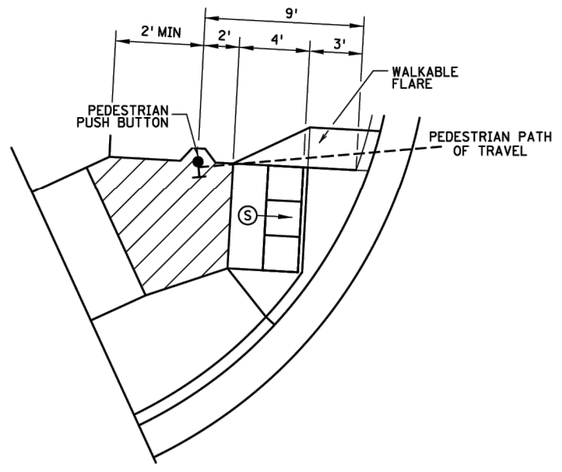
STANDARD ONE-WAY DIRECTIONAL ⑨





DETECTABLE WARNING PLACEMENT WHEN SETBACK CRITERIA IS EXCEEDED ⑫

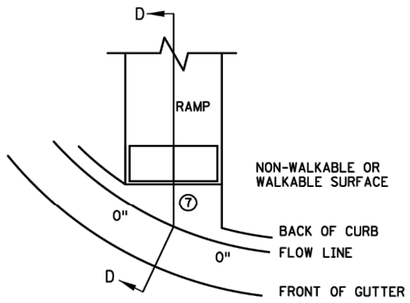
ONE-WAY DIRECTIONAL WITH DETECTABLE WARNING AT BACK OF CURB

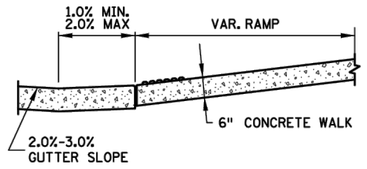


SEMI-DIRECTIONAL RAMP ③④⑨

3' DOME SETBACK, 4' LONG RAMP AND PUSH BUTTON 9' FROM THE BACK OF CURB

PRIMARILY USED FOR APS APPLICATIONS WHERE THE PAR DOES NOT CONTINUE PAST THE PUSH BUTTON (DEAD-END SIDEWALK)





SECTION D-D

CURB FOR DIRECTIONAL RAMPS ⑭

NOTES:

LANDINGS SHALL BE LOCATED ANYWHERE THE PEDESTRIAN ACCESS ROUTE (PAR) CHANGES DIRECTION, AT THE TOP OF RAMPS THAT HAVE RUNNING SLOPES GREATER THAN 5.0%, AND IF THE APPROACHING WALK IS INVERSE GRADE.

INITIAL CURB RAMP LANDINGS SHALL BE CONSTRUCTED WITHIN 15' FROM THE BACK OF CURB, WITH 6' FROM THE BACK OF CURB BEING THE PREFERRED DISTANCE, ONLY APPLICABLE WHEN THE INITIAL RAMP RUNNING SLOPE IS OVER 5.0%.

SECONDARY CURB RAMP LANDINGS ARE REQUIRED FOR EVERY 30" OF VERTICAL RISE WHEN THE LONGITUDINAL SLOPE IS GREATER THAN 5.0%.

CONTRACTION JOINTS SHALL BE CONSTRUCTED ALONG ALL GRADE BREAKS WITHIN THE PAR. 1/4" DEEP VISUAL JOINTS SHALL BE USED AT THE TOP GRADE BREAK OF CONCRETE FLARES ADJACENT TO WALKABLE SURFACES.

ALL GRADE BREAKS WITHIN THE PAR SHALL BE PERPENDICULAR TO THE PATH OF TRAVEL. THUS BOTH SIDES OF A SLOPED WALKING SURFACE MUST BE EQUAL LENGTH.

TO ENSURE INITIAL RAMPS AND INITIAL LANDINGS ARE PROPERLY CONSTRUCTED, LANDINGS SHALL BE CAST SEPARATELY. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON SHEET 6 AND THE ADA SPECIAL PROVISION (PROSECUTION OF WORK).

TOP OF CURB SHALL MATCH PROPOSED ADJACENT WALK GRADE.

WHEN THE BOULEVARD IS 4' WIDE OR LESS, THE TOP OF CURB TAPER SHALL MATCH THE RAMP SLOPES TO REDUCE NEGATIVE BOULEVARD SLOPES FROM THE TOP BACK OF CURB TO THE PAR.

ALL RAMP TYPES SHOULD HAVE A MINIMUM 3' LONG RAMP LENGTH.

4' MINIMUM WIDTH OF DETECTABLE WARNING IS REQUIRED FOR ALL RAMPS. DETECTABLE WARNINGS SHALL CONTINUOUSLY EXTEND FOR A MIN. OF 24" IN THE PATH OF TRAVEL. DETECTABLE WARNING TO COVER THE ENTIRE PAR WIDTH OF SHARED-USE PATHS AND THE ENTIRE PAR WIDTH OF THE WALK WITH THE EXCEPTION OF 3" MAXIMUM ON EACH OUTSIDE EDGE WHICH ENSURES THE DETECTABLE WARNINGS ARE ENCASED IN CONCRETE WHEN ADJACENT TO TURF. WHEN ADJACENT TO CONCRETE FLARES 0" - 3" OFFSET IS ALLOWED.

WHEN DESIGNING OR ORDERING RECTANGULAR DETECTABLE WARNING SURFACES SHOULD BE 6" LESS THAN THE INCOMING PAR. ARC LENGTH OF THE RADIAL DETECTABLE WARNINGS SHOULD NOT BE GREATER THAN 20 FEET.

RADIAL DETECTABLE WARNINGS SHALL BE SETBACK 3" MINIMUM TO 6" MAXIMUM FROM THE BACK OF CURB. SEE NOTES ⑩ & ⑪ FOR INFORMATION REGARDING RECTANGULAR DETECTABLE WARNING PLACEMENT.

① MATCH FULL CURB HEIGHT.

② 3" HIGH CURB WHEN USING A 3' LONG RAMP
4" HIGH CURB WHEN USING A 4' LONG RAMP.

③ 3" MINIMUM CURB HEIGHT (5.5' MIN. DISTANCE REQUIRED BETWEEN DOMES)
4" PREFERRED (7' MIN. DISTANCE REQUIRED BETWEEN DOMES).

④ THE "BUMP" IN BETWEEN THE RAMPS SHOULD NOT BE IN THE PATH OF TRAVEL FOR COMBINED DIRECTIONAL RAMPS. IF THIS OCCURS MODIFY THE RAMP LOCATION OR SWITCH RAMP TO A FAN/DEPRESSED CORNER.

⑤ WHEN USING CONCRETE PAVED FLARES ON THE OUTSIDE OF DIRECTIONAL RAMPS, AND ADJACENT TO A WALKABLE SURFACE, DIRECTIONAL RAMP FLARES SHALL BE USED. SEE THE DETAIL ON THIS SHEET.

⑥ GRADING SHALL ALWAYS BE USED WHEN FEASIBLE. V CURB, IF USED, SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS. WHEN ADJACENT TO PARKING LOTS, CONCRETE OR BITUMINOUS TAPERS SHOULD BE USED OVER V CURB TO REDUCE TRIPPING HAZARDS AND FACILITATE SNOW & ICE REMOVAL.

⑦ MAX. 2.0% SLOPE IN ALL DIRECTIONS IN FRONT OF GRADE BREAK AND DRAIN TO FLOW LINE. SHALL BE CONSTRUCTED INTEGRAL WITH CURB AND GUTTER.

⑧ 8% TO 10% WALKABLE FLARE.

⑨ PLACE DOMES AT THE BACK OF CURB WHEN ALLOWABLE SETBACK CRITERIA IS EXCEEDED.

⑩ FRONT EDGE OF DETECTABLE WARNING SHALL BE SET BACK 2' MAXIMUM WHEN ADJACENT TO WALKABLE SURFACE, AND 5' MAXIMUM WHEN ADJACENT TO NON-WALKABLE SURFACE WITH ONE CORNER SET 3" FROM BACK OF CURB. A WALKABLE SURFACE IS DEFINED AS A PAVED SURFACE ADJACENT TO A CURB RAMP WITHOUT RAISED OBSTACLES THAT COULD MISTAKENLY BE TRAVERSED BY A USER WHO IS VISUALLY IMPAIRED.

⑪ RECTANGULAR DETECTABLE WARNINGS MAY BE SETBACK UP TO 9" FROM THE BACK OF CURB WITH CORNERS SET 3" FROM BACK OF CURB. IF 9" SETBACK IS EXCEEDED USE RADIAL DETECTABLE WARNINGS.

⑫ FOR DIRECTIONAL RAMPS WITH THE DETECTABLE WARNINGS PLACED AT THE BACK OF CURB, THE DETECTABLE WARNINGS SHALL COVER THE ENTIRE WIDTH OF THE WALK/PATH. THIS ENSURES A DETECTABLE EDGE AND HELPS ELIMINATE THE CURB TAPER OBSTRUCTING THE PATH OF PEDESTRIAN TRAVEL.

⑬ THE CONCRETE WALK SHALL BE FORMED AND CONSTRUCTED PERPENDICULAR TO THE BACK OF CURB. MAINTAIN 3" BETWEEN EDGE OF DOMES AND EDGE OF CONCRETE.

⑭ TO BE USED FOR ALL DIRECTIONAL RAMPS, EXCEPT WHERE DOMES ARE PLACED ALONG THE BACK OF CURB.

⑮ PLACE 2 NO. 4 BARS 4 INCHES FROM SIDE OF FORMS WITH A MINIMUM 2 INCHES OF CONCRETE COVER ALONG EACH SIDE OF FLARE (INCIDENTAL).

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

(S) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

(F) INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE GREATER THAN 2.0% AND LESS THAN 5.0% IN THE DIRECTION SHOWN AND CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

X" CURB HEIGHT

REVISION:

APPROVED: 11-04-2021

JEFFREY PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

THOMAS STYRBICKI
STATE DESIGN ENGINEER

STANDARD PLAN 5-297.250 | 2 OF 6

APPROVED: 11-04-2021
REVISED:

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. | (T.H.) | SHEET NO. OF SHEETS

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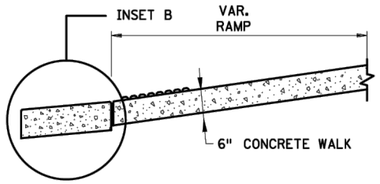
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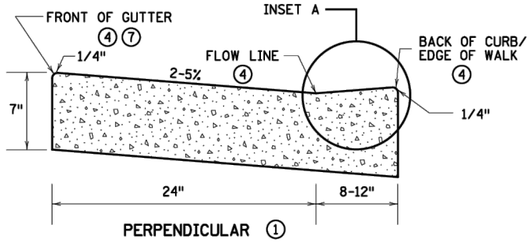
ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
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DRAWN BAP			
CHECKED BJF			
CLIENT PROJ. NO. PW-26-0100			

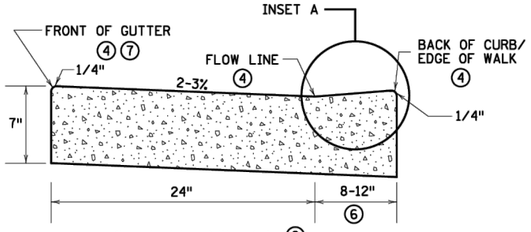
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STANDARD PLANS

SHEET C1.11

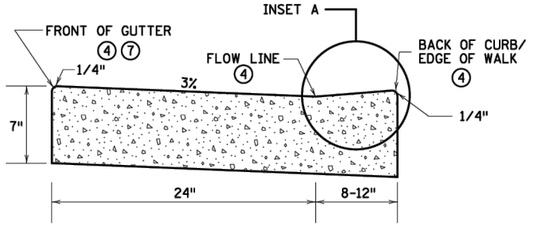




PERPENDICULAR ①

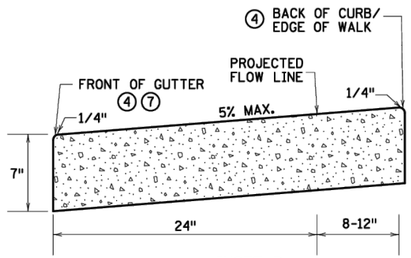


NON PERPENDICULAR ②

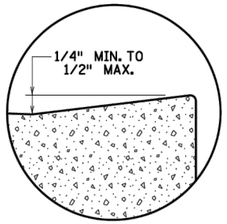


FOR CURB MACHINE PLACEMENT AROUND RADIUS ③
(REGARDLESS OF RAMP TYPE)

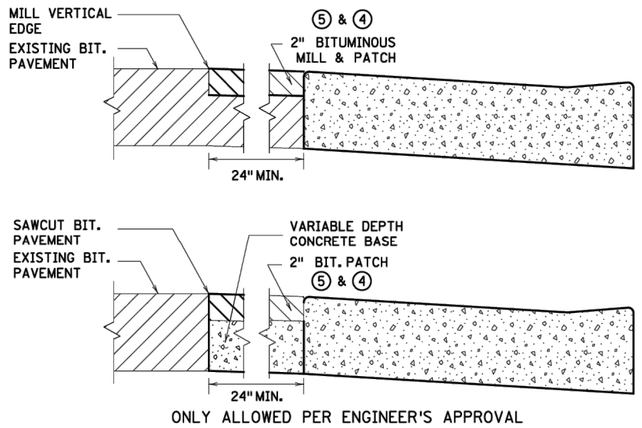
PEDESTRIAN ACCESS ROUTE CURB & GUTTER DETAIL



INSET B
OUTFLOW GUTTER ⑧

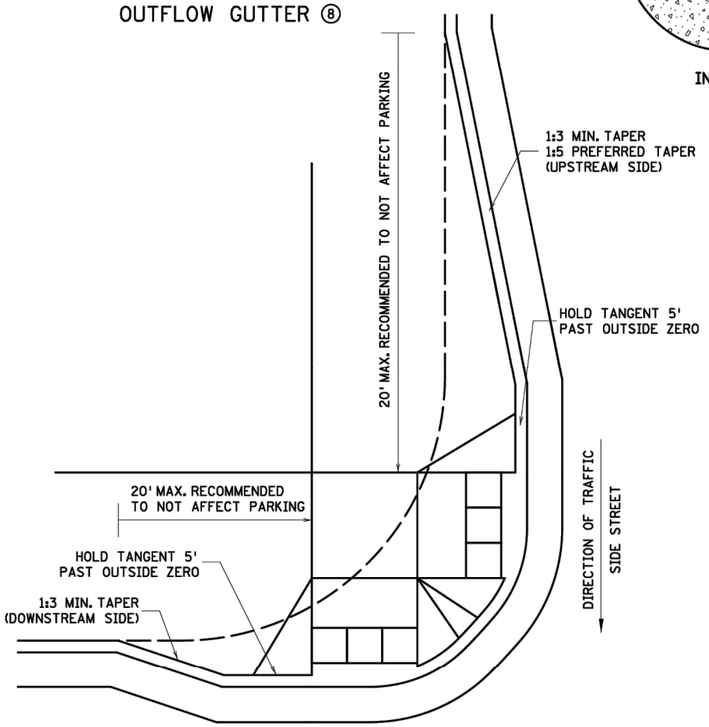


INSET A

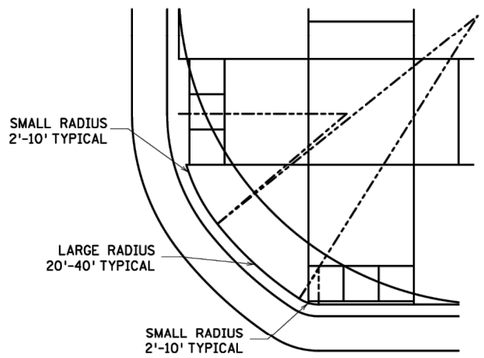


ONLY ALLOWED PER ENGINEER'S APPROVAL

PAVEMENT TREATMENT OPTIONS IN FRONT OF CURB & GUTTER
FOR USE ON CURB RAMP RETROFITS



ADA CURB EXTENSION WITH COMPOUND RADIUS (BUMP OUT) ⑪



COMBINED DIRECTIONAL ⑩
(COMPOUND RADIUS)

NOTES:

POSITIVE FLOW LINE DRAINAGE SHALL BE MAINTAINED THROUGH THE PEDESTRIAN ACCESS ROUTE (PAR) AT A 2% MAXIMUM.
NO PONDING SHALL BE PRESENT IN THE PAR.
ANY VERTICAL LIP THAT OCCURS AT THE FLOW LINE SHALL NOT BE GREATER THAN 1/4 INCH.

① FOR USE AT CURB CUTS WHERE THE PEDESTRIAN'S PATH OF TRAVEL IS ASSUMED PERPENDICULAR TO THE GUTTER FLOW LINE. RAMP TYPES INCLUDE: PERPENDICULAR, TIERED PERPENDICULAR, PARALLEL, AND DIAGONAL RAMPS.
② FOR USE AT CURB RAMPS WHERE THE PEDESTRIAN'S PATH OF TRAVEL IS ASSUMED NON PERPENDICULAR TO THE GUTTER FLOW LINE. RAMP TYPES INCLUDE: FANS & DEPRESSED CORNERS.
③ BEGIN GUTTER SLOPE TRANSITION 10' OUTSIDE OF ALL CURB RAMPS.
④ THERE SHALL BE NO VERTICAL DISCONTINUITIES GREATER THAN 1/4".
⑤ ELEVATION CHANGE TAKES PLACE FROM THE EXISTING TO NEW FRONT OF GUTTER. PATCH IS USED TO MATCH THE NEW GUTTER FACE INTO THE EXISTING ROADWAY.
⑥ VARIABLE WIDTH FOR DIRECTIONAL CURB APPLICATIONS. SEE SHEET 2 FOR DIRECTIONAL CURB SLOPE REQUIREMENTS.
⑦ TOP FRONT OF GUTTER SHALL BE CONSTRUCTED FLUSH WITH PROPOSED ADJACENT PAVEMENT ELEVATION. TOP 1.5" OF THE GUTTER FACE MUST BE A FORMED EDGE. PAR GUTTER SHALL NOT BE OVERLAID.
⑧ SHOULD BE USED AT VERTICALLY CONSTRAINED AREAS WHEN AT A DRAINAGE HIGH POINT OR SUPER ELEVATED ROADWAY SEGMENTS.
⑨ DRILL AND GROUT NO. 4 EPOXY-COATED 18" LONG TIE BARS AT 30" CENTER TO CENTER INTO EXISTING CONCRETE PAVEMENT 1' MINIMUM FROM ALL JOINTS.
⑩ HELPS PROVIDE TWO SEPARATE RAMPS, REDUCES THE DOME SETBACK LENGTH AND MINIMIZES DIRECTIONAL CURB. THIS RADIUS DESIGN CLOSELY FOLLOWS THE TURNING VEHICLE PATH WHILE OPTIMIZING CURB RAMP LENGTH.
⑪ CURB EXTENSIONS SHOULD BE USED IN VERTICALLY CONSTRAINED AREAS, USUALLY IN DOWNTOWN ROADWAY SEGMENTS WHERE ON-STREET PARKING IS AVAILABLE. CURB EXTENSIONS SHOULD BE CONSIDERED FOR APS INTERSECTIONS WHERE SPACE IS LIMITED. PUSH BUTTONS MUST MEET APS CRITERIA AS DESCRIBED IN THE PUSH BUTTON LOCATION DETAIL SHEET.

REVISION:
APPROVED: 11-04-2021
JEFFREY PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.250 | 3 OF 6

APPROVED: 11-04-2021
REVISED:
THOMAS STYRBICKI
STATE DESIGN ENGINEER

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

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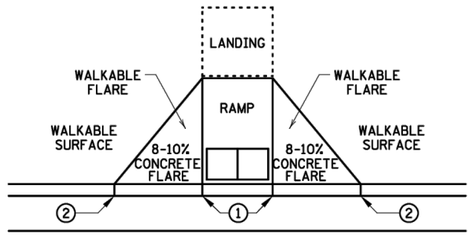
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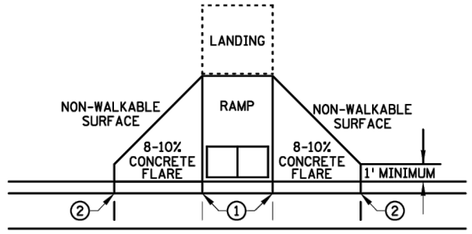
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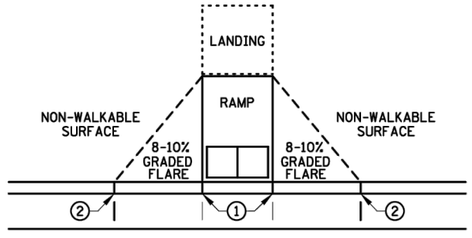
SHEET C1.12



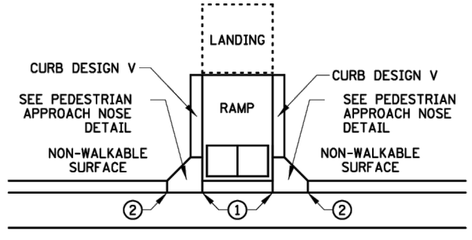
PAVED FLARES
ADJACENT TO WALKABLE SURFACE



PAVED FLARES
ADJACENT TO NON-WALKABLE SURFACE

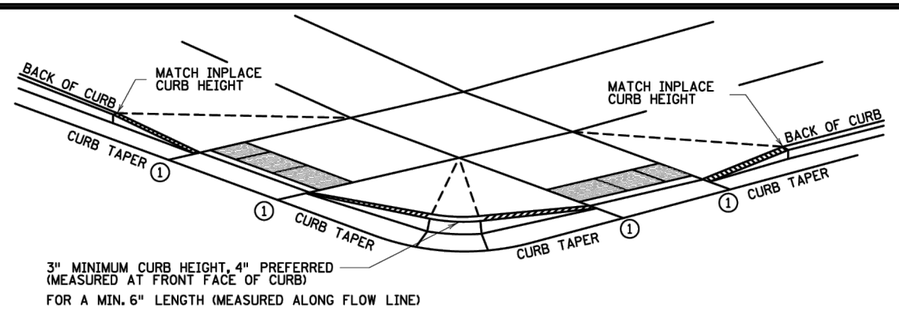


GRADED FLARES

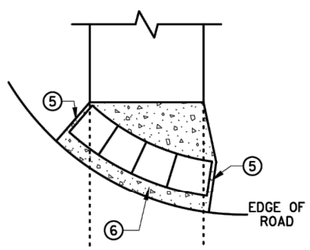


RETURNED CURB ④

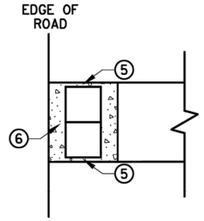
TYPICAL SIDE TREATMENT OPTIONS ③ ⑩



DETECTABLE EDGE WITH ⑦
CURB AND GUTTER

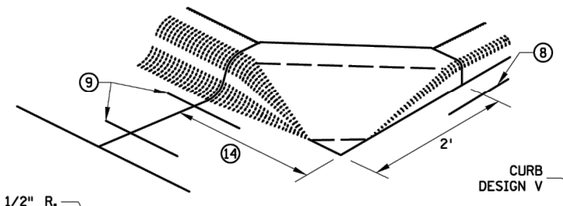


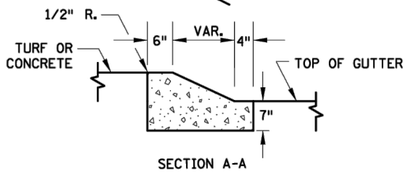
RADIAL DETECTABLE WARNING



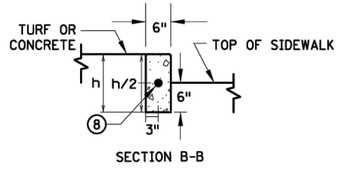
RECTANGULAR DETECTABLE WARNING

DETECTABLE EDGE WITHOUT CURB AND GUTTER

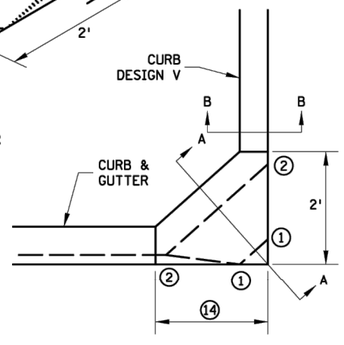




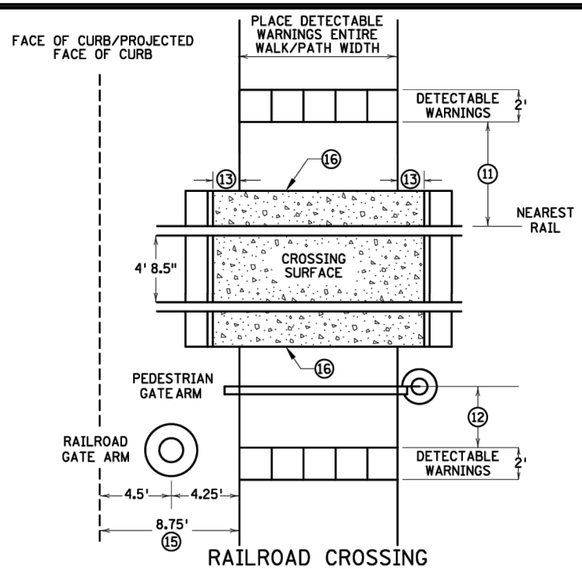
SECTION A-A



SECTION B-B



PEDESTRIAN APPROACH
NOSE DETAIL
(FOR RETURNED CURB
SIDE TREATMENT)



RAILROAD CROSSING
PLAN VIEW

NOTES:

INTERMEDIATE CURB HEIGHTS TAPER SHALL RISE AT 8-10% TO A MINIMUM 3 INCH CURB HEIGHT. INCREASE CURB TAPER LENGTH AT LESS THAN 8% OR REDUCE INTERMEDIATE CURB HEIGHT TO 2+ INCHES IF NECESSARY TO MATCH ADJACENT BOULEVARD OR SIDEWALK GRADES.

SEE STANDARD PLATE 7038 AND THIS SHEET FOR ADDITIONAL DETAILS ON DETECTABLE WARNING.

A WALKABLE SURFACE IS DEFINED AS A PAVED SURFACE ADJACENT TO A CURB RAMP WITHOUT RAISED OBSTACLES THAT COULD MISTAKENLY BE TRAVERSED BY A USER WHO IS VISUALLY IMPAIRED.

CONCRETE FLARE LENGTHS ADJACENT TO NON-WALKABLE SURFACES SHOULD BE LESS THAN 8' LONG MEASURED ALONG THE RAMPS FROM THE BACK OF CURB.

① 0" CURB HEIGHT. SEE INSET A ON SHEET 3 OF 6.

② FULL CURB HEIGHT.

③ SIDE TREATMENTS ARE APPLICABLE TO ALL RAMP TYPES AND SHOULD BE IMPLEMENTED AS NEEDED AS FIELD CONDITIONS DICTATE. THE ENGINEER SHALL DETERMINE THE RAMP SIDE TREATMENTS BASED ON MAINTENANCE OF BOTH ROADWAY AND SIDEWALK, ADJACENT PROPERTY CONSIDERATIONS, AND MITIGATING CONSTRUCTION IMPACTS.

④ TYPICALLY USED FOR MEDIANS AND ISLANDS.

⑤ WHEN NO CONCRETE FLARES ARE PROPOSED, THE CONCRETE WALK SHALL BE FORMED AND CONSTRUCTED PERPENDICULAR TO THE EDGE OF ROADWAY. MAINTAIN 3" MAX. BETWEEN EDGE OF DOMES AND EDGE OF CONCRETE.

⑥ IF NO CURB AND GUTTER IS PLACED IN RURAL SECTIONS, DETECTABLE WARNINGS SHALL BE PLACED 1' FROM THE EDGE OF BITUMINOUS ROADWAY AND/OR BITUMINOUS SHARED-USE PATH TO PROVIDE VISUAL CONTRAST.

⑦ ALL CONSTRUCTED CURBS MUST HAVE A CONTINUOUS DETECTABLE EDGE FOR THE VISUALLY IMPAIRED. THIS DETECTABLE EDGE REQUIRES DETECTABLE WARNINGS WHEREVER THERE IS ZERO-INCH HIGH CURB. CURB TAPERS ARE CONSIDERED A DETECTABLE EDGE WHEN THE TAPER STARTS WITHIN 3" OF THE EDGE OF THE DETECTABLE WARNINGS. AND UNIFORMLY RISES TO A 3-INCH MINIMUM CURB HEIGHT. ANY CURB NOT PART OF A CURB TAPER AND LESS THAN 3 INCHES IN HEIGHT IS NOT CONSIDERED A DETECTABLE EDGE AND THEREFORE IS NOT COMPLIANT WITH ACCESSIBILITY STANDARDS.

⑧ DRILL AND GROUT 1 - NO. 4 12" LONG REINFORCEMENT BAR (EPOXY COATED) WITH 3" MIN. COVER. REINFORCEMENT BARS ARE NOT NEEDED IF THE APPROACH NOSE IS POURED INTEGRAL WITH THE V CURB.

⑨ DRILL AND GROUT 2 - NO. 4 12" LONG REINFORCEMENT BARS (EPOXY COATED) WITH 3" MIN. COVER. REINFORCEMENT BARS ARE NOT NEEDED IF THE APPROACH NOSE IS POURED INTEGRAL WITH THE CURB AND GUTTER.

⑩ SIDE TREATMENT EXAMPLES SHOWN ARE WHEN THE INITIAL LANDING IS APPROXIMATELY LEVEL WITH THE FULL HEIGHT CURB (I.E. 6' LONG RAMP FOR 6" HIGH CURB). WHEN THE INITIAL LANDING IS MORE THAN 1" BELOW FULL HEIGHT CURB REFER TO SHEETS 1 & 2 TO MODIFY THE CURB HEIGHT TAPERS AND MAINTAIN POSITIVE BOULEVARD DRAINAGE. CONSTRUCT THESE TAPERS AT 0"-3" AT 8-10%, THEN LESS THAN 5% FROM 3" CURB TO FULL CURB HEIGHT.

⑪ NEAREST EDGE OF DETECTABLE WARNING SURFACES SHALL BE PLACED 12' MINIMUM TO 15' MAXIMUM FROM THE NEAREST RAIL. FOR SKEWED RAILWAYS IN NO INSTANCE SHALL THE DETECTABLE WARNING BE CLOSER THAN 12' MEASURED PERPENDICULAR TO THE NEAREST RAIL.

⑫ WHEN PEDESTRIAN GATES ARE PROVIDED, DETECTABLE WARNING SURFACES SHALL BE PLACED ON THE SIDE OF THE GATES OPPOSITE THE RAIL, 2' FROM THE APPROACHING SIDE OF THE GATE ARM. THIS CRITERIA GOVERNS OVER NOTE ⑪.

⑬ CROSSING SURFACE SHALL EXTEND 2' MINIMUM PAST THE OUTSIDE EDGE OF WALK OR SHARED-USE PATH.

⑭ 3' FOR MEDIANS AND SPLITTER ISLANDS. NOSE CAN BE REDUCED TO 2' ON FREE RIGHT ISLANDS.

⑮ SIDEWALK TO BE PLACED 8.75' MIN. FROM THE FACE OF CURB/PROJECTED FACE OF CURB. THIS ENSURES MIN. CLEARANCE BETWEEN THE SIDEWALK AND GATE ARM COUNTERWEIGHT SUPPORTS.

⑯ CONSTRUCT WITH EXPANSION MATERIAL PER MNDOT SPECIFICATION 3702 TYPES A-E. EXPANSION MATERIAL SHALL MATCH FULL HEIGHT OF ADJACENT CONCRETE.

REVISION:

APPROVED: 11-04-2021
JEFFREY PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.250 | 4 OF 6

APPROVED: 11-04-2021
REVISED:
THOMAS STYRBICKI
STATE DESIGN ENGINEER

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

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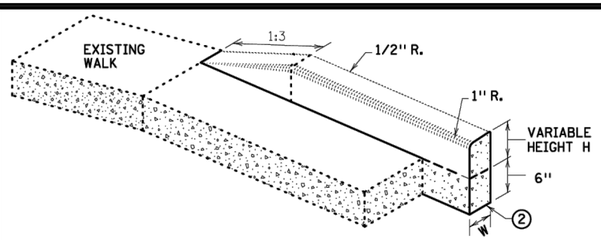
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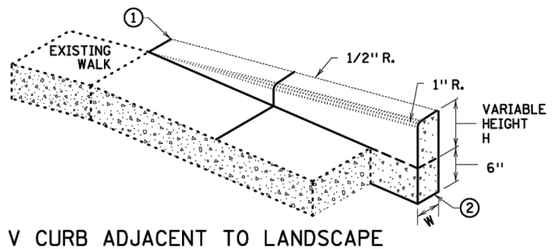
SHEET C1.13

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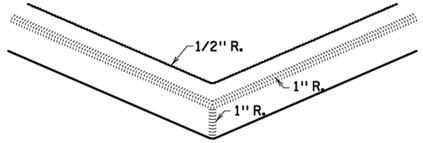
V CURB ADJACENT TO LANDSCAPE

CURB WITHIN SIDEWALK LIMITS



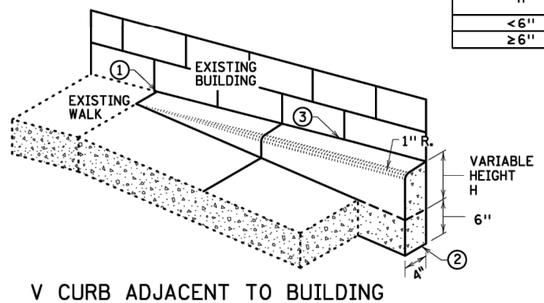
V CURB ADJACENT TO LANDSCAPE

CURB OUTSIDE SIDEWALK LIMITS

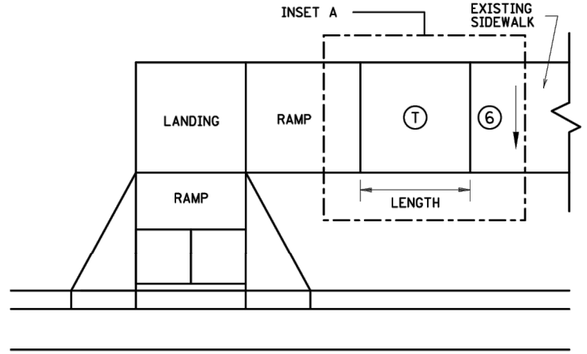


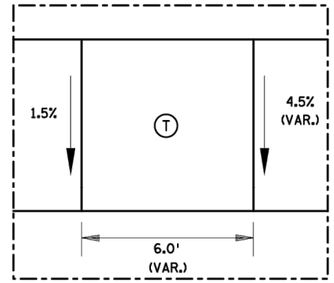
V CURB INTERSECTION

CONCRETE CURB DESIGN V	
CURB HEIGHT H	CURB WIDTH W
<6"	4"
≥6"	6"



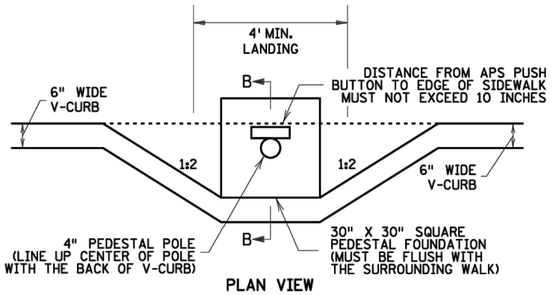
V CURB ADJACENT TO BUILDING OR BARRIER



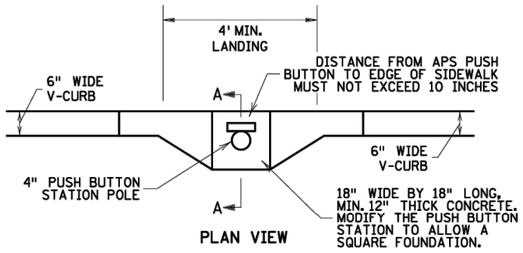


TRANSITION PANEL ④⑤

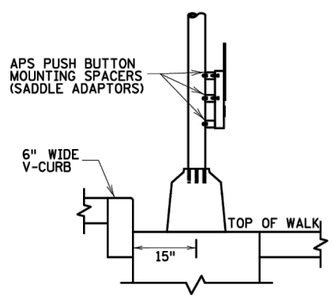
INSET A



PLAN VIEW

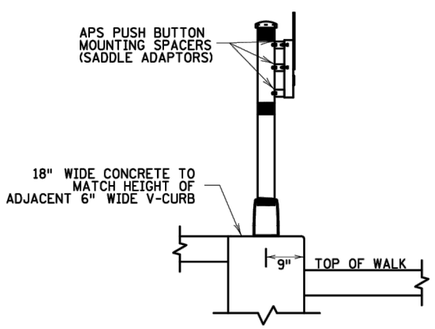


PLAN VIEW



SECTION B-B

SIGNAL PEDESTAL & PUSH BUTTON (V-CURB)



SECTION A-A

PUSH BUTTON STATION (V-CURB)

NOTES:

A WALKABLE FLARE IS AN 8-10% CONCRETE FLARE THAT IS REQUIRED WHEN THE FLARE IS ADJACENT TO A WALKABLE SURFACE, OR WHEN THE PEDESTRIAN PATH OF TRAVEL OF A PUSH BUTTON TRAVERSES THE FLARE.

ALL V CURB CONTRACTION JOINTS SHALL MATCH CONCRETE WALK JOINTS.

WHERE RIGHT-OF-WAY ALLOWS, USE OF V CURB SHOULD BE MINIMIZED. GRADING ADJACENT TURF OR SLOPING ADJACENT PAVEMENT IS PREFERRED.

V CURB SHALL BE PLACED OUTSIDE THE SIDEWALK LIMITS WHEN RIGHT OF WAY ALLOWS.

V CURB NEXT TO BUILDING SHALL BE A 4" WIDTH AND SHALL MATCH PREVIOUS TOP OF SIDEWALK ELEVATIONS.

① END TAPERS AT TRANSITION SECTION SHALL MATCH INPLACE SIDEWALK GRADES.

② ALL V CURB SHALL MATCH BOTTOM OF ADJACENT WALK.

③ CONSTRUCT USING APPROVED EXPANSION MATERIAL PER MNDOT TYPE A-E EXPANSION. LEAVE A MINIMUM ½" TOP GAP AND SEAL WITH MNDOT APPROVED SILICONE PER MNDOT SPEC 3722.

④ THE MAX. RATE OF CROSS SLOPE TRANSITIONING IS 1' LINEAR FOOT OF SIDEWALK PER HALF PERCENT CROSS SLOPE. WHEN PAR WIDTH IS GREATER THAN 6' OR THE RUNNING SLOPE IS GREATER THAN 5%, DOUBLE THE CALCULATED TRANSITION LENGTH.

⑤ TRANSITION PANELS ARE TO ONLY BE USED AFTER THE RAMP, OR IF NEEDED, LANDING ARE AT THE FULL CURB HEIGHT (TYPICAL SECTION).

⑥ EXISTING CROSS SLOPE GREATER THAN 2.0%.

LEGEND

THESE LONGITUDINAL SLOPE RANGES SHALL BE THE STARTING POINT. IF SITE CONDITIONS WARRANT, LONGITUDINAL SLOPES UP TO 8.3% OR FLATTER ARE ALLOWED.

Ⓢ INDICATES PEDESTRIAN RAMP - SLOPE SHALL BE BETWEEN 5.0% MINIMUM AND 8.3% MAXIMUM IN THE DIRECTION SHOWN AND THE CROSS SLOPE SHALL NOT EXCEED 2.0%.

LANDING AREA - 4' X 4' MIN. (5' X 5' MIN. PREFERRED) DIMENSIONS AND MAX 2.0% SLOPE IN ALL DIRECTIONS. LANDING SHALL BE FULL WIDTH OF INCOMING PARS.

Ⓣ TRANSITION PANEL(S) - TO BE USED FOR TRANSITIONING THE CROSS-SLOPE OF A RAMP TO THE EXISTING WALK CROSS-SLOPE. RATE OF TRANSITION SHOULD BE 0.5% PER 1 LINEAR FOOT OF WALK. SEE THIS SHEET FOR ADDITIONAL INFORMATION.

REVISION:

APPROVED: 11-04-2021

JEFFREY PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.250 | 5 OF 6

APPROVED: 11-04-2021
REVISED:

THOMAS STYRBICKI
STATE DESIGN ENGINEER

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

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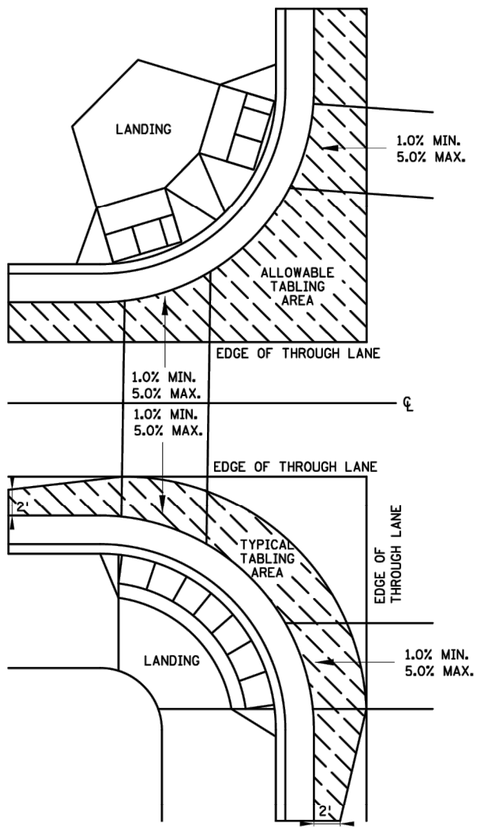
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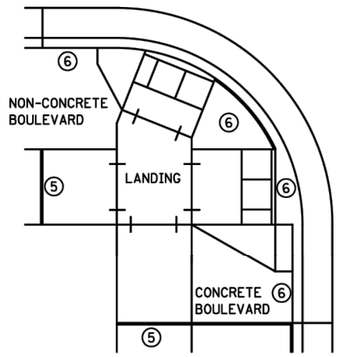
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STANDARD PLANS

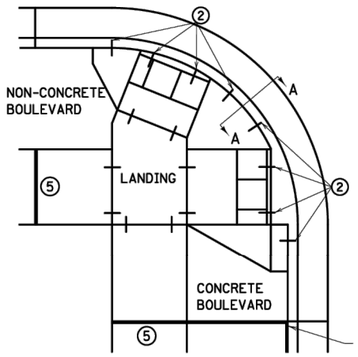
SHEET C1.14



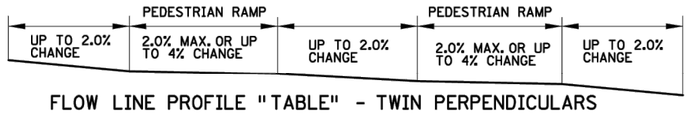
CURB LINE AND ROAD CROSSING ADJUSTMENTS



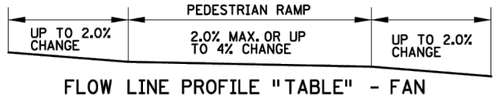
EXPANSION MATERIAL PLACEMENT
FOR CONCRETE ROADWAYS



CURB LINE REINFORCEMENT ④
PLACEMENT ON BITUMINOUS ROADWAYS



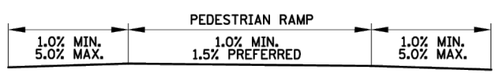
FLOW LINE PROFILE "TABLE" - TWIN PERPENDICULARS



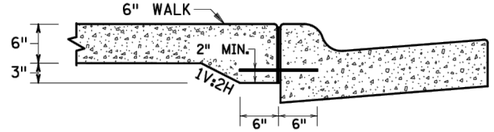
FLOW LINE PROFILE "TABLE" - FAN



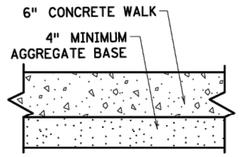
FLOW LINE PROFILE RAISE - TWIN PERPENDICULARS



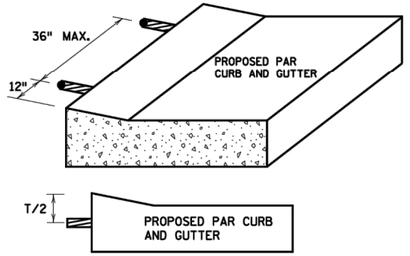
FLOW LINE PROFILE RAISE - FAN



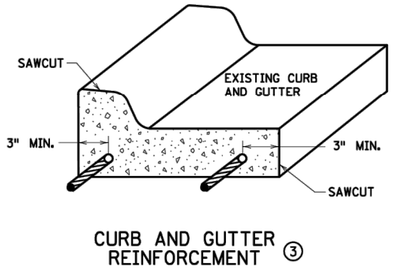
SECTION VIEW A-A
THICKENED SECTION
THROUGH CURB RAMP FLARES



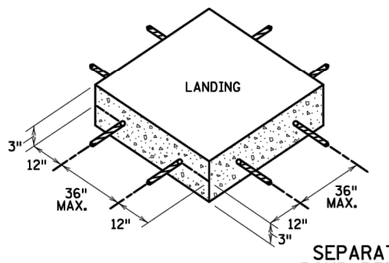
TYPICAL SIDEWALK SECTION
WITHIN INTERSECTION CORNER

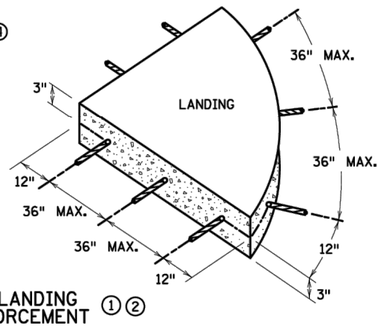


CURB RAMP REINFORCEMENT DETAILS ②④



CURB AND GUTTER
REINFORCEMENT ③





SEPARATE LANDING
POUR REINFORCEMENT ①②

GENERAL NOTES:

"TABLING" OF CROSSWALKS MEANS MAINTAINING LESS THAN 2% CROSS SLOPE WITHIN A CROSSWALK, IS REQUIRED WHEN A ROADWAY IS IN A STOP OR YIELD CONDITION AND THE PROJECT SCOPE ALLOWS.

RECONSTRUCTION PROJECTS: ON FULL PAVEMENT REPLACEMENT PROJECTS "TABLING" OF ENTIRE CROSSWALK SHALL OCCUR WHEN FEASIBLE.

MILL & OVERLAY PROJECTS: "TABLING" OF FLOW LINES, IN FRONT OF THE PEDESTRIAN RAMP, IS REQUIRED WHEN THE EXISTING FLOW LINE IS GREATER THAN 2%. WARPING OF THE BITUMINOUS PAVEMENT CAN NOT EXTEND INTO THE THROUGH LANE. TABLE THE FLOW LINE TO 2% OR AS MUCH AS POSSIBLE WHILE ADHERING TO THE FOLLOWING CRITERIA:

1) 1.0% MIN. CROSS-SLOPE OF THE ROAD
2) 5.0% MAX. CROSS-SLOPE OF THE ROAD
3) "TABLE" FLOW LINE UP TO 4% CHANGE FROM EXISTING SLOPE IN FRONT OF PEDESTRIAN RAMP
4) UP TO 2% CHANGE IN FLOW LINE FROM EXISTING SLOPE BEYOND THE PEDESTRIAN CURB RAMP

STAND-ALONE ADA RETROFITS: FOLLOW MILL & OVERLAY CRITERIA ABOVE HOWEVER ALL PAVEMENT WARPING IS DONE WITH BITUMINOUS PATCHING ON BITUMINOUS ROADWAYS AND FULL-DEPTH APRON REPLACEMENT ON CONCRETE ROADWAYS.

RAISING OF CURB LINES SHOULD OCCUR IN VERTICALLY CONSTRAINED AREAS. RAISE THE CURB LINES ENOUGH TO ALLOW COMPLIANT RAMPS OR AS MUCH AS POSSIBLE WHILE ADHERING TO THE FOLLOWING CRITERIA:

1) 1.0% MIN. AND 5.0% MAXIMUM CROSS-SLOPE OF THE ROAD
2) 1.0% MIN. FLOW LINE (ON EITHER SIDE OF PEDESTRIAN RAMP) TO MAINTAIN POSITIVE DRAINAGE
3) 5.0% RECOMMENDED MAX. FLOW LINE
4) LONGITUDINAL THROUGH LANE ROADWAY TAPERS SHOULD BE 1" VERTICAL PER 15' HORIZONTAL

NOTES:

① TO ENSURE RAMPS AND LANDINGS ARE PROPERLY CONSTRUCTED, ALL INITIAL LANDINGS AT A TOP OF A RAMPED SURFACE (RUNNING SLOPE GREATER THAN 2%) SHALL BE FORMED AND PLACED SEPARATELY IN AN INDEPENDENT CONCRETE POUR. FOLLOW SIDEWALK REINFORCEMENT DETAILS ON THIS SHEET FOR ALL SEPARATELY POURED INITIAL LANDINGS.

② DRILL AND GROUT NO. 4 12" LONG REINFORCEMENT BARS (EPOXY COATED) AT 36" MAXIMUM CENTER TO CENTER MINIMUM 12" SPACING FROM CONSTRUCTION JOINTS. BARS TO BE ADJUSTED TO MATCH RAMP GRADE. BARS TO BE PAID BY EACH.

③ DRILL AND GROUT 2 - NO. 4 X 12" LONG (6" EMBEDDED) REINFORCEMENT BARS (EPOXY COATED). REINFORCEMENT REQUIRED FOR ALL CONSTRUCTION JOINTS. BARS TO BE PAID BY EACH.

④ THIS CURB LINE REINFORCEMENT DETAIL SHALL BE USED ON BITUMINOUS ROADWAYS. FOR CONCRETE ROADWAYS, SEE NOTE 6.

⑤ CONSTRUCT WITH EXPANSION MATERIAL PER MNDOT SPECIFICATION 3702 TYPES A-E. EXPANSION MATERIAL SHALL MATCH FULL HEIGHT OF ADJACENT CONCRETE.

⑥ USE AN APPROVED TYPE F (1/4 INCH THICK) SEPARATION MATERIAL. SEPARATION MATERIAL SHALL MATCH FULL HEIGHT DIMENSION OF ADJACENT CONCRETE.

REVISION:

APPROVED: 11-04-2021
JEFFREY J. PERKINS
OPERATIONS DIVISION

MINNESOTA DEPARTMENT OF TRANSPORTATION

STANDARD PLAN 5-297.250 | 6 OF 6

APPROVED: 11-04-2021
REVISED:

THOMAS STYRBICKI
STATE DESIGN ENGINEER

PEDESTRIAN CURB RAMP DETAILS

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

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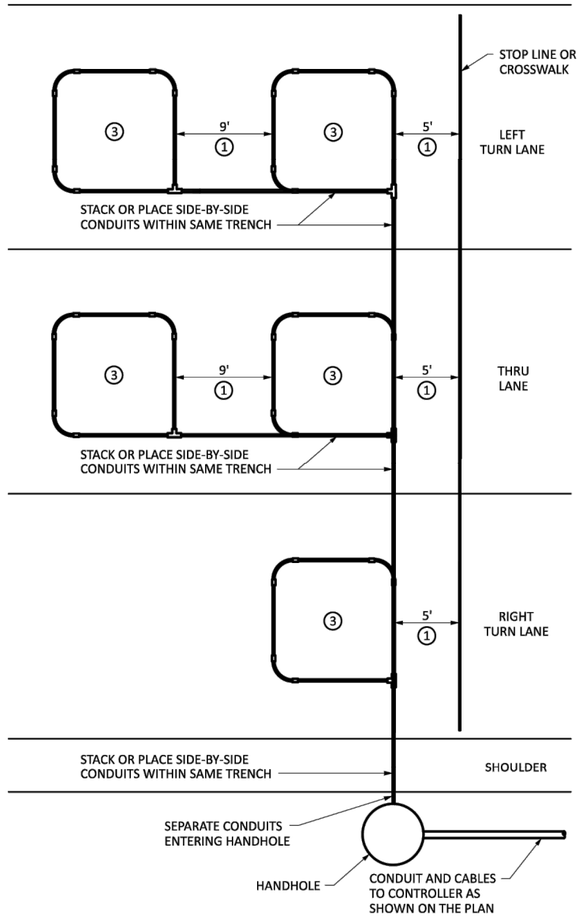
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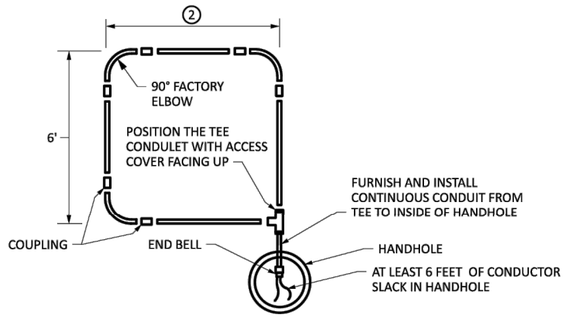
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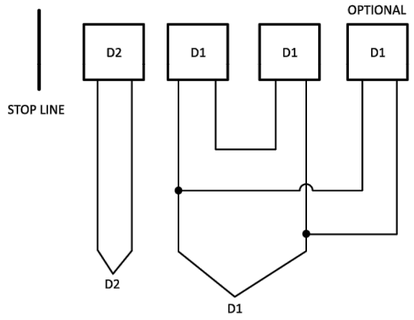
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RIGID PVC LOOP DETECTOR PLACEMENT DETAIL



PREFORMED RIGID PVC LOOP DETECTOR DETAIL



MULTIPLE LOOP SERIES HOOKUP DETAIL

NOTES:

FURNISH AND INSTALL ¾" CONDUIT AND FITTINGS.

ASSEMBLE THE PREFORMED RIGID PVC CONDUIT LOOP DETECTOR AS SHOWN IN THE DETAIL.

USE PRIMER AND PVC SOLVENT CEMENT MADE FOR JOINING RIGID PVC CONDUIT AND FITTINGS.

ATTACH A FERROUS METAL ITEM IN OR ADJACENT TO THE TEE CONDULET COVER OR AS APPROVED BY THE ENGINEER.

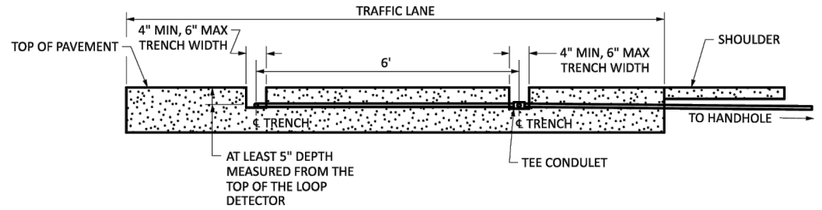
SLOPE CONDUITS FROM THE TEE CONDULETS TOWARDS THE HANDHOLE.

LOOP DETECTOR CONDUITS TO THE HANDHOLE MAY BE PLACED WITHIN THE SAME TRENCH.

(1) USE DIMENSION SHOWN ON THE PLAN.

(2) DIMENSION ACCORDING TO LOOP SIZE SHOWN ON THE PLAN.

(3) CENTER RIGID PVC LOOP DETECTOR IN THE LANE.



LOOP DETECTOR PLACEMENT IN EXISTING PAVEMENT

NOTES:

FURNISH AND INSTALL THE SAME LOOP DETECTOR USED TO TRACE OUT THE SPECIFIC LOCATION ON THE PAVEMENT TO ASSURE A PROPER FIT IN THE TRENCH.

MILL BEYOND THE LOOP DETECTOR PAVEMENT MARKINGS TO ACHIEVE FULL TRENCH DEPTH OF THE LOOP DETECTOR.

BEFORE APPLYING THE TACK COAT, REMOVE DEBRIS AND FOREIGN MATTER FROM THE TRENCH AND USE COMPRESSED AIR TO CLEAN AND DRY THE TRENCH.

APPLY A BITUMINOUS TACK COAT IN ACCORDANCE WITH SPEC. 2357 TO THE BOTTOM OF A CLEAN AND DRY TRENCH.

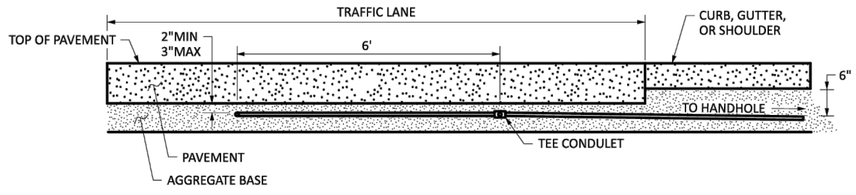
BACKFILL THE LOOP DETECTOR TRENCHES WITH A PLANT-MIXED ASPHALT IN ACCORDANCE WITH SPEC 2360, UNLESS OTHERWISE APPROVED BY THE ENGINEER TO USE AN ALTERNATE MIXTURE TYPE.

BACKFILL THE TRENCH WITH THE REQUIRED MIXED ASPHALT IN AT LEAST TWO COMPACTED LIFTS. BEFORE COMPACTING THE FIRST LIFT OF MIXED ASPHALT, ENSURE THERE IS AN ADEQUATE AMOUNT OF MIX ON THE SIDES AND ABOVE THE LOOP DETECTORS TO PREVENT DAMAGE DURING COMPACTION. USE "ORDINARY COMPACTION" METHOD IN ACCORDANCE WITH SPEC 2560.3D.2 FOR EACH LIFT. LEAVE ¼" TO ½" COMPACTED MIXED ASPHALT IN THE TRENCH ABOVE THE EXISTING PAVEMENT TO ALLOW FOR ADDITIONAL COMPACTION BY TRAFFIC.

FILL THE TRENCH WITH PACKAGED, DRY, NON-SHRINK, RAPID-HARDENING, CEMENT MATERIAL FOR CONCRETE REPAIRS LISTED ON MnDOT'S APL UNDER "CONCRETE PRODUCTS."

MILLING IS REQUIRED FOR RIGID PVC LOOP INSTALLATIONS. WHEN MILLING INTO EXISTING SURFACE THAT WILL BE OVERLAYED WITH BITUMINOUS, MILL THE TRENCH DEPTH NO LESS THAN THE HIGHEST LOOP DETECTOR IN THE TRENCH.

CONCRETE UNDER THE EXISTING BITUMINOUS SURFACE MAY BE ENCOUNTERED DURING MILLING OPERATIONS.



LOOP DETECTOR PLACEMENT IN NEW PAVEMENT

NOTES:

OBTAIN THE REQUIRED COMPACTION OF THE AGGREGATE BASE AFTER PLACEMENT OF LOOP DETECTOR AND LEAD-IN CONDUIT.

PLACE THE LOOP DETECTORS INTO THE AGGREGATE BASE 2" MINIMUM TO 3" MAXIMUM, MEASURED FROM THE TOP OF THE AGGREGATE BASE TO THE TOP OF THE LOOP DETECTOR AND LEAD-IN CONDUIT.

LEAD EXPERT OFFICE: BRIAN SORENSON, STATE TRAFFIC ENGINEER, OFFICE OF TRAFFIC ENGINEERING		PREFORMED RIGID PVC CONDUIT LOOP DETECTORS	APPROVED: 10-04-2024	THOMAS STYRBICKI, STATE DESIGN ENGINEER	STANDARD PLAN 5-297.874	1 OF 1
DEPARTMENT OF TRANSPORTATION			STANDARD PLAN	STATE PROJ. NO.	SHEET NO.	
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2026 PMP STREET & UTILITY IMPROVEMENTS
STANDARD PLANS

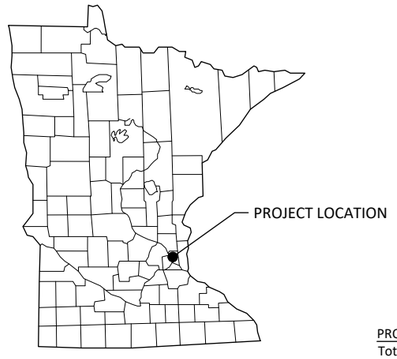
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STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

2026 PMP STREET & UTILITY IMPROVEMENTS

CITY OF ARDEN HILLS
RAMSEY COUNTY, MINNESOTA



LEGEND

- 1-MILE BOUNDARY
- PROJECT BOUNDARY
- OR — IMPAIRED, SPECIAL OR PROTECTED WATERS
- NATIONAL WETLANDS INVENTORY
- CALCAREOUS FEN
- RECEIVING WATERS

RESPONSIBLE PARTIES:
The Contractor and Owner will be joint applicants under the MPCA's General Stormwater Permit for Construction Activity as required by the National Pollutant Discharge Elimination System (NPDES) Phase II program.

The Contractor shall provide one or more trained Construction SWPPP Manager(s) knowledgeable and experienced in the application of erosion prevention and sediment control BMPs that will oversee the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion prevention and sediment control BMPs.

A Construction SWPPP Manager must be available for an on-site inspection within 72 hours upon request by the MPCA.

	COMPANY	CONTACT PERSON	PHONE
OWNER:	City of Arden HIlls	David Swearingen	651-792-7847
SWPPP DESIGNER:	Bolton & Menk, Inc.	Lani Leichty	952-299-0512
CONTRACTOR:	TBD	TBD	TBD
CONSTRUCTION SWPPP MANAGER:	TBD	TBD	TBD
PARTY RESPONSIBLE FOR LONG TERM O&M:	City of Arden Hills	David Swearingen	651-792-7847

The SWPPP Designer, Construction SWPPP Manager, and BMP Installer must have appropriate training. Documentation showing training commensurate with the job duties and responsibilities is required to be included in the SWPPP prior to any work beginning on the site. Training documentation for the SWPPP Designer is included on the Narrative sheet. The Contractor shall attach training documentation to this SWPPP for the Construction SWPPP Manager and BMP Installer prior to the start of construction. This information shall be kept up to date until the project NOT is filed.

ADDITIONAL COMPENSATION
Payment for all work associated with Erosion and Sediment Control shall be as described in the Project Manual. Unless otherwise authorized by the Owner no additional payment shall be made for any work required to administer and maintain the site erosion and sediment control in compliance with the Minnesota Pollution Control Agency (MPCA) - General Stormwater Permit for Construction Activity (MN R100001) including but not limited to inspection, maintenance, and removal of BMPs or addition of BMPs to accommodate Contractor phasing.

DOCUMENT RETENTION
Permittees must make the SWPPP, including all inspection reports, maintenance records, training records and other information required by this permit, available to federal, state, and local officials within three (3) days upon request for the duration of the permit and for three (3) years following the NOT.

GENERAL STORMWATER DISCHARGE REQUIREMENTS
All requirements listed in Section 5.1 of the Permit for the design of the permanent stormwater management system and discharge have been included in the preparation of this SWPPP. These include but are not limited to:

1. The expected amount, frequency, intensity, and duration of precipitation.
2. The nature of stormwater runoff and run-on at the site
3. Peak flow rates and stormwater volumes to minimize erosion at outlets and downstream channel and stream bank erosion.
4. The range of soil particle sizes expected to be present on the site.

Permanent stormwater treatment systems for this project have been designed in accordance with the guidance in the MN Stormwater Manual in place at the time of bidding. Copies of the design information and calculations are part of this SWPPP and will be provided in digital format upon written request to the Engineer.

PROJECT AREAS (PER RCWD DEFINITIONS):

Total Project Size (disturbed underlying soils area) =	1.4	ACRES
Existing area of applicable impervious surface =	0.2	ACRES
Post construction area of applicable impervious surface =	0.2	ACRES
Total new applicable impervious surface area created =	0.0	ACRES

PER RICE CREEK WATERSHED DISTRICT RULES, STORMWATER MANAGEMENT IS REQUIRED ONLY FOR PUBLIC LINEAR PROJECTS RESULTING IN ONE ACRE OR MORE OF NEW OR RECONSTRUCTED IMPERVIOUS SURFACE. APPLICABLE EXCEPTIONS TO THIS THRESHOLD INCLUDE RECLAMATION/MILL & OVERLAY/REHABILITATION PROJECT AREAS THAT DO NOT EXPOSE THE UNDERLYING SOILS AND TRAILS 10 FEET WIDE OR LESS WITH 5 FEET OF VEGETATED AREA DOWN-GRADIENT. THE TOTAL DISTURBED UNDERLYING SOILS AREA ABOVE INCLUDES THE AREAS OF WATERMAIN & STORM SEWER UTILITY EXCAVATION AND THE NEW STORMWATER POND BMP. ALL REMAINING AREAS ARE EXCLUDED AS THEY ARE EITHER WITHIN THE RECLAMATION/MILL/REHABILITATION AREA, INCLUDES A 5 FOOT VEGETATED AREA DOWN-GRADIENT FROM THE 10 FOOT WIDE TRAIL, OR THE WORK DOES NOT REQUIRE EXCAVATION/EXPOSURE OF UNDERLYING SOILS. THE DISTURBED UNDERLYING SOILS INCLUDE LESS THAN 1 ACRE OF IMPERVIOUS AREA FOR THIS PUBLIC LINEAR PROJECT SO PERMANENT STORMWATER MANAGEMENT, AND AN ASSOCIATED RCWD PERMIT ARE NOT REQUIRED.

PROJECT AREAS:

Total Project Size (disturbed area) =	8.2	ACRES
Existing area of impervious surface =	7.4	ACRES
Post construction area of impervious surface =	7.4	ACRES
Total new impervious surface area created =	0.0	ACRES

Planned Construction Start Date:	05/01/2026
Estimated Construction Completion Date:	11/30/2026

PERMANENT STORMWATER MANAGEMENT SYSTEM:
Type of storm water management used if more than 1 acre of new impervious surface is created:

	Wet Sedimentation Basin
	Infiltration/Filtration
	Regional Pond
X	Permanent Stormwater Management Not Required

PROJECT LOCATION:

COUNTY	TOWNSHIP	RANGE	SECTION	LATITUDE	LONGITUDE
RAMSEY	T30N	R23W	22	45.077°	-93.152°

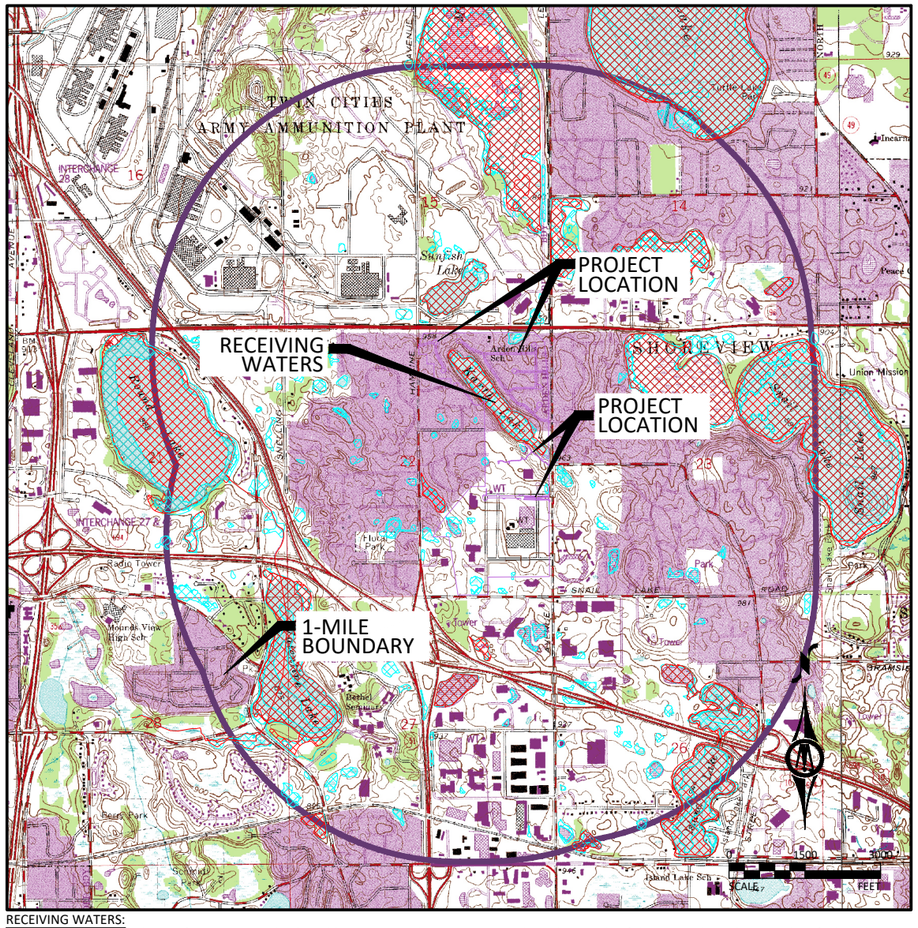
BMP SUMMARY	QUANTITY	UNIT
Riprap	72	CY
Silt Fence	502	LF
Inlet Protection	43	EA
Sediment Control Log	4018	LF
Turbidity Barrier	133	LF
Seed & Blanket	7715	SY

DESCRIPTION OF CONSTRUCTION ACTIVITIES AND STORMWATER MANAGEMENT:
Construction activities include: Site grading, water main rehabilitations and hydrant installations, mill and overlay, reclamation and overlay, temporary erosion and sediment control, and permanent stabilization.

Stormwater currently moves through the existing storm sewer network and discharges to Karth Lake

After construction is complete stormwater will maintain the same pathway.

This project includes the following stormwater management BMPs: See table



RECEIVING WATERS:
Receiving waters, including surface water, wetlands, Public Waters, and stormwater ponds, within 1-mile of the project boundary are identified on the USGS 7.5 min quad map above. Receiving waters that are impaired, the impairment, and WLA are listed as follows. All specific BMPs relative to construction activities listed in the permit for special, prohibited, restricted, or impaired have been incorporated into this plan. All specific BMPs listed in approved TMDLs and those BMPs listed for construction related waste load allocations have also been incorporated.

NAME OF WATER BODY	TYPE (ditch, pond, wetland, lake, etc.)	Special, Prohibited, Restricted Water [1]	Flows to Impaired Water Within 1-Mile [2]	USEPA Approved Construction Related TMDL [3]
Karth Lake	Lake	Yes	Yes	No
Round Lake	Lake	Yes	Yes	No
Snail Lake	Lake	Yes	Yes	No

[1] Special, prohibited, and restricted waters are listed in Section 23 of the MN Construction Stormwater General Permit (MNR100001).
[2] Identified as impaired under section 303 (d) of the federal Clean Water Act for phosphorus, turbidity, TSS, dissolved oxygen, and/or aquatic biota.
[3] Construction Related TMDLs include those related to: phosphorus, turbidity, TSS, dissolved oxygen, and/or aquatic biota.

IMPLEMENTATION SCHEDULE AND PHASING: The Contractor is required to provide an updated schedule and site management plan meeting the minimum requirements of Section 1717 of the Minnesota Standard Specifications for Construction.

1) Submit SWPPP Updates to Engineer. Submittal shall include any requested changes to the SWPPP, including but not limited to: Trained Personnel, Locations for Stockpiles, Concrete Washout, Sanitation Facilities, Types and Locations of Erosion & Sediment Control. Failure to submit updates shall be considered acceptance of the SWPPP as designed with no changes.
2) Install perimeter sediment control, inlet protection, and construction exit.
3) Perform removals
4) Grading and utility installation
5) Construct permanent stormwater management system
6) Add additional temporary BMPs as necessary during construction based on inspection reports.
7) Ensure final stabilization measures are complete.
8) Provide digital copy of all Field SWPPP Documentation including Inspection Reports and SWPPP Revisions to the Owner.
9) Submit Notice of Termination (NOT) to MPCA. NOTE: The NOT must be submitted to MPCA before Final Stabilization is considered complete.

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LIC. NO. 56595 DATE 02/09/2026

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORMWATER POLLUTION PREVENTION PLAN
SWPPP PLAN

SHEET C2.01

Information contained in this SWPPP narrative sheet summarizes requirements of the GENERAL PERMIT AUTHORIZATION TO DISCHARGE STORMWATER ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM/STATE DISPOSAL SYSTEM PROGRAM - Permit No: MN RI0000I (Permit) as they apply to this project. All provisions of the Permit including those not specifically cited herein shall apply to this project. The Contractor is responsible to be familiar with and comply with all conditions of the permit. The full text of the Permit is available at: https://www.pca.state.mn.us/sites/default/files/wq-strm2-80a.pdf

SWPPP AMENDMENTS AND SUBMITTALS

Contractor must prepare and submit to the Engineer a SWPPP amendment as necessary to include additional Best Management Practices (BMPs) to correct problems identified or address the following situations.

1. Contact information and training documentation for Construction SWPPP Manager and BMP Installer,
2. There is a change in construction method of phasing, operation, maintenance, weather or seasonal conditions not anticipated during the design of the SWPPP including but not limited to:
   a. Types and/or Locations of BMPs
   b. Material Storage and Spill Response
   c. Fueling Plans
   d. Locations for Stockpiles, Concrete Washout, and Sanitation Facilities and
   e. Project Phasing
3. It is determined that the SWPPP is not achieving objectives of minimizing pollutants in stormwater discharges associated with construction activity, or
4. The SWPPP is not consistent with the terms and conditions of the permit.

The Contractor may implement SWPPP amendments immediately and is not required to wait for Engineer review of the submittal. The responsibility for completeness of SWPPP amendments and compliance with the Permit lies with the Contractor. Review, comment, or lack of comment by the Engineer on a SWPPP amendment shall not absolve the responsibilities of the Contractor in any way.

If a change order is issued for a design change the SWPPP amendment will be prepared by the Engineer and included in the change order.

In addition to SWPPP amendments, the Contractor shall submit to the Engineer Weekly Erosion and Sediment Control Schedule meeting the requirements of MnDOT 1717.

The Contractor shall keep copies of all SWPPP amendments, Weekly Erosion and Sediment Control Schedules, inspection logs, and maintenance logs with the field copy of the SWPPP. A PDF copy of these documents will be provided along with a copy of the final Field Copy of the SWPPP to the Engineer along with the signed Notice of Termination when final stabilization is complete.

EROSION PREVENTION PRACTICES

Stormwater conveyance channels shall be routed around unstabilized areas. Erosion controls and velocity dissipation devices shall be used at outlets within and along the length of any constructed conveyance channel.

The normal wetted perimeter of all ditches or swales, including storm water management pond slopes, that drain waters from the site must be stabilized within 200' of any property edge or discharge point, including storm sewer inlets, within 24 hours of connection.

Temporary or permanent ditches or swales used as sediment containment during construction do not need to be stabilized during temporary period of use and shall be stabilized within 24 hours after no longer used as sediment containment.

Mulch, hydromulch, tackifier, or similar practice shall not be used in any portion of the wetted perimeter of a temporary or permanent drainage ditch or swale section with a continuous slope of greater than 2 percent.

Energy dissipation shall be installed at all temporary or permanent pipe outlets within 24 hours of connection to a surface water or permanent stormwater treatment system.

The Contractor shall phase construction and use construction methods to the extent practical to minimize exposed soils. The project phasing shall be documented in the Weekly Erosion and Sediment Control Schedule.

SEDIMENT CONTROL PRACTICES

Down gradient BMPs including perimeter BMPs must be in place before up gradient land- disturbing activities begin and shall remain in place until final stabilization.

All BMPs that have been adjusted or removed to accommodate short-term activities shall be re-installed or replaced the earlier of the end of the work day or before the next precipitation event even if the activity is not complete.

Inlet BMPs may be removed for specific safety concerns. The BMPs shall be replaced as soon as the safety concern is resolved. The removal shall be documented in the SWPPP as a SWPPP amendment.

Temporary stockpiles must have sediment control BMPs. The Contractor shall prepare and submit to the Engineer a SWPPP amendment showing the location of temporary stockpiles and the BMPs for each stockpile. The SWPPP amendment must meet the minimum requirements of Section 9 of the Permit.

Soil compaction shall be minimized and topsoil shall be preserved, unless infeasible or if construction activities dictate soil compaction or topsoil stripping.

The use of polymers, flocculants, or other sedimentation treatment chemicals are not proposed as part of this SWPPP as designed by the Engineer. If methods or phasing of construction require the use of any of these chemicals, the Contractor shall prepare and submit to the Engineer a SWPPP amendment that meets the minimum requirements of Section 9 of the Permit.

TEMPORARY SEDIMENTATION BASINS

A temporary sedimentation basin has not been included in this SWPPP as designed by the Engineer. If a basin is later determined to be desirable or necessary the Contractor shall prepare and submit to the Engineer a SWPPP amendment. Temporary sedimentation basins shall meet or exceed the minimum requirements of Section 14 of the Permit and shall include a basin draining plan meeting or exceeding the minimum requirements of Section 10 of the Permit. Where the site discharges to Special and/or Impaired Waters the SWPPP amendment shall also meet or exceed the minimum requirements of Section 23 of the permit.

DEWATERING

A dewatering plan has not been included in this SWPPP as designed by the Engineer. If dewatering is required for this project, the Contractor shall prepare and submit to the Engineer a SWPPP amendment. All dewatering shall meet or exceed the minimum requirements of Section 10 of the Permit.

POLLUTION PREVENTION

Products and materials that have the potential to leach pollutants that are stored on the site must be stored in a manner designed to minimize contact with stormwater. Materials that are not a source of potential contamination to stormwater or that are designed for exposure to stormwater are not required to be covered.

Hazardous materials including but not limited to pesticides, fertilizer, petroleum products, curing compounds and toxic waste must be properly stored and protected from stormwater exposure as recommended by the manufacturer in an access restricted area.

Solid waste must be stored, collected and disposed of in compliance with Minnesota Administrative Rules Chapter 7035.

Portable toilets must be positioned so that they are secure and will not be tipped or knocked over. Sanitary waste must be disposed of properly in accordance with Minn. R. CH 7041.

Exterior vehicle or equipment washing on the project site shall be limited to a defined area of the site. No engine degreasing is allowed on site. A sign must be installed adjacent to each washout facility that requires site personnel to utilize the proper facilities for disposal of concrete and other washout wastes.

The Contractor shall prepare and submit a SWPPP amendment detailing the location and BMPs proposed for storage of materials, solid waste, portable toilets, and exterior vehicle or equipment washing on the site. The SWPPP amendment shall include a spill prevention and response plan that is appropriate for the materials proposed to be on the site. The SWPPP amendment shall meet or exceed the minimum requirements of Section 12 of the Permit.

INSPECTION & MAINTENANCE

A trained person shall routinely inspect the entire construction site at the time interval indicated on this sheet of the SWPPP during active construction and within 24-hours after a rainfall event greater than 0.5 inches in 24 hours. Following an inspection that occurs within 24-hours after a rainfall event, the next inspection must be conducted at the time interval indicated in the Receiving Waters Table found on the SITE PLAN AND INFORMATION SHEET of the SWPPP.

All inspections and maintenance conducted during construction must be recorded on the day it is completed and must be retained with the SWPPP. Inspection report forms are available in the Project Specifications. Inspection report forms other than those provided shall be approved by the engineer.

The Contractor may request a change in inspection schedule for the following conditions:

a. Inspections of areas with permanent cover to be reduced to once per month,
b. Inspections of areas that have permanent cover and have had no construction activity for 12 months to be suspended until construction resumes,
c. Inspections of areas where construction is suspended due to frozen ground conditions, inspections to be suspended until the earlier of within 24 hours of runoff occurring, or upon resuming construction.

No change in inspection schedule shall occur until authorized by the Engineer.

Inspections must include:

1. All erosion prevention and sediment control BMPs and Pollution Prevention Management Measures to ensure integrity and effectiveness.
2. Surface waters, including drainage ditches and conveyance systems for evidence of erosion and sediment deposition.
3. Construction site vehicle exit locations, streets and curb and gutter systems within and adjacent to the project for sedimentation from erosion or tracked sediment from vehicles.
4. Infiltration areas to ensure that no sediment from ongoing construction activity is reaching the infiltration area and that equipment is not being driven across the infiltration area.

All non-functioning BMPs and those BMPs where sediment reaches one-half (1/2) of the depth of the BMP, or in the case of sediment basins one-half (1/2) of the storage volume, must be repaired, replaced, or supplemented by the end of the next business day after discovery, or as soon as field conditions allow.

Permittees must repair, replace or supplement all nonfunctional BMPs with functional BMPs by the end of the next business day after discovery, or as soon as field conditions allow.

Any sediment that escapes the site must be removed and the area stabilized within 7 calendar days of discovery unless precluded by legal, regulatory, or physical access in which case the work shall be completed within 7 calendar days of authorization. Paved surfaces such as streets shall have any escaped or tracked sediment removed by the end of the day that it is discovered. Sediment release, other than paved surfaces that can be cleaned up with street sweeping shall be reported immediately upon discovery to the Engineer.

PUBLIC WATER RESTRICTIONS:

For public waters that have been promulgated "work in water restrictions" during fish spawning time frames, all exposed soil areas that are within 200 feet of the water's edge, and drain to these waters must complete stabilization within 24-hours during the time period. MN DNR permits are not valid for work in waters that are designated as infested waters unless accompanied by an Infested Waters Permit or written notification has been obtained from MN DNR stating that such permit is not required. There is no exception for pre-existing permits. If a MN DNR Permit has been issued for the project and the water is later designated as infested, the Contractor shall halt all work covered by the MN DNR Permit until an Infested Waters Permit is obtained or that written notification is obtained stating that such permit is not required.

FINAL STABILIZATION

Final Stabilization is not complete until all the following requirements have been met:

1. Substantial Completion has been reached and no ground disturbing activities are anticipated.
2. Permanent cover has been installed with an established minimum uniform perennial vegetation density of 70 percent of its expected final growth. Vegetation is not required in areas where no vegetation is proposed by this project such as impervious surfaces or the base of a sand filter.
3. Accumulated sediment has been removed from all permanent stormwater treatment systems as necessary to ensure the system is operating as designed.
4. All sediment has been removed from conveyance systems
5. All temporary synthetic erosion prevention and sediment control BMPs have been removed. BMPs designated on the SWPPP to remain to decompose on-site may remain.
6. For residential construction only, permit coverage terminates on individual lots if the structures are finished and temporary erosion prevention and downgradient perimeter control is complete, the residence sells to the homeowner, and the permittee distributes the MPCA's "Homeowner Fact Sheet" to the homeowner.
7. For agricultural land only (e.g., pipelines across cropland), the disturbed land must be returned to its preconstruction agricultural use prior to submitting the NOT.

SITE STABILIZATION COMPLETION:

Stabilization of exposed soils shall begin immediately and shall be completed after the construction activity has temporarily or permanently ceased no later than:	7 calendar days

SITE INSPECTION INTERVAL:

A trained person shall routinely inspect the entire construction site during active construction at an interval of no more than:	3 calendar days

SPECIAL ENVIRONMENTAL CONSIDERATIONS AND PERMITS:

1)	Was an environmental review required for this project or any part of a common plan of development or sale that includes all or any portion of this project?	NO
2)	Does any portion of the site have the potential to affect threatened or endangered species or their critical habitat?	NO
3)	Does any portion of this site discharge to a Calcareous fen.	NO
4)	Will any portion of the site potentially affect properties listed on the National Register of Historic Places or a known or discovered archeological site?	NO
5)	Have any Karst features have been identified in the project vicinity?	NO
6)	Is compliance with temporary or permanent stormwater management design requirements infeasible for this project?	NO
7)	Has the MN DNR promulgated "work in water restrictions" for any Public Water this site disharges to during fish spawning?	NO

TYPE OF PERMIT	PERMITTING AGENCY	PERMIT STATUS AND CONDITIONS
Construction Stormwater NPDES	MPCA	To Be Applied For
Watershed Permit	RCWD	Permit Coverage Pending
Wetland Conservation Act	BWSR	Permit Coverage Pending
Section 404 Permit	USACE	Permit Coverage Pending
Work in Waters Permit	MNDNR	Permit Coverage Pending
T/E Species	State/Federal	Permit Coverage Pending

SWPPP DESIGNER TRAINING DOCUMENTATION:



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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

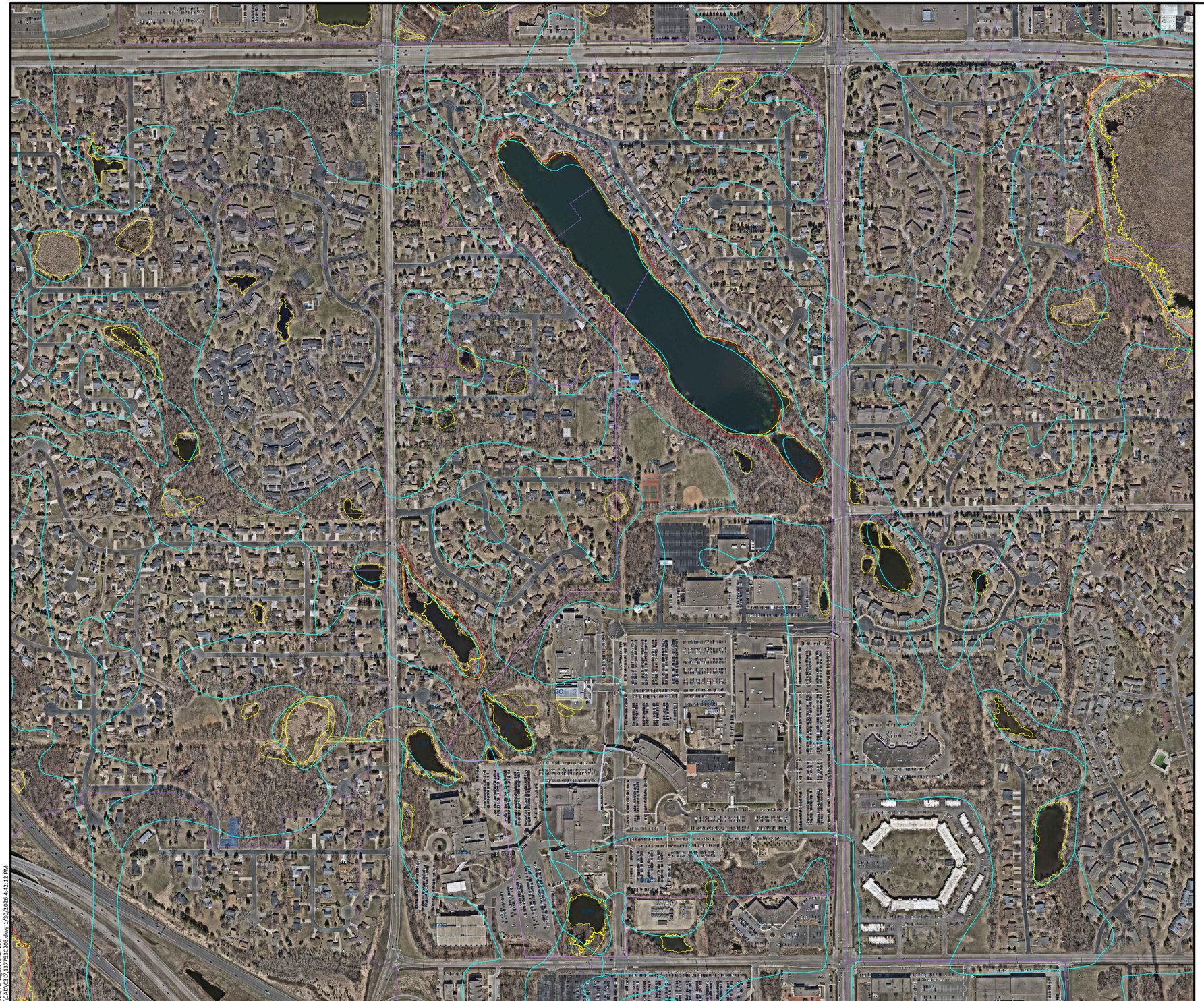
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CLIENT PROJ. NO.			
PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORMWATER POLLUTION PREVENTION PLAN
SWPPP NARRATIVE

SHEET C2.02



LEGEND

- PROJECT BOUNDARY
- SOIL TYPE
- IMPAIRED, SPECIAL OR PROTECTED WATERS
- NATIONAL WETLANDS INVENTORY
- DWSMA, LOW VULNERABILITY
- STEEP SLOPES (>33.3%)
- RECEIVING WATERS

N

0 300 600
SCALE FEET

SOIL TYPE SUMMARY

Map Unit Symbol	Soil Name	Hyd. Soil Group	Erodibility
MUSYM	MUNAME	HYDGRP	MUHELCL
1039	Urban Land	N/A	N/A
1055	Aquolls and histosols	B/D	N/A
123	Dundas fine sandy loam	B/D	N/A
132B	Hayden fine sandy loam, 2 to 6 percent slopes	B	NHEL
132C	Hayden fine sandy loam, 6 to 12 percent slopes	B	PHEL
132D	Hayden fine sandy loam, 12 to 25 percent slopes	B	HEL
166	Ronneby fine sandy loam	B/D	NHEL
225	Nessel fine sandy loam, 1 to 4 percent slopes	C	N/A
540	Seeleyville muck	A/D	N/A
859B	Urban Land-Zimmerman complex, 1 to 8 percent slopes	N/A	N/A
860C	Urban Land-Hayden-Kingsley complex, 3 to 15 percent slopes	N/A	N/A
W	Water	N/A	N/A

NHEL - Not Highly Erodible Land
PHEL - Potentially Highly Erodible Land
HEL - Highly Erodible Land

LOCATION OF SWPPP REQUIREMENTS IN PROJECT PLAN

DESCRIPTION	SHEET NO.
SITE MAP	C2.01
DIRECTION OF FLOW	C2.04 - C2.13
FINAL STABILIZATION	C2.04 - C2.13
SOILS	C2.03
DRAINAGE STRUCTURES	C1.02 - C1.06
DRAINAGE TABULATION	N/A
STORM SEWER PLAN & PROFILE SHEETS	C5.00 - C5.04
EROSION & SEDIMENT CONTROL DETAILS	C2.04
EROSION CONTROL TABULATION	C2.01
TURF ESTABLISHMENT TABULATION	C2.01
NARRATIVE & NOTES	C2.01 - C2.02

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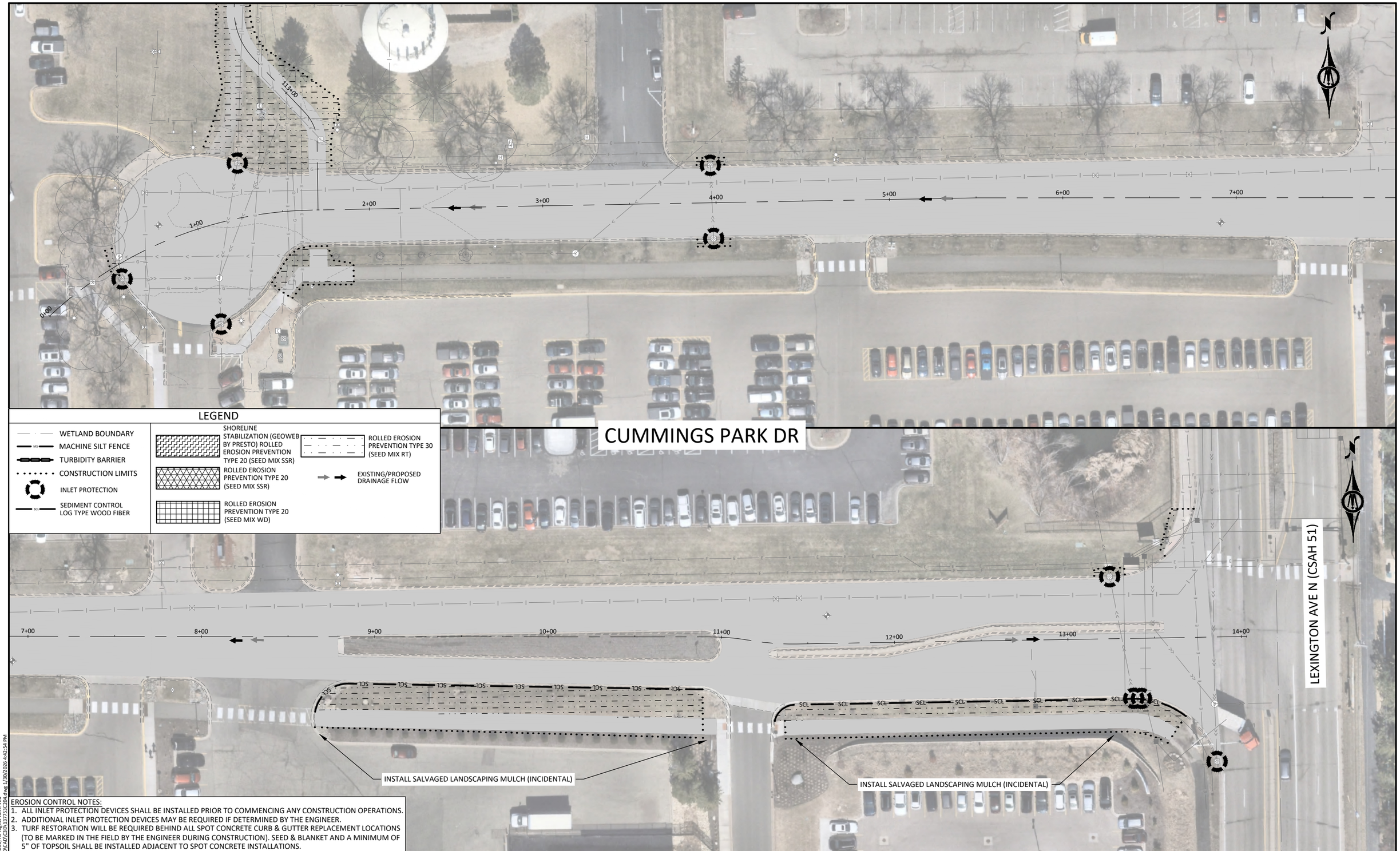
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORMWATER POLLUTION PREVENTION PLAN
SWPPP SOILS

SHEET C2.03



LEGEND

- WETLAND BOUNDARY
- MS — MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SCL — SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

EROSION CONTROL NOTES:

1. ALL INLET PROTECTION DEVICES SHALL BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION OPERATIONS.
2. ADDITIONAL INLET PROTECTION DEVICES MAY BE REQUIRED IF DETERMINED BY THE ENGINEER.
3. TURF RESTORATION WILL BE REQUIRED BEHIND ALL SPOT CONCRETE CURB & GUTTER REPLACEMENT LOCATIONS (TO BE MARKED IN THE FIELD BY THE ENGINEER DURING CONSTRUCTION). SEED & BLANKET AND A MINIMUM OF 5" OF TOPSOIL SHALL BE INSTALLED ADJACENT TO SPOT CONCRETE INSTALLATIONS.

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
CUMMINGS PARK DR

SHEET C2.04

HAMLINE AVE N (CSAH 50)

34+00

35+00

36+00

37+00

38+00

39+00

KARTH LAKE CIR

REDUNDANT BMP REQUIRED

NORMAL WATER LEVEL

ORDINARY HIGH WATER LEVEL

38+00

39+00

40+00

41+00

42+00

43+00

44+00

LEGEND

- WETLAND BOUNDARY
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- TURBIDITY BARRIER
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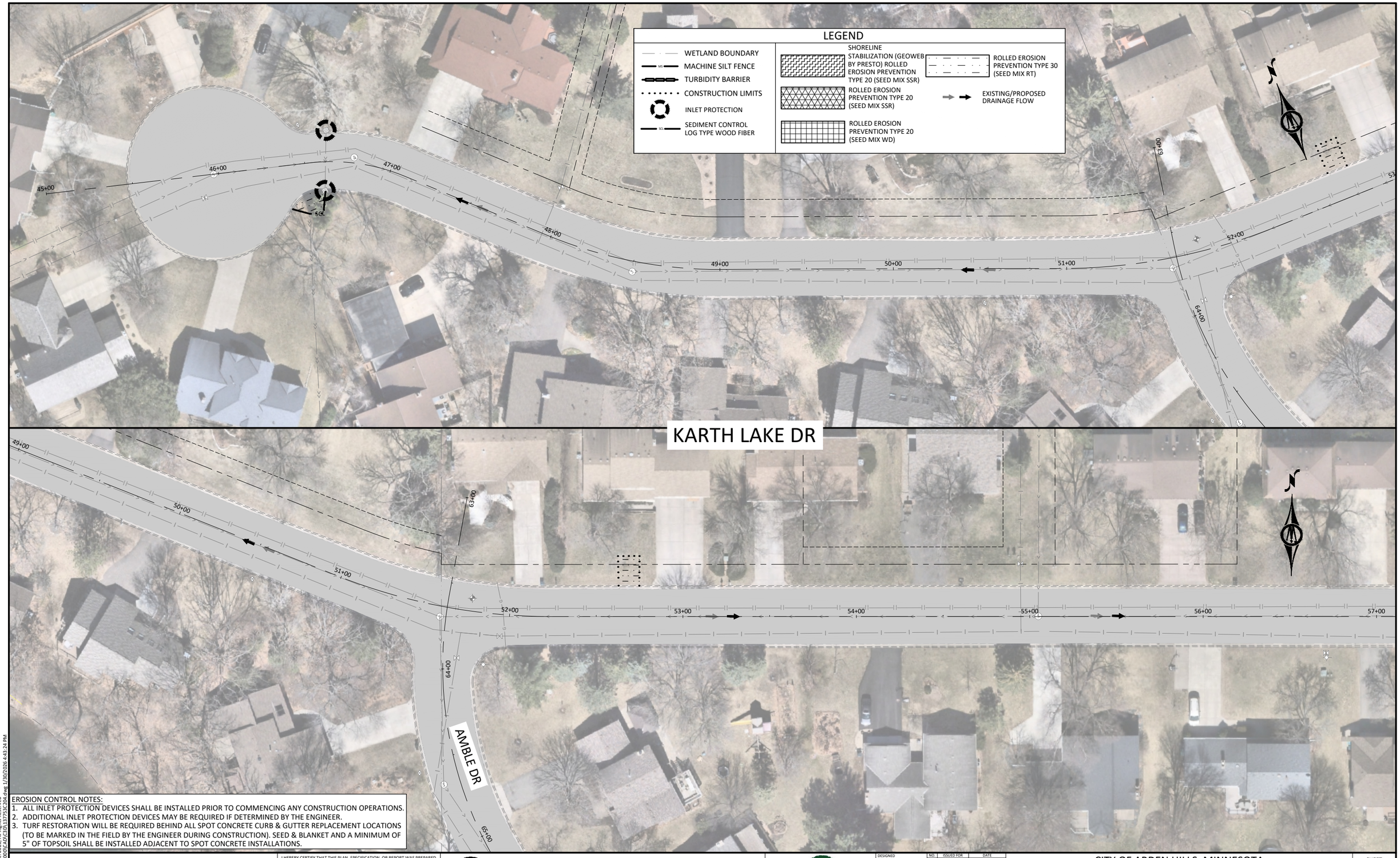
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
KARTH LAKE CIR

SHEET C2.05

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EROSION CONTROL NOTES:

1. ALL INLET PROTECTION DEVICES SHALL BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION OPERATIONS.
2. ADDITIONAL INLET PROTECTION DEVICES MAY BE REQUIRED IF DETERMINED BY THE ENGINEER.
3. TURF RESTORATION WILL BE REQUIRED BEHIND ALL SPOT CONCRETE CURB & GUTTER REPLACEMENT LOCATIONS (TO BE MARKED IN THE FIELD BY THE ENGINEER DURING CONSTRUCTION). SEED & BLANKET AND A MINIMUM OF 5" OF TOPSOIL SHALL BE INSTALLED ADJACENT TO SPOT CONCRETE INSTALLATIONS.

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LIC. NO. 56595 DATE 02/09/2026

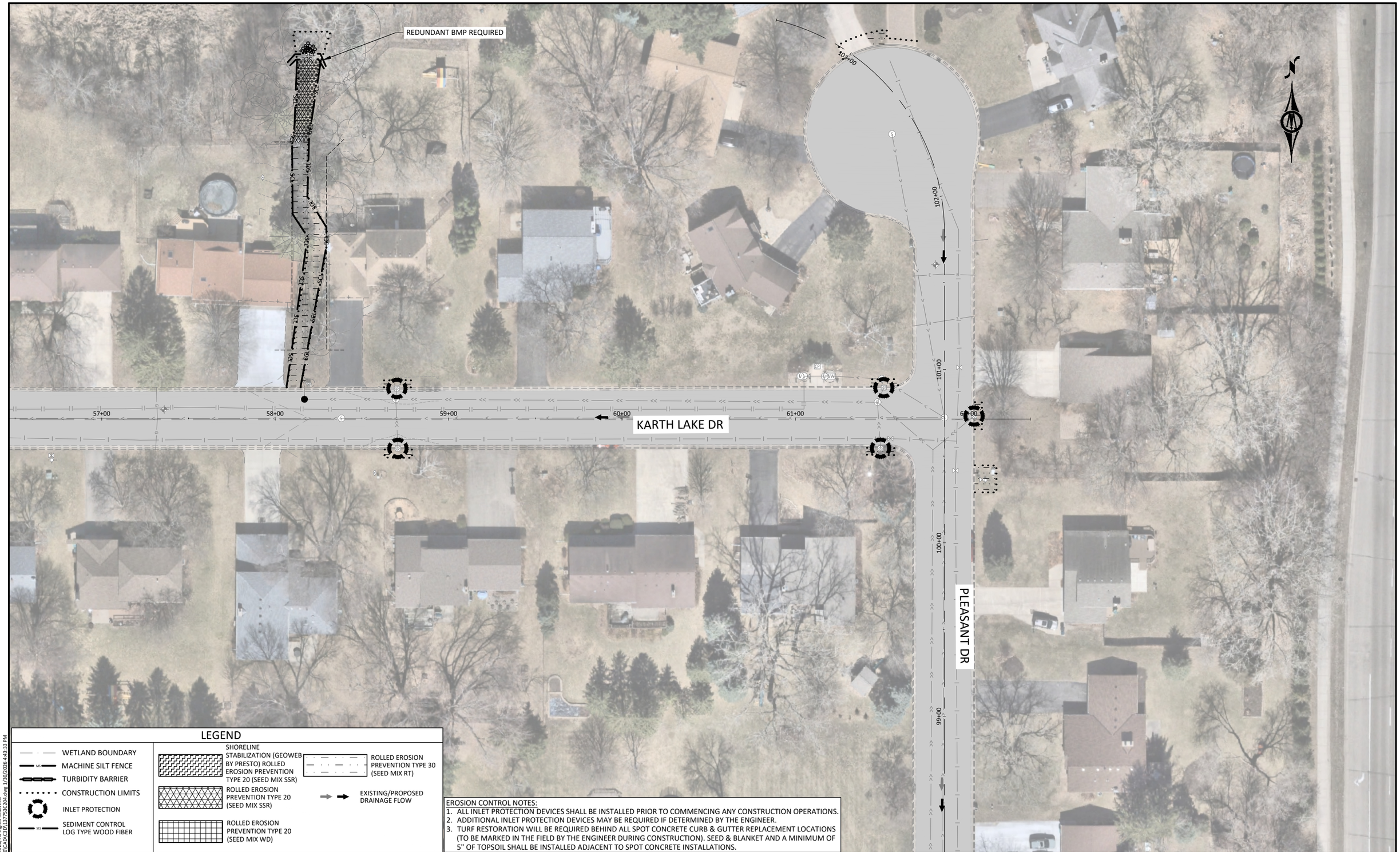
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
KARTH LAKE DR

SHEET C2.06



LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
KARTH LAKE DR

SHEET C2.07



LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
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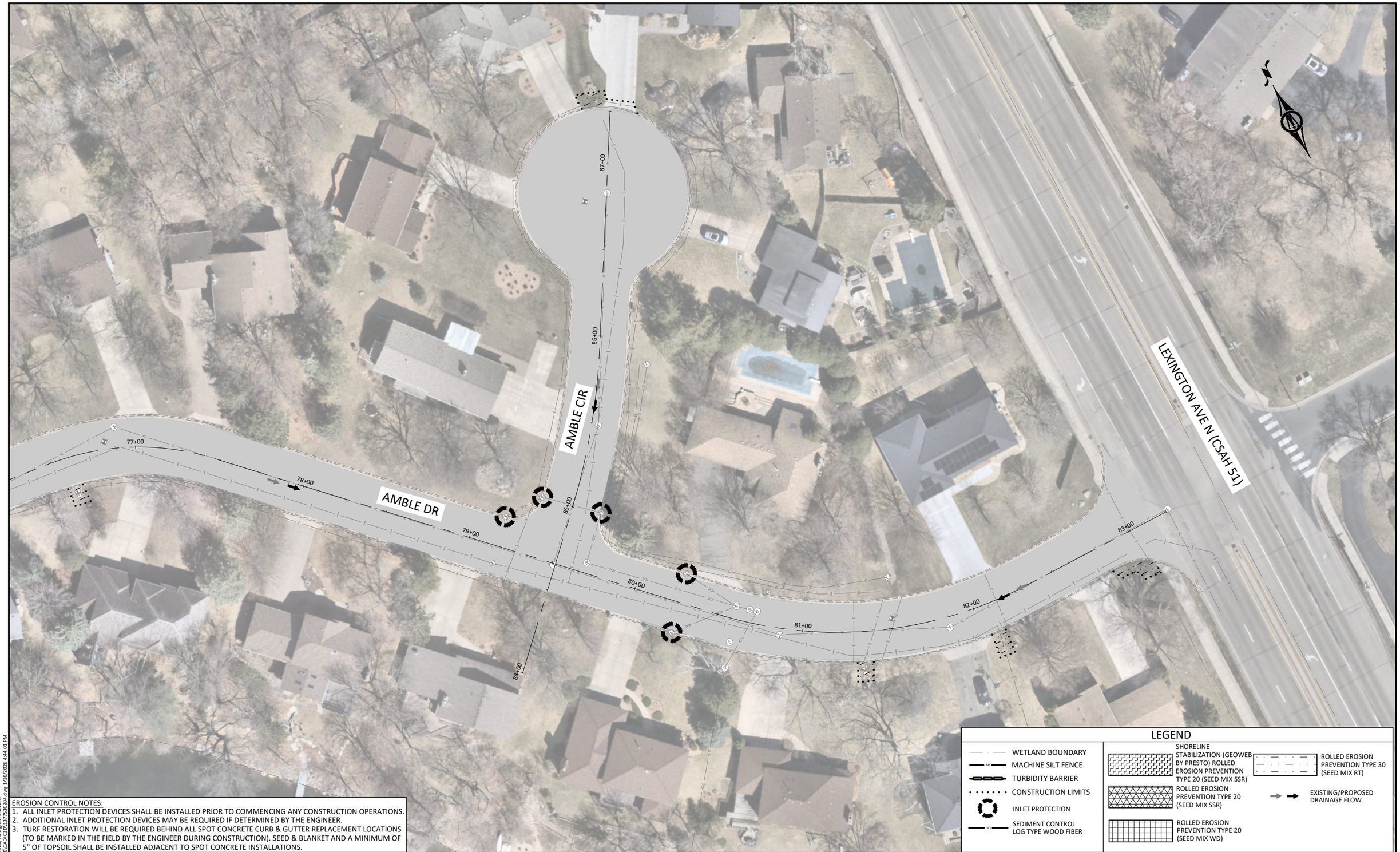
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2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
AMBLE DR

SHEET C2.08



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LEGEND

- WETLAND BOUNDARY
- MS — MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SCL — SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

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SCALE FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
AMBLE DR & AMBLE CIR

SHEET C2.09

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LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE (MS)
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER (SCL)
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

AMBLE DR

PLEASANT DR

PLEASANT CIR

KARTH LAKE DR

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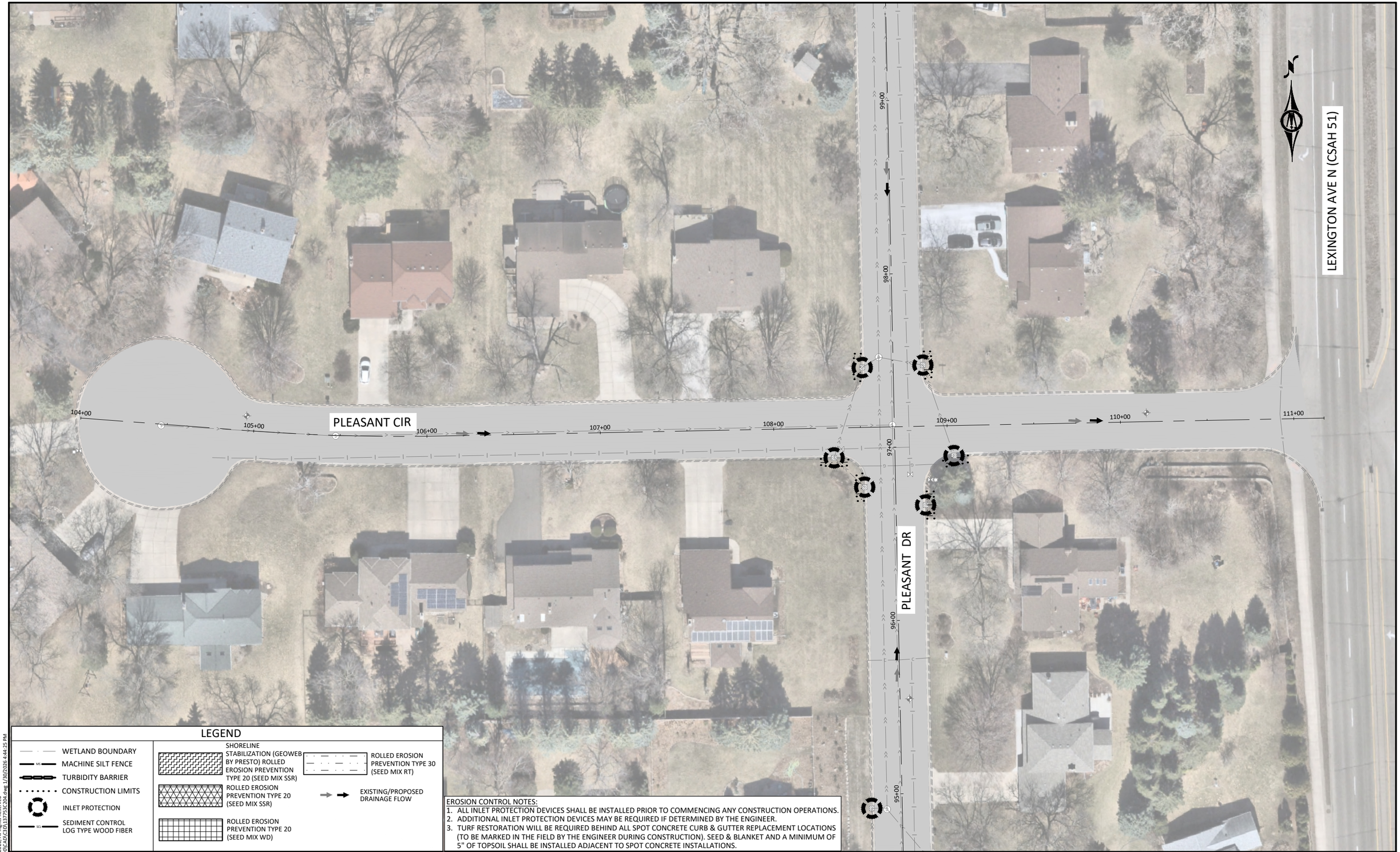
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
PLEASANT DR

SHEET C2.10

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LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

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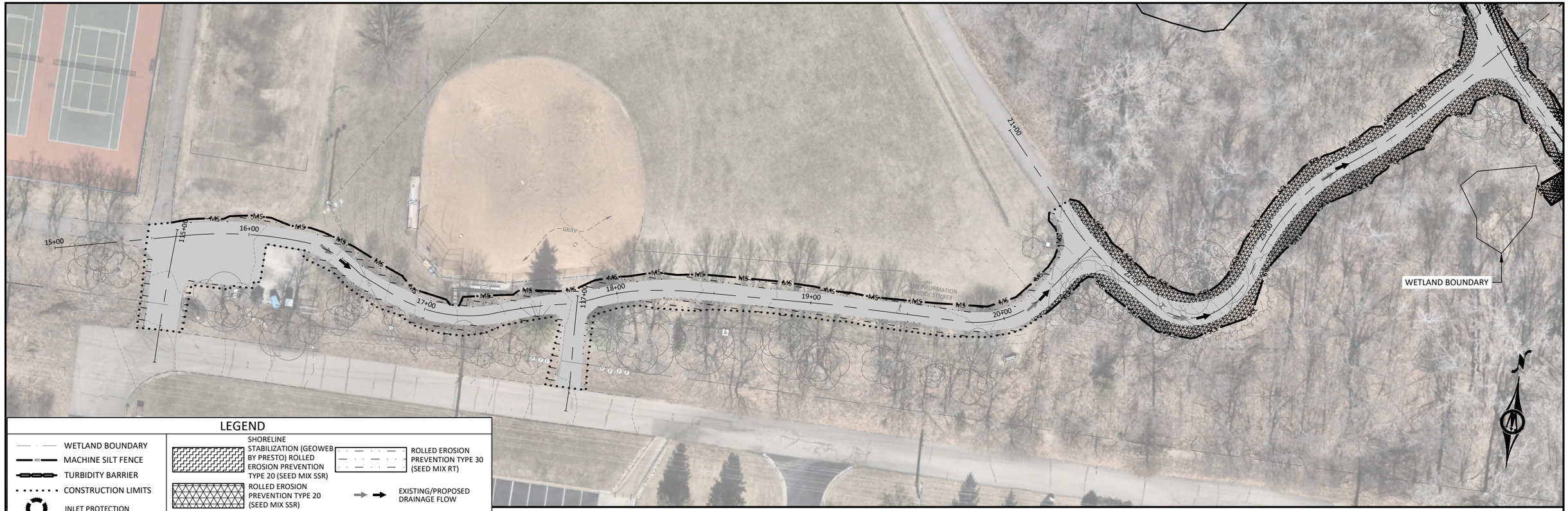
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
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LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
- EXISTING/PROPOSED DRAINAGE FLOW

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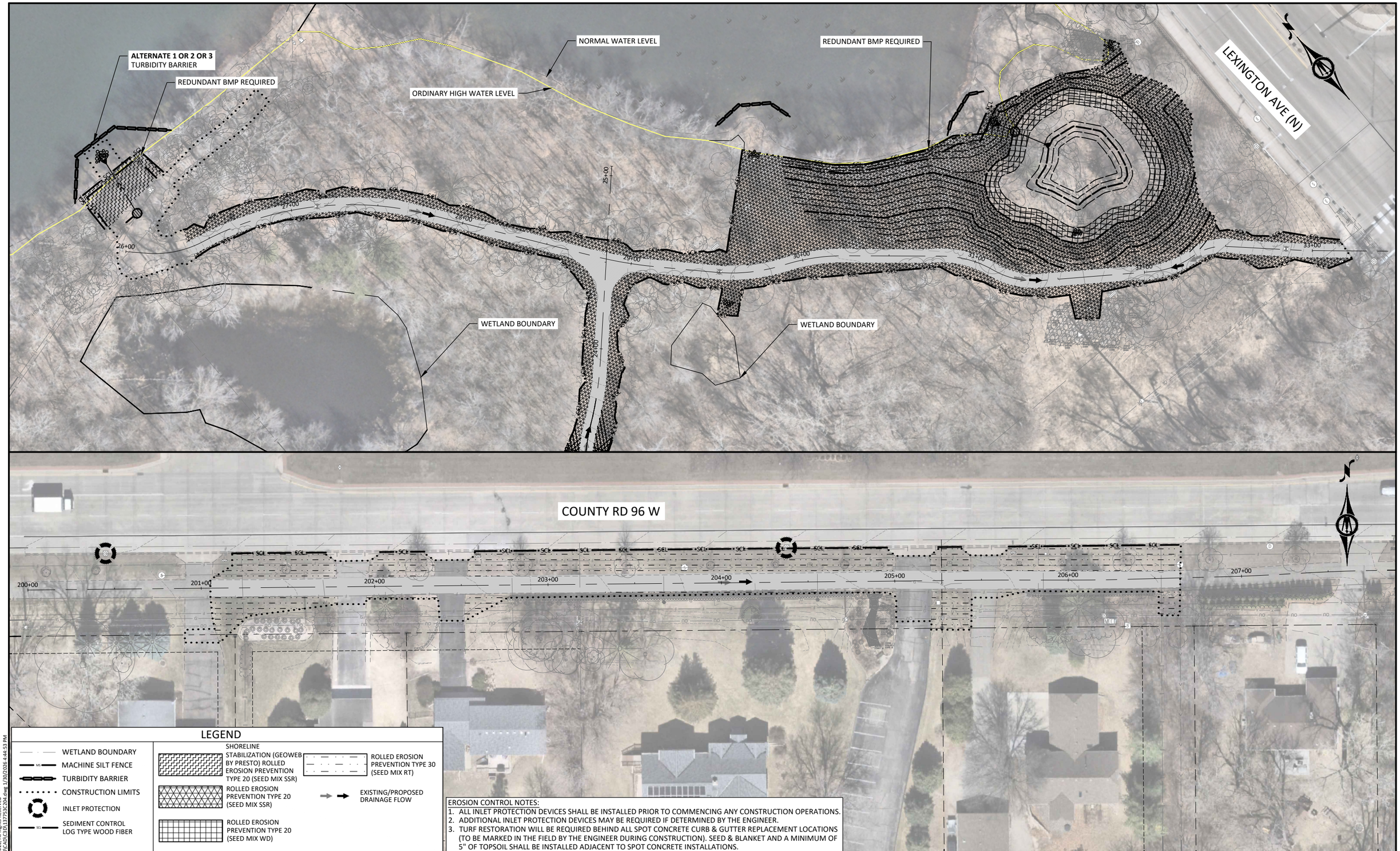
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
KARTH LAKE PARK TRAIL WEST

SHEET C2.12



LEGEND

- WETLAND BOUNDARY
- MACHINE SILT FENCE (MS)
- TURBIDITY BARRIER
- CONSTRUCTION LIMITS
- INLET PROTECTION
- SEDIMENT CONTROL LOG TYPE WOOD FIBER (SCL)
- SHORELINE STABILIZATION (GEOWEB BY PRESTO) ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX SSR)
- ROLLED EROSION PREVENTION TYPE 20 (SEED MIX WD)
- ROLLED EROSION PREVENTION TYPE 30 (SEED MIX RT)
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
RESTORATION & EROSION CONTROL PLAN
KARTH LAKE PARK TRAIL NORTH & HWY 96 TRAIL

SHEET C2.13

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CONSTRUCTION NOTES:

1. CONTRACTOR IS RESPONSIBLE TO LOCATE AND VERIFY ALL EXISTING PRIVATE AND PUBLIC UTILITIES PRIOR TO BEGINNING WORK.
2. PROPOSED CONDITIONS CONTOURS IN PLAN INDICATE FINISHED GRADE OF RIP RAP, WHERE APPLICABLE.
3. PROTECT ALL CULVERT ENDS DURING DRAWDOWN OPERATION AND CONSTRUCTION.
4. PROTECT ALL TREES NOT SPECIFIED FOR REMOVAL.
5. PLACE NONWOVEN GEOTEXTILE FABRIC BELOW RIP RAP, AS INDICATED IN THE DETAIL (INCIDENTAL).
6. ALL STOCKPILING MUST TAKE PLACE WITHIN THE EXCAVATED POND FOOTPRINT.
7. DREDGE ENTIRE POND (APPROX. 395 CY). EXACT LIMITS WILL BE DETERMINED BY OWNER AT TIME OF CONSTRUCTION.
8. CONTRACTOR SHALL COMPACT THE BOTTOM 6" OF SOIL, INSIDE OF THE NORMAL WATER LEVEL, TO THE MAXIMUM EXTENT POSSIBLE. COMPACTION TO BE APPROVED BY THE ENGINEER. POND BOTTOM COMPACTION SHALL BE CONSIDERED INCIDENTAL TO THE POND EXCAVATION.

CONSTRUCT EMERGENCY OVERFLOW (EOF), AS DETAILED

NORMAL WATER LEVEL

ORDINARY HIGH WATER LEVEL/WETLAND BOUNDARY

PROTECT CULVERT/APRON

937
938
939
940
939
938
937

936
935
934
933

POND 1
BOTTOM - ELEV. 933.00
HWL - ELEV. 939.75

LEXINGTON AVE (N)

D
E

LEGEND

952	EXISTING CONTOUR MINOR
950	EXISTING CONTOUR MAJOR
952	PROPOSED CONTOUR MINOR
950	PROPOSED CONTOUR MAJOR
	CONSTRUCTION LIMITS

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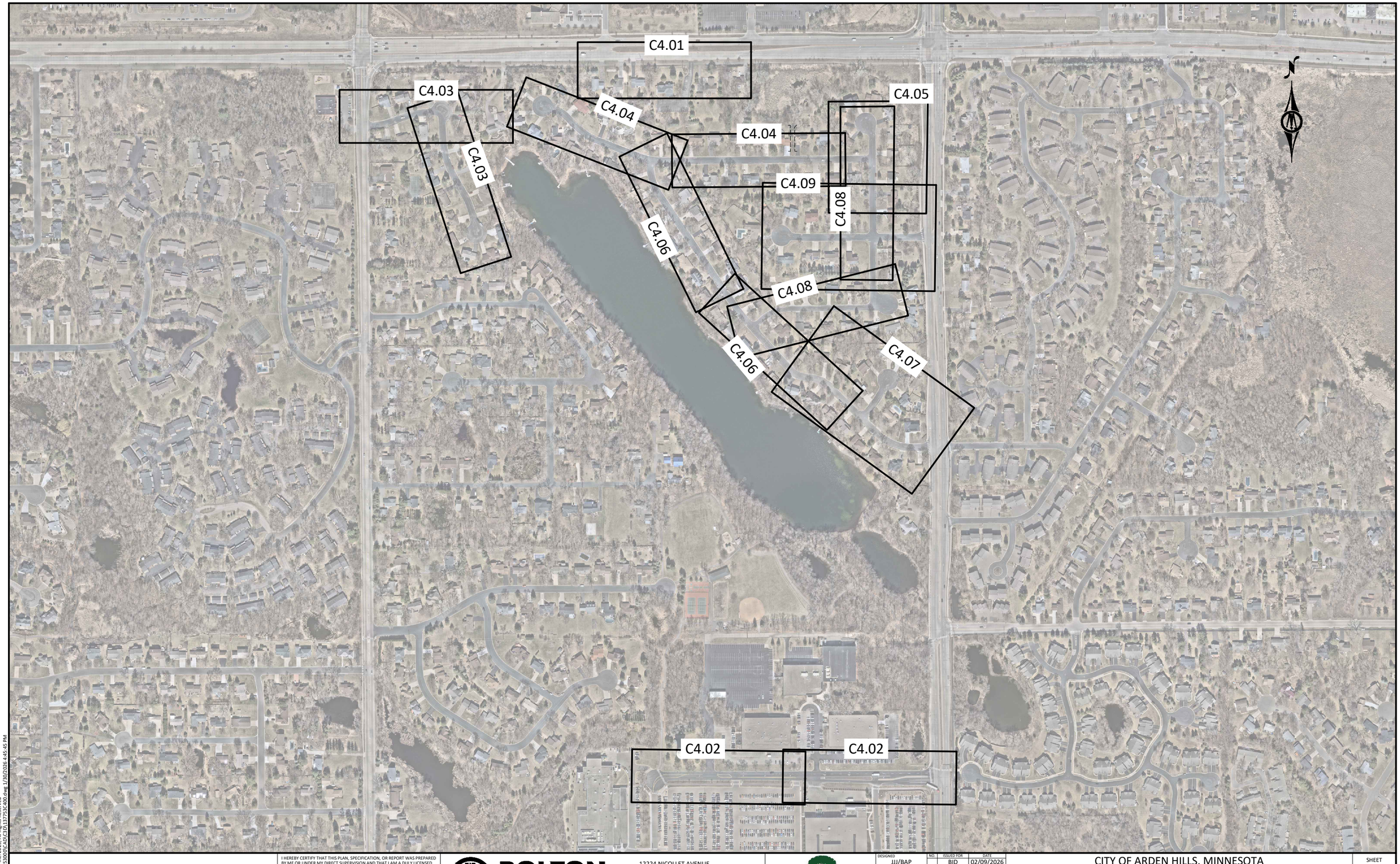
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
GRADING PLAN
POND BMP

SHEET C3.01

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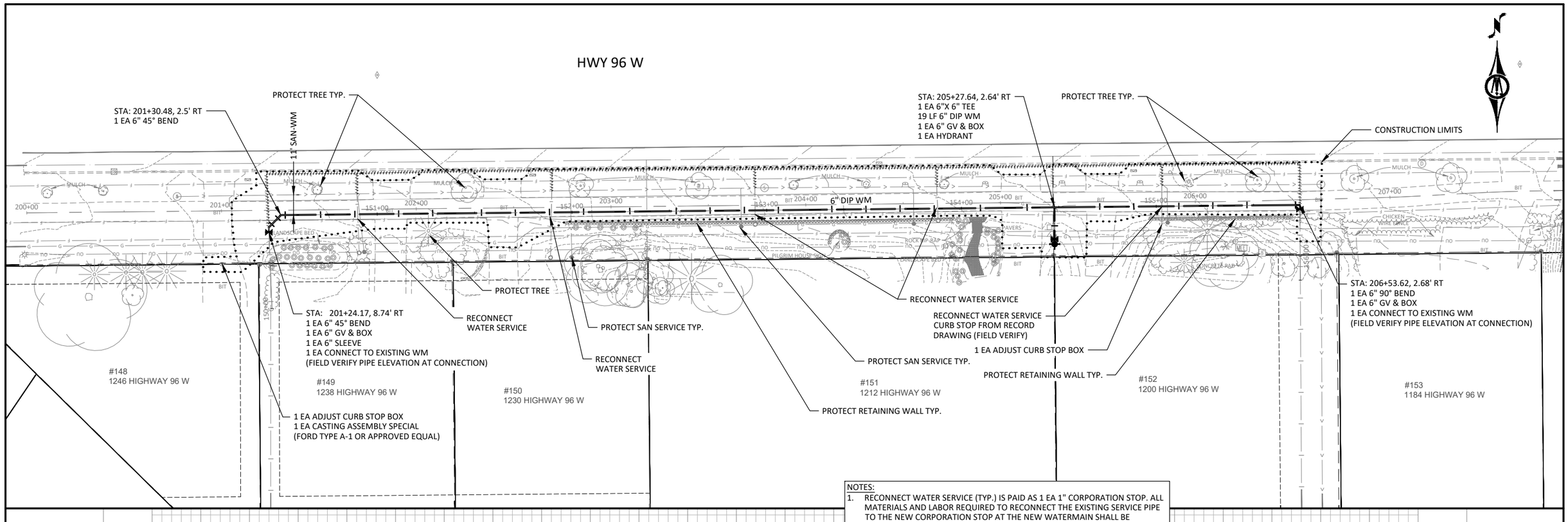
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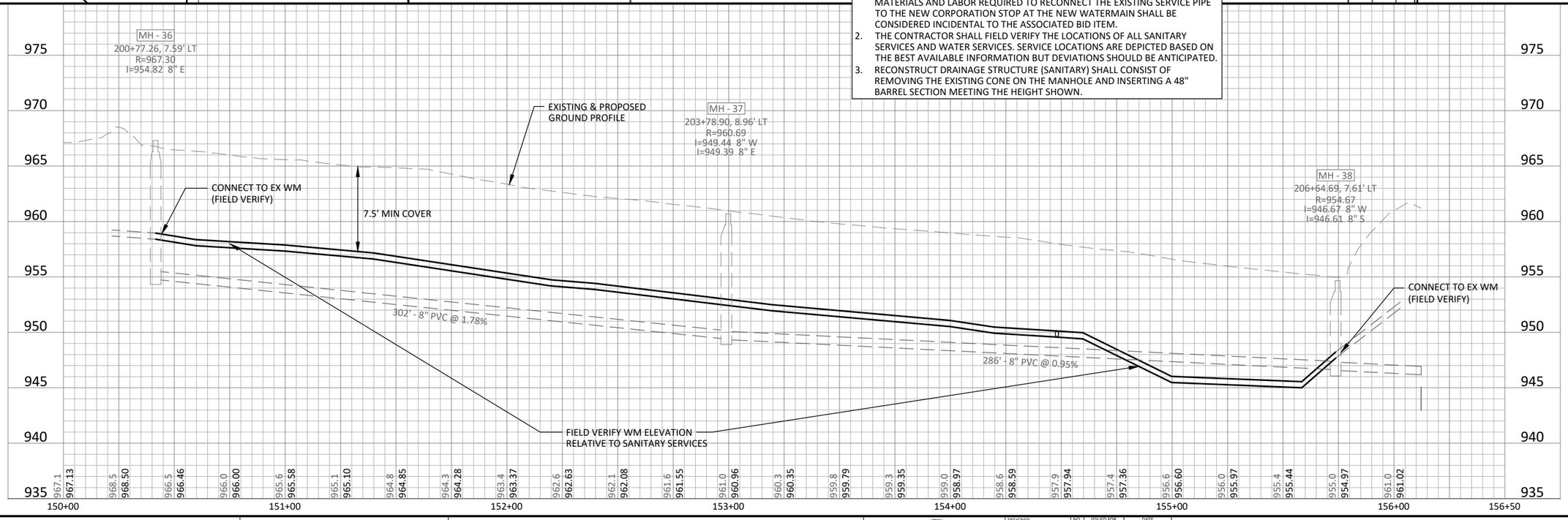
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN & PROFILE
SANITARY & WATER PLAN INDEX

SHEET
C4.00



NOTES:

1. RECONNECT WATER SERVICE (TYP.) IS PAID AS 1 EA 1" CORPORATION STOP. ALL MATERIALS AND LABOR REQUIRED TO RECONNECT THE EXISTING SERVICE PIPE TO THE NEW CORPORATION STOP AT THE NEW WATERMAIN SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED BID ITEM.
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3. RECONSTRUCT DRAINAGE STRUCTURE (SANITARY) SHALL CONSIST OF REMOVING THE EXISTING CONE ON THE MANHOLE AND INSERTING A 48" BARREL SECTION MEETING THE HEIGHT SHOWN.



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HORZ. SCALE 0 25 50 FEET
VERT. SCALE 0 5 10 FEET

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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www.bolton-menk.com

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	BID	02/09/2026

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN & PROFILE
HWY 96 W

SHEET
C4.01

NOTES:
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CUMMINGS PARK DR

PROTECT TRAFFIC LIGHT & FOUNDATION

CONSTRUCTION LIMITS (TYP.)

1 EA 6" GV & BOX
1 EA 8" GV & BOX
1 EA HYDRANT
1 EA 8" SLEEVE
1 EA 8" X 6" TEE
6 LF 8" DIP WM
24 LF 6" DIP WM
2 EA CONNECT TO EXISTING WM

#42
4265 LEXINGTON AVE N

CUMMINGS PARK DR

LEXINGTON AVE N (CSAH 51)

#156
3 BOSTON SCIENTIFIC DR

HORZ. SCALE 0 25 50 FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
CUMMINGS PARK DR

SHEET C4.02

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KARTH LAKE CIR

EXPLORATORY EXCAVATION TO LOCATE CURB STOP
(COORDINATE W/ PW STAFF)
1 EA ADJUST CURB STOP BOX
1 EA CASTING ASSEMBLY SPECIAL
(FORD TYPE A-1 OR APPROVED EQUAL)

EXPLORATORY EXCAVATION TO LOCATE CURB STOP
(COORDINATE W/ PW STAFF)
1 EA ADJUST CURB STOP BOX
1 EA CASTING ASSEMBLY SPECIAL
(FORD TYPE A-1 OR APPROVED EQUAL)

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA 8" GV & BOX
6 LF 8" DIP WM
1 EA 8" SLEEVE
2 EA CONNECT TO EXISTING WM

1 EA JOINT SEAL MANHOLE (SAN)

1 EA 6" GV & BOX
1 EA HYDRANT
16 LF 6" DIP WM
1 EA CONNECT TO EXISTING WM

CONSTRUCTION LIMITS (TYP.)

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1.5 LF RECONSTRUCT SANITARY MANHOLE

HAMLINE AVE N (CSAH 50)

KARTH LAKE CIR

#1 1337 KARTH LAKE CIR
#2 1331 KARTH LAKE CIR
#3 1325 KARTH LAKE CIR
#4 1321 KARTH LAKE CIR
#5 1317 KARTH LAKE CIR
#6 1313 KARTH LAKE CIR
#7 1307 KARTH LAKE CIR
#8 1301 KARTH LAKE CIR
#9 1295 KARTH LAKE CIR
#10 1289 KARTH LAKE CIR
#11 1285 KARTH LAKE CIR
#12 1281 KARTH LAKE CIR
#13 1280 KARTH LAKE CIR
#19 1326 KARTH LAKE CIR
#20 1332 KARTH LAKE CIR
#22 1280 HIGHWAY 96 W

NOTES:
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
KARTH LAKE CIR

SHEET C4.03

1.5 LF RECONSTRUCT SANITARY MANHOLE

1 EA ADJUST CURB STOP BOX

EXPLORATORY EXCAVATION TO LOCATE CURB STOP (COORDINATE W/ PW STAFF)
1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

EXPLORATORY EXCAVATION TO LOCATE CURB STOP (COORDINATE W/ PW STAFF)
1 EA ADJUST CURB STOP BOX

1 EA CURB STOP BOX

8" CIPP SHORT LINER (SAN)
REVIEW TELEVISING (ROOTS)

1 EA ADJUST CURB STOP BOX

CONSTRUCTION LIMITS (TYP.)

1 EA ADJUST CURB STOP BOX

1 LF RECONSTRUCT SANITARY MANHOLE

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 LF RECONSTRUCT SANITARY MANHOLE

1 EA 6" GV & BOX
1 EA HYDRANT
16 LF 6" DIP WM
1 EA CONNECT TO EXISTING WM

1 EA 8" GV & BOX
6 LF 8" DIP WM
1 EA 8" SLEEVE
2 EA CONNECT TO EXISTING WM

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

NOTES:
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KARTH LAKE DR

HORZ. SCALE 0 25 50 FEET

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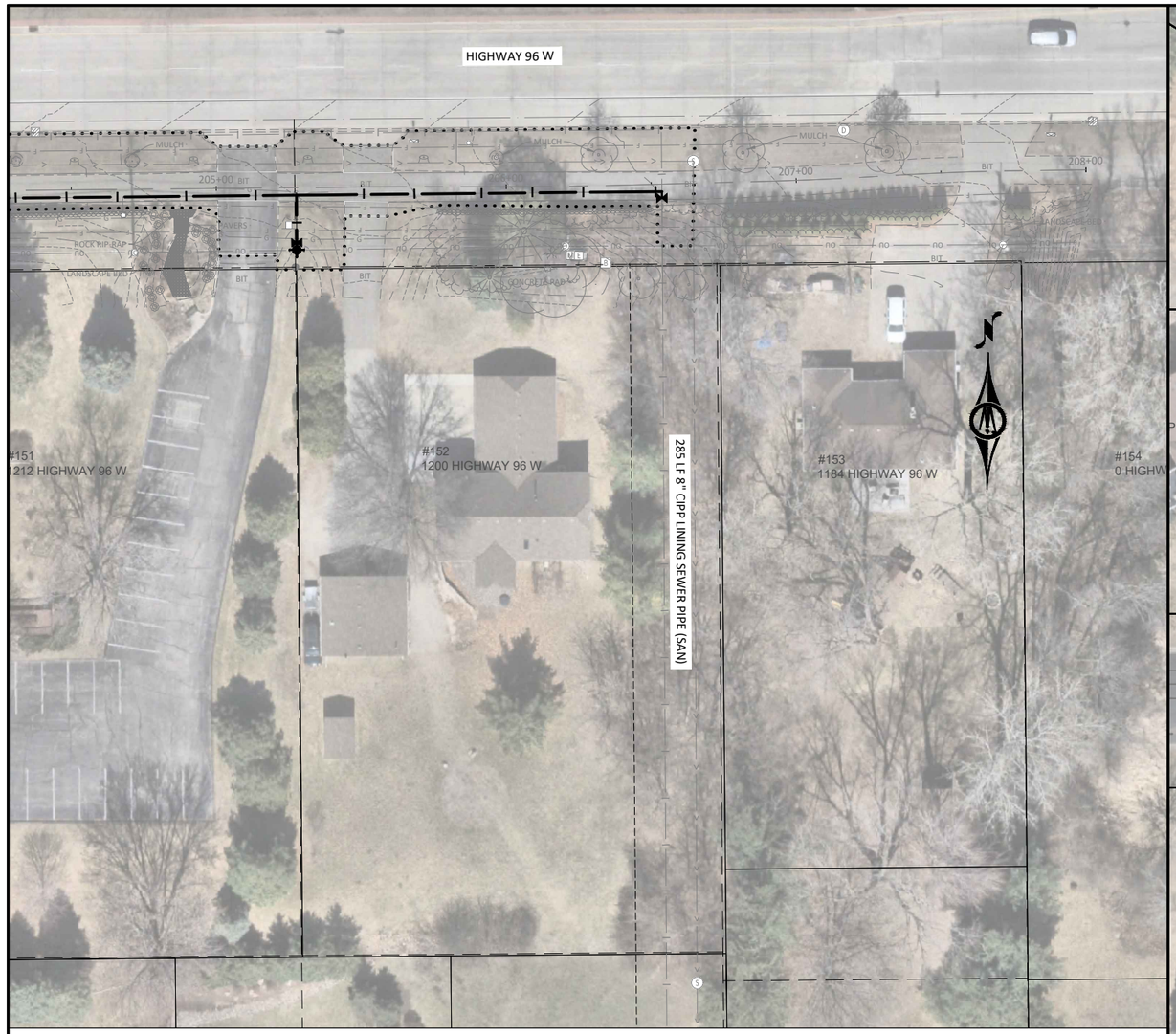
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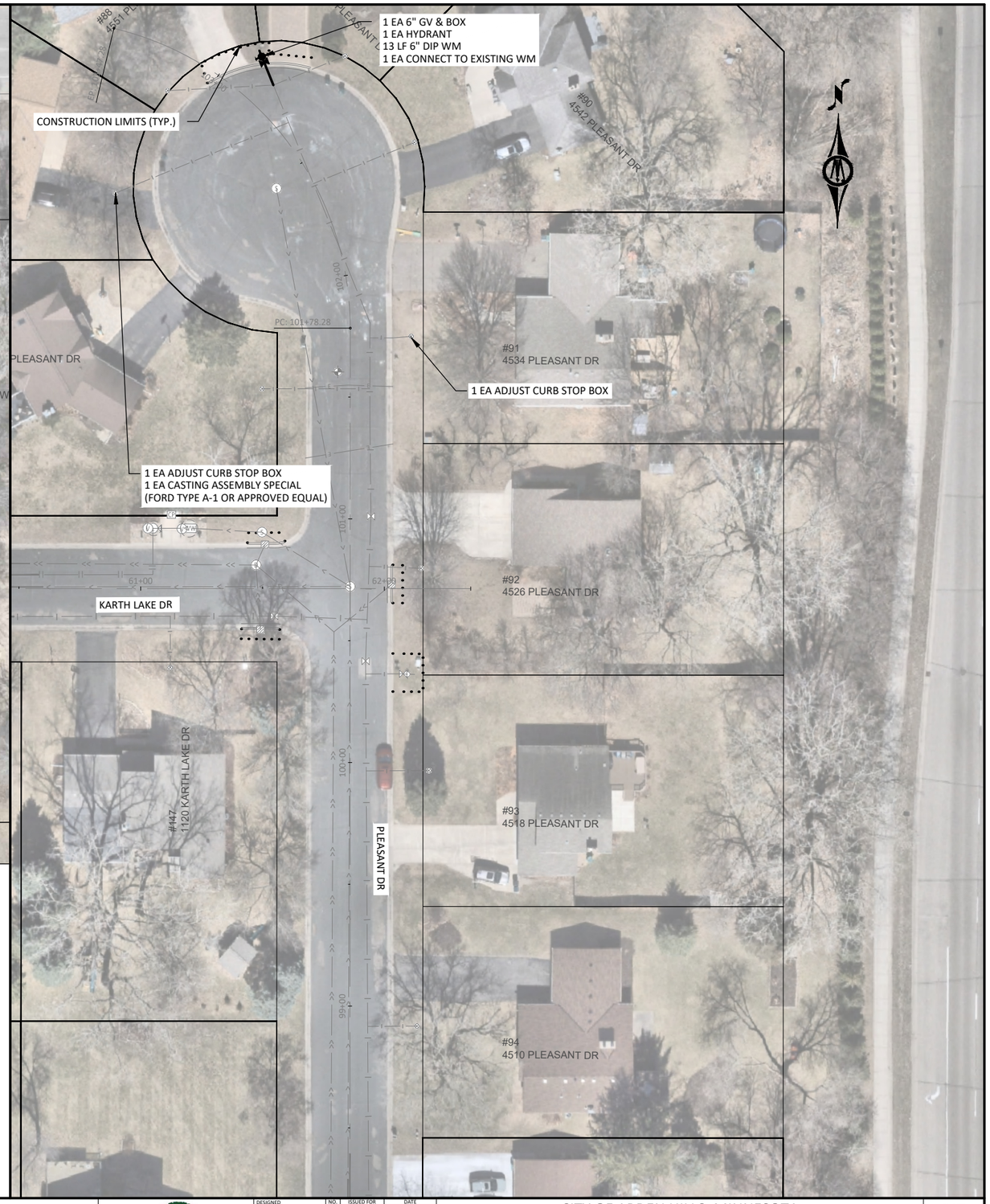
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
KARTH LAKE DR

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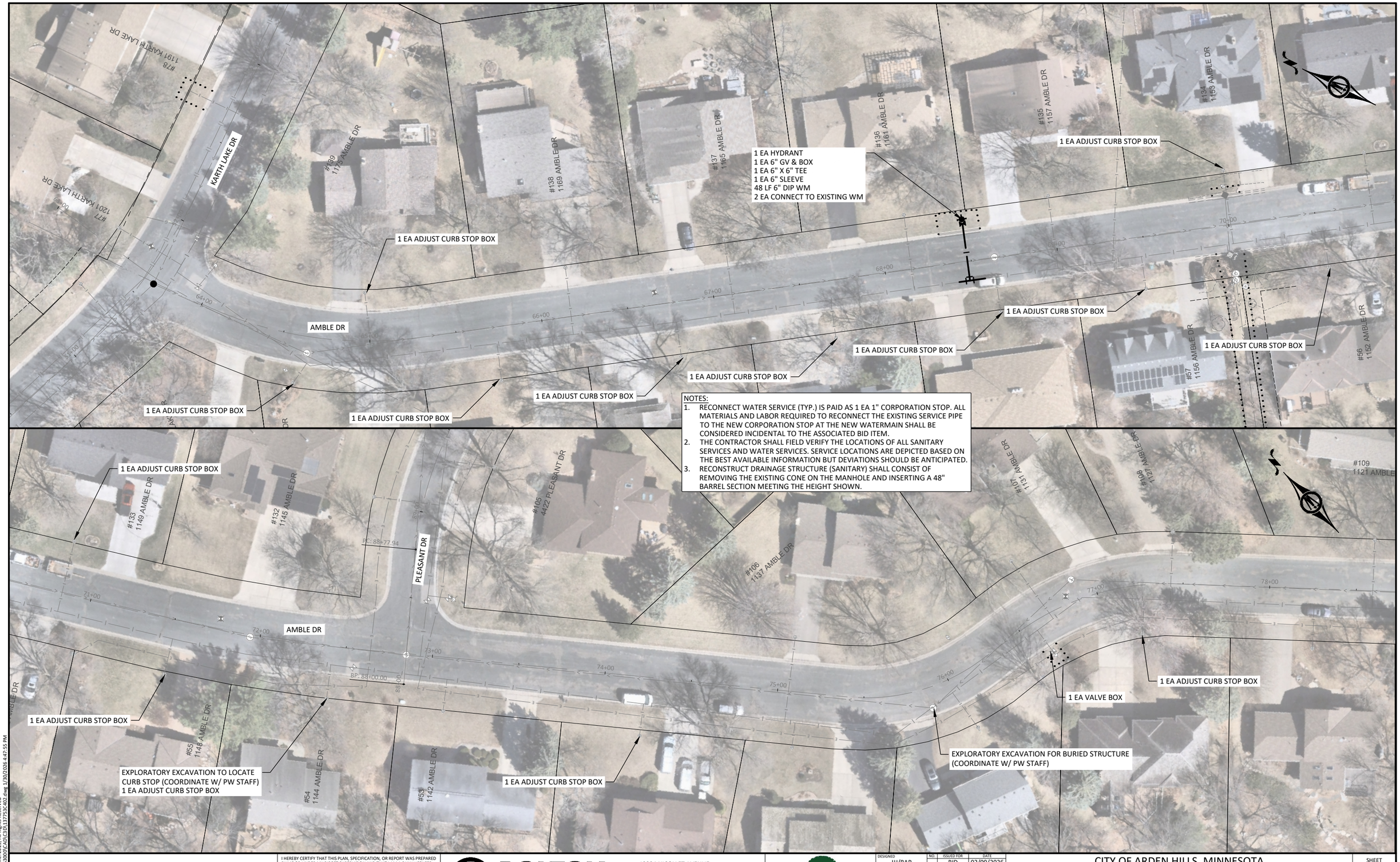
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
KARTH LAKE DR & PLEASANT DR

SHEET C4.05



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HORZ. SCALE: 0 25 50 FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
AMBLE DR

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1 EA 6" GV & BOX
1 EA HYDRANT
14 LF 6" DIP WM
1 EA CONNECT TO EXISTING WM

PROTECT WATER SERVICE (APPROXIMATE LOCATION). FIELD VERIFY LOCATION AND ELEVATION.

1 EA 8" X 6" TEE
12 LF 6" DIP WM
12 LF 8" DIP WM
1 EA 8" SLEEVE
1 EA 8" GV & BOX
1 EA 6" GV & BOX
1 EA HYDRANT
2 EA CONNECT TO EXISTING WM

1 EA ADJUST CURB STOP BOX

1 EA 6" GV & BOX
6 LF 6" DIP WM
1 EA 6" SLEEVE
2 EA CONNECT TO EXISTING WM

1 EA ADJUST CURB STOP BOX

1 LF RECONSTRUCT SANITARY MANHOLE

1 EA ADJUST CURB STOP BOX
1 EA CASTING ASSEMBLY SPECIAL
(FORD TYPE A-1 OR APPROVED EQUAL)

1 EA ADJUST VALVE BOX
(STRAIGHTEN STANDPIPE)

1 EA ADJUST CURB STOP BOX

1 EA 8" GV & BOX
6 LF 8" DIP WM
1 EA 8" SLEEVE
2 EA CONNECT TO EXISTING WM

PROTECT PRIVATE LANDSCAPING

CONSTRUCTION LIMITS (TYP.)

#111 4419 AMBLE CIR
#110 4415 AMBLE CIR
#114 4408 AMBLE CIR
#113 4414 AMBLE CIR
#107 1131 AMBLE DR
#108 1127 AMBLE DR
#109 1121 AMBLE DR
#116 1113 AMBLE DR
#115 1105 AMBLE DR
#49 1128 AMBLE DR
#48 1124 AMBLE DR
#47 1120 AMBLE DR
#46 1116 AMBLE DR
#45 1112 AMBLE DR
#44 1108 AMBLE DR
#43 1104 AMBLE DR
AMBLE DR
AMBLE CIR
LEXINGTON AVE N (CSAH 51)

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
AMBLE DR & AMBLE CIR

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1 EA SANITARY SEWER SPOT REPAIR
(INCLUDES NEW PVC WYE, RECONNECTION TO SANITARY SEWER MAIN AND RECONNECTION TO SERVICE PIPE)

1.5 LF RECONSTRUCT SANITARY MANHOLE

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

EXPLORATORY EXCAVATION TO LOCATE CURB STOP (COORDINATE W/ PW STAFF)
1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 LF RECONSTRUCT SANITARY MANHOLE

1 EA ADJUST CURB STOP BOX

1 EA ADJUST VALVE BOX
(STRAIGHTEN STANDPIPE)

NOTES:
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PLEASANT DR

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SANITARY & WATER PLAN
PLEASANT DR

SHEET C4.08

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1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX

1 EA ADJUST CURB STOP BOX
1 EA CASTING ASSEMBLY SPECIAL
(FORD TYPE A-1 OR APPROVED EQUAL)

1 EA ADJUST CURB STOP BOX

#94
4510 PLEASANT DR

#95
4500 PLEASANT DR

#96
4480 PLEASANT DR

#97
4472 PLEASANT DR

#131
PLEASANT DR

#124
1150 PLEASANT CIR

#125
1140 PLEASANT CIR

#126
1130 PLEASANT CIR

#127
1120 PLEASANT CIR

#120
1149 PLEASANT CIR

#119
1139 PLEASANT CIR

#118
1129 PLEASANT CIR

#117
1119 PLEASANT CIR

PLEASANT CIR

PLEASANT DR

LEXINGTON AVE N (CSAH 51)

104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00

99+00 98+00 97+00 96+00 95+00

HORZ. 0 25 50
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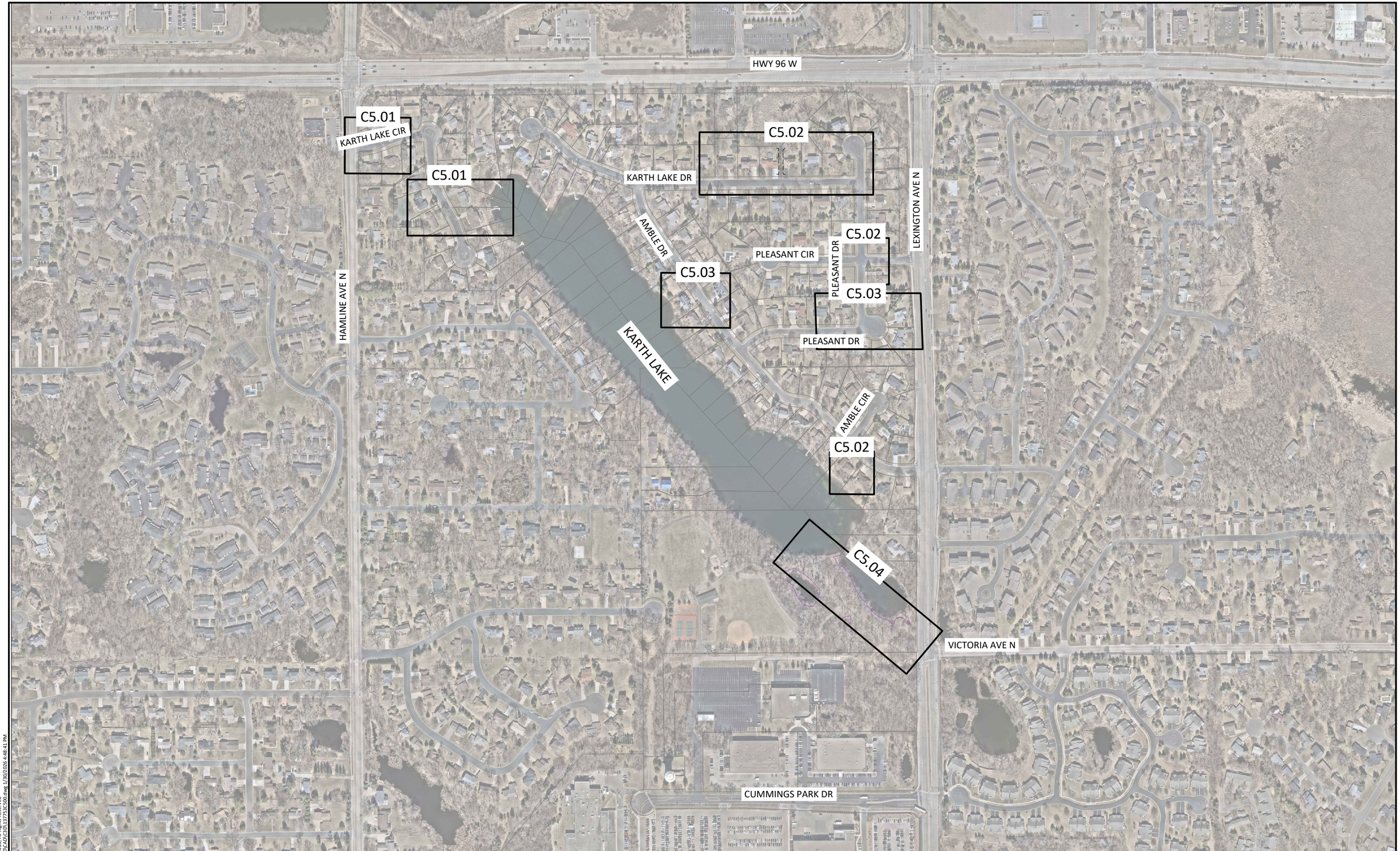
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CITY OF ARDEN HILLS, MINNESOTA
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LIC. NO. 56595 DATE 02/09/2026

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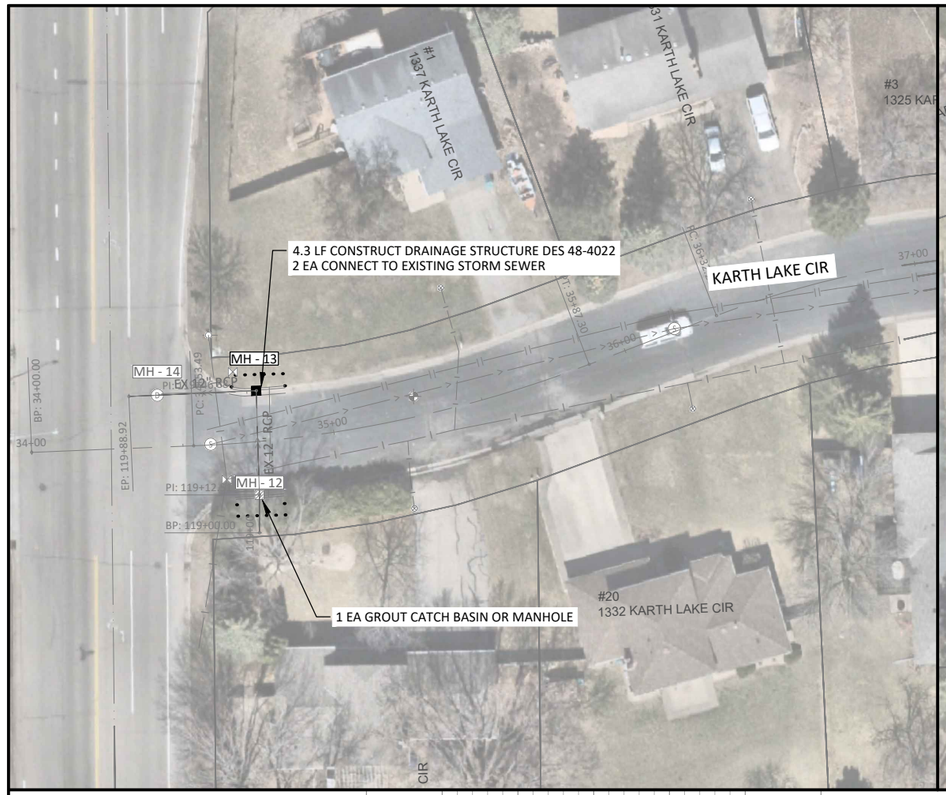
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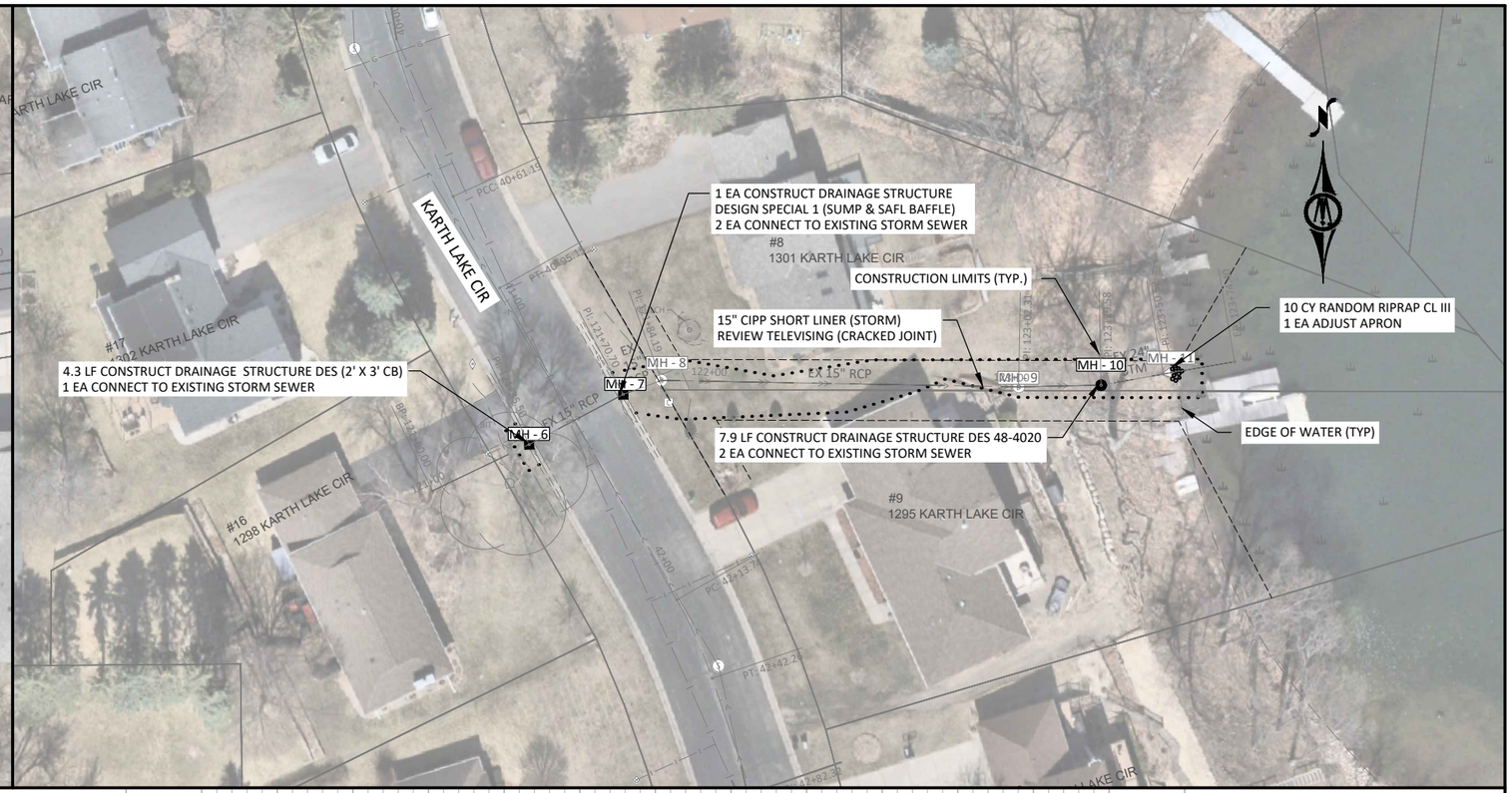
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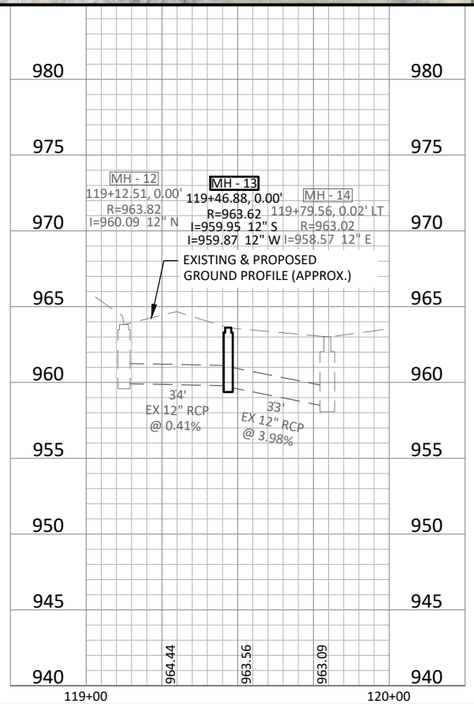
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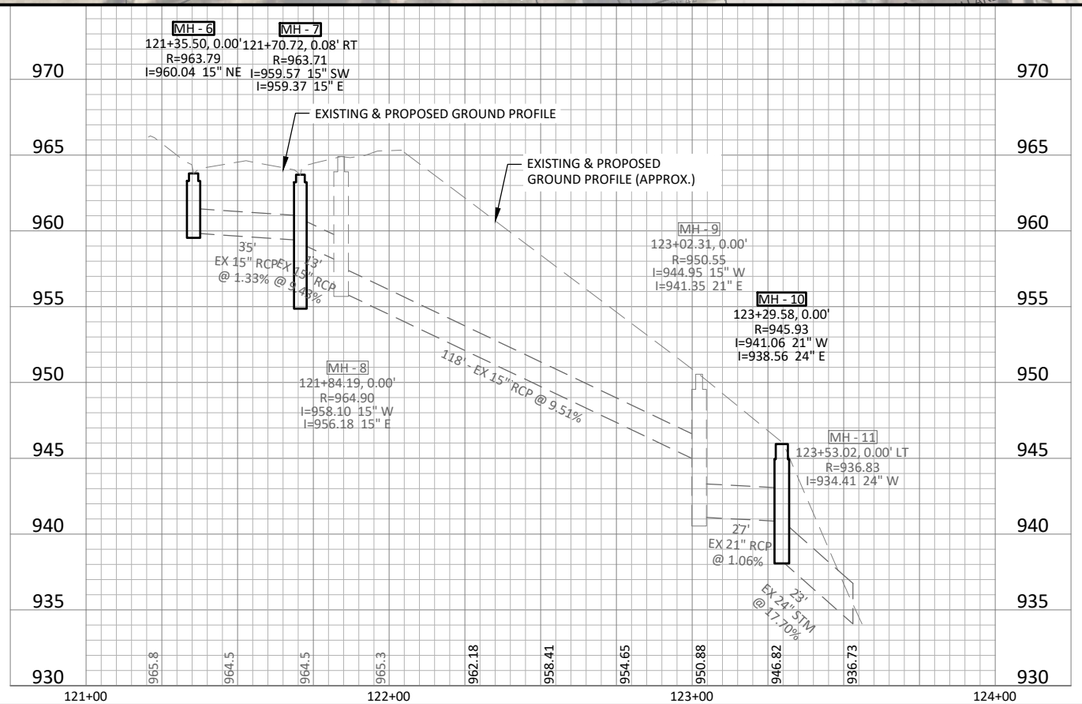
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORM SEWER PLAN & PROFILE
STORM SEWER PLAN INDEX

SHEET C5.00









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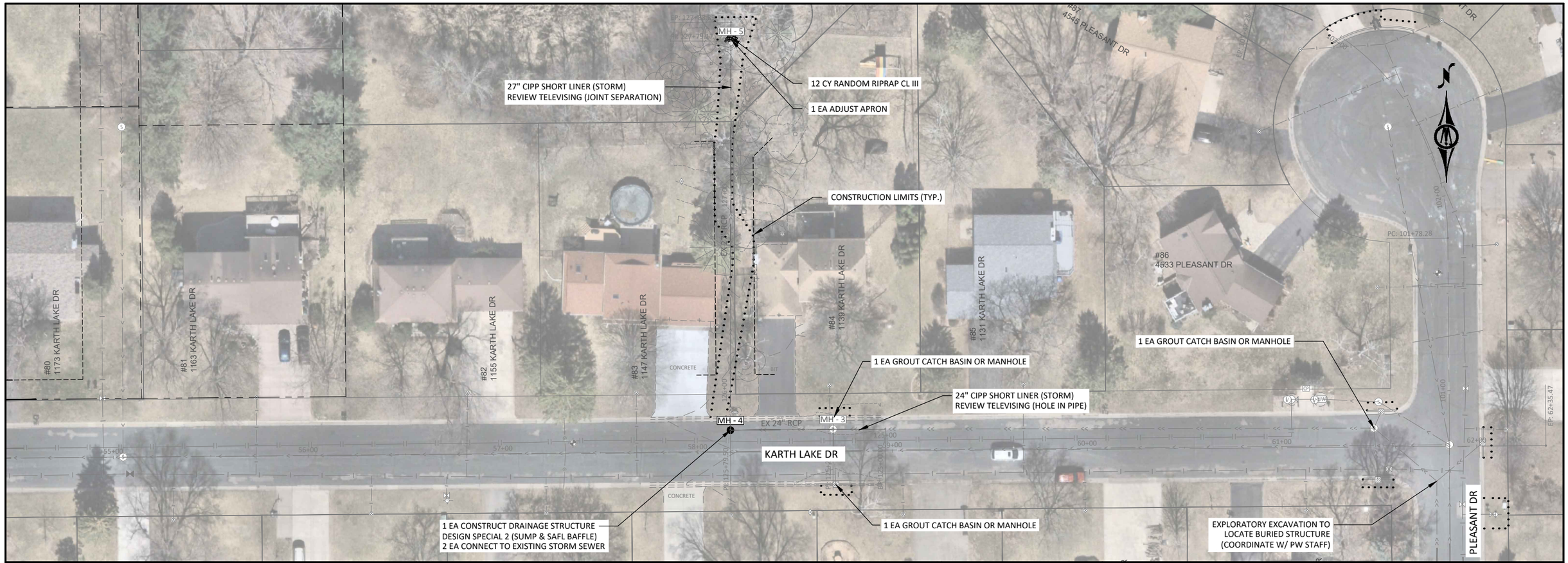
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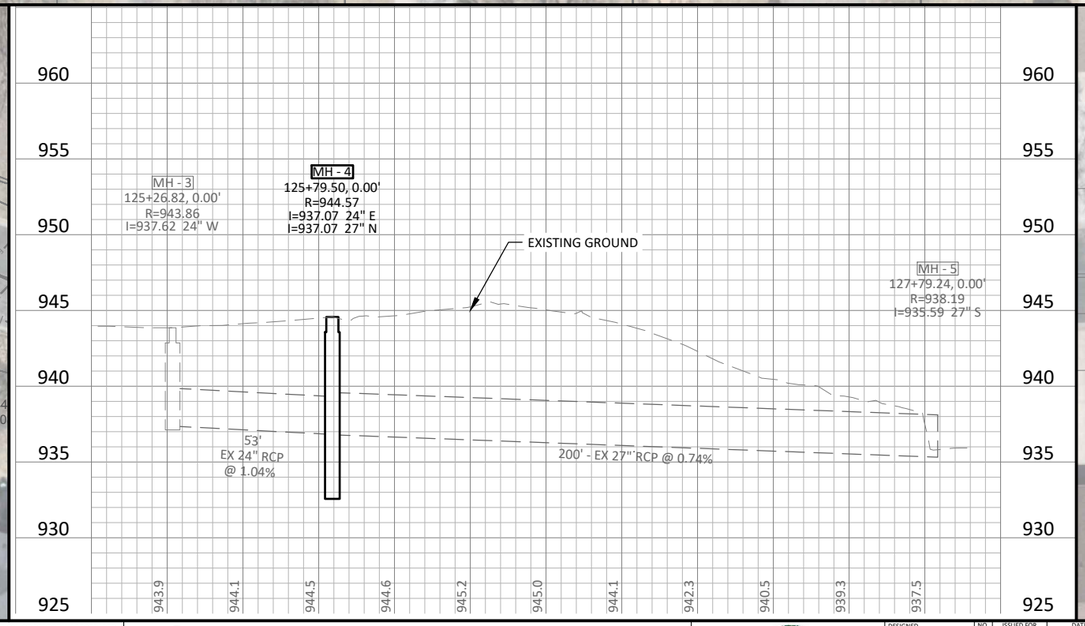
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2026 PMP STREET & UTILITY IMPROVEMENTS
STORM SEWER PLAN & PROFILE

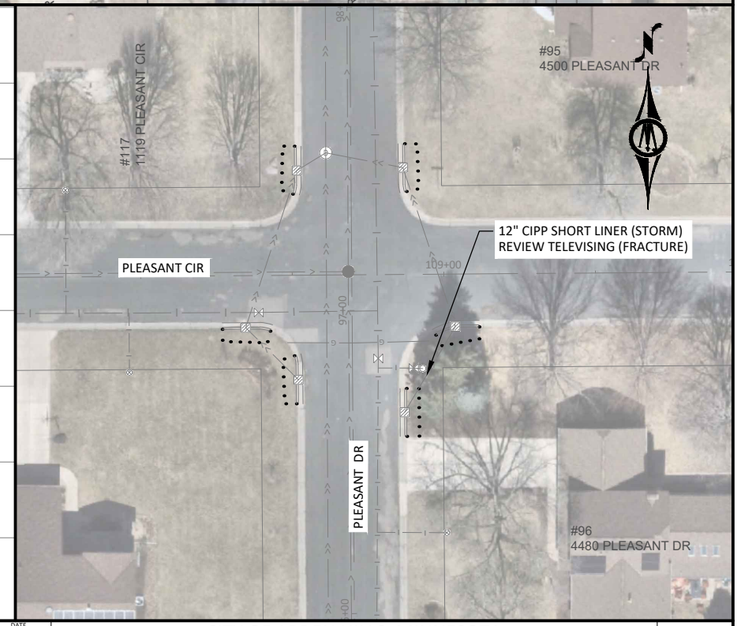
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VERT. SCALE 0 5 10 FEET

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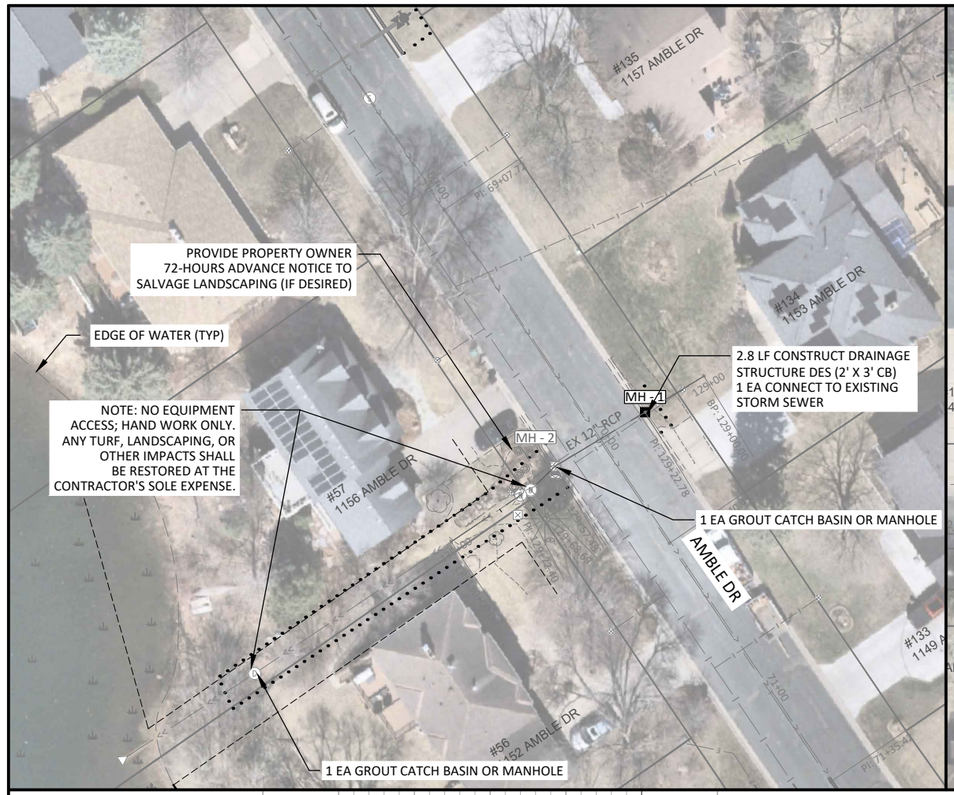
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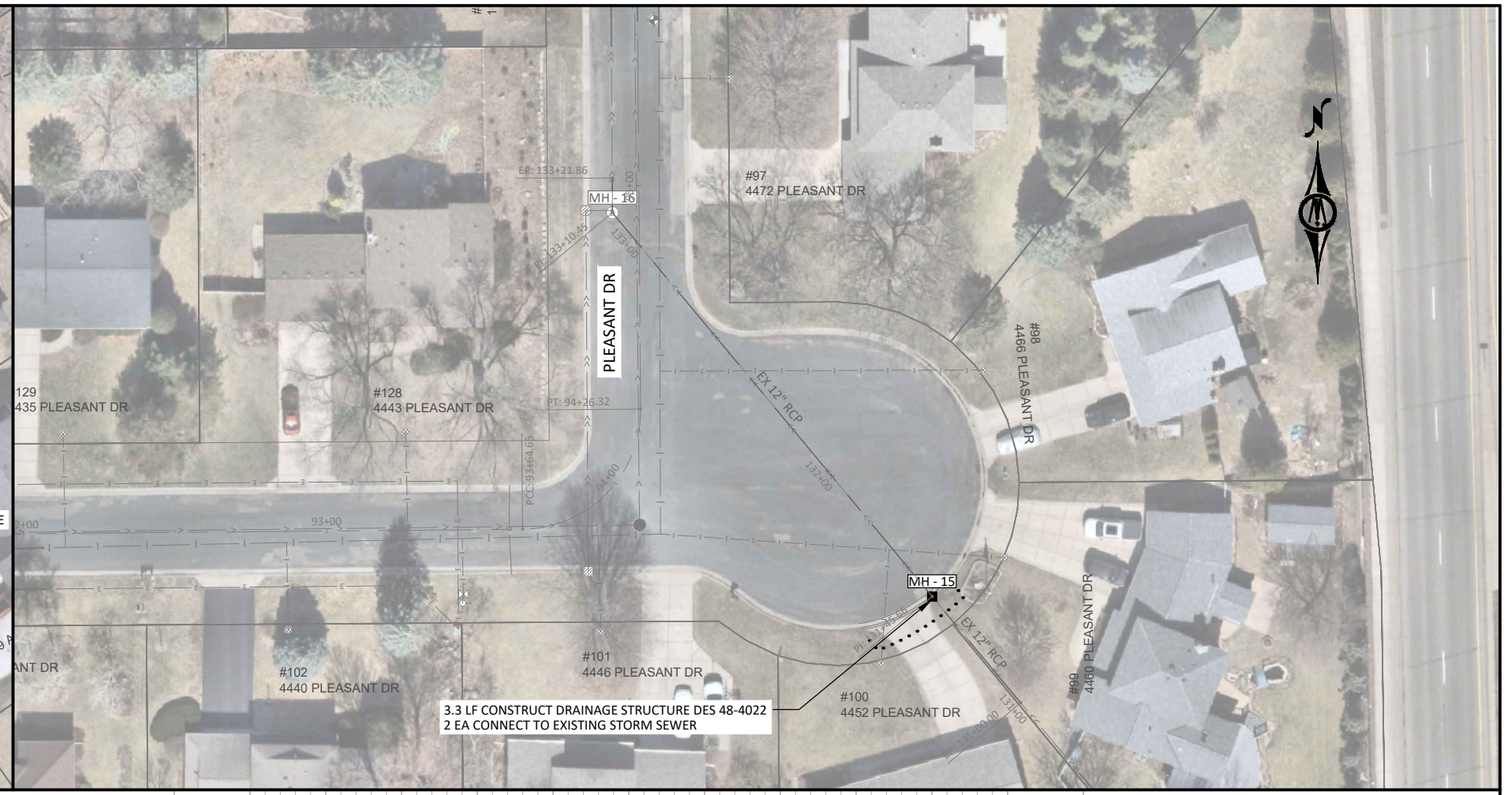
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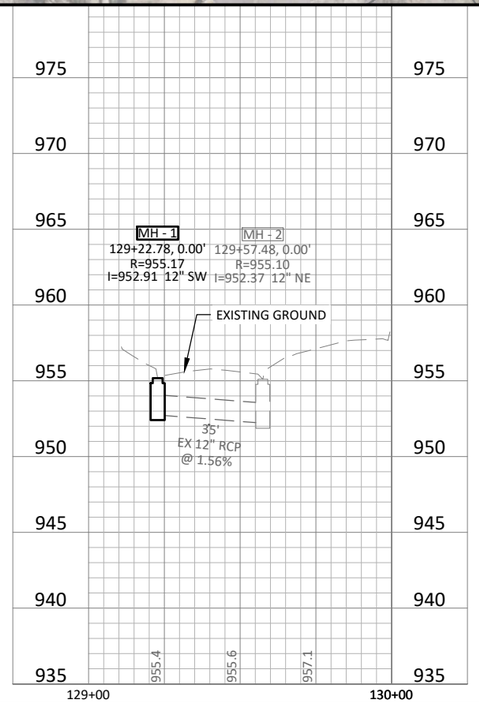
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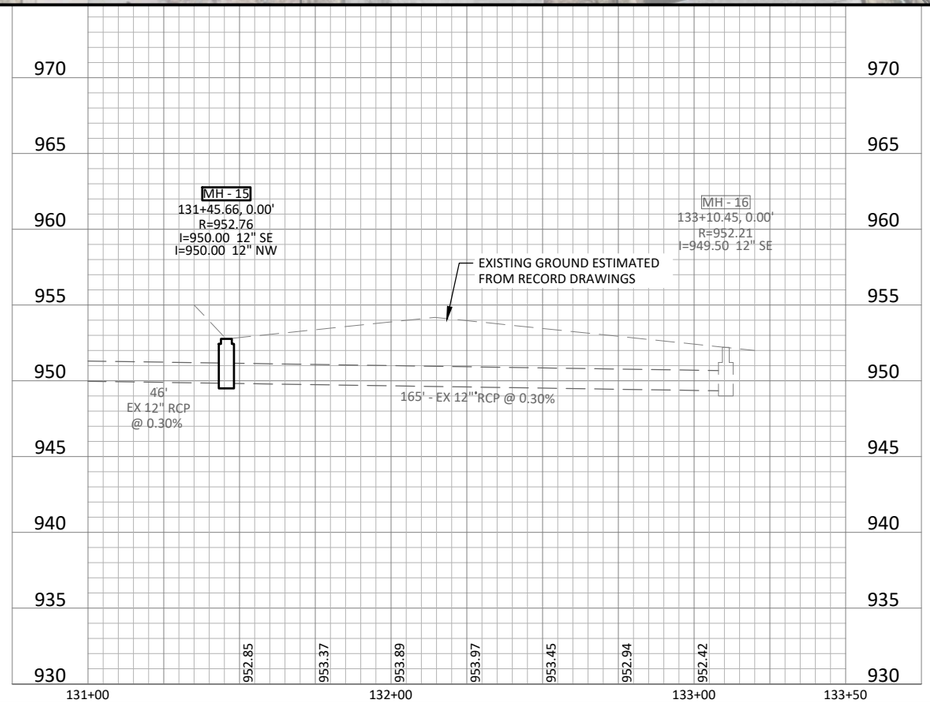
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORM SEWER PLAN & PROFILE

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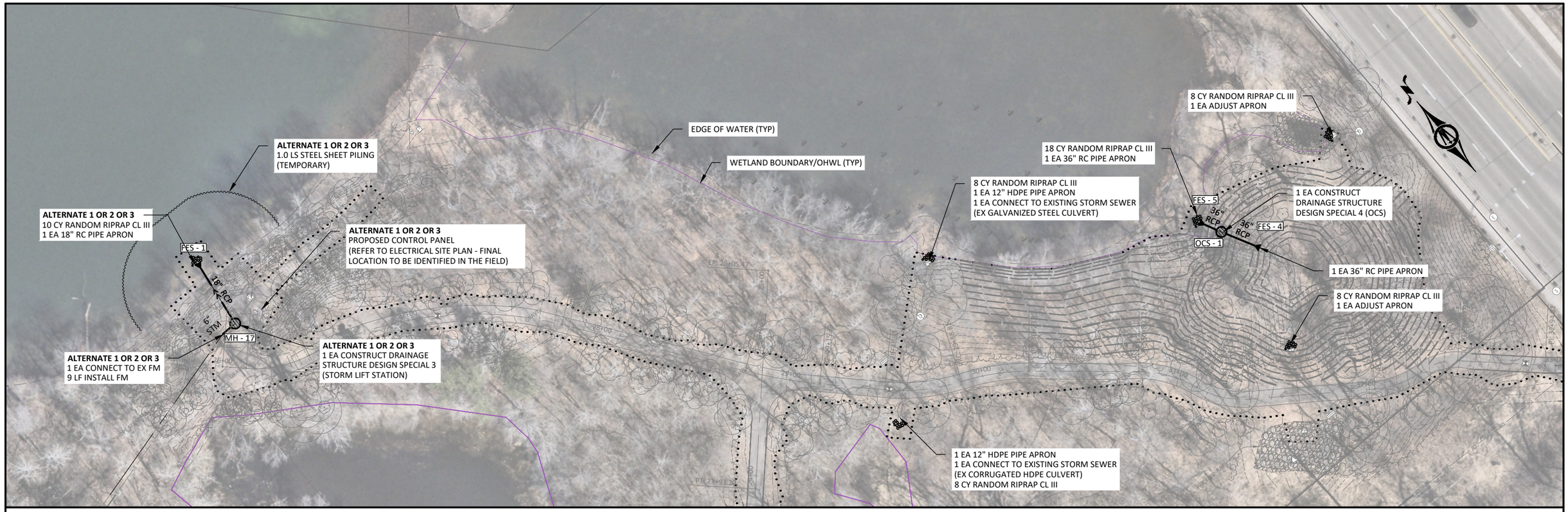
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STORM SEWER PLAN & PROFILE

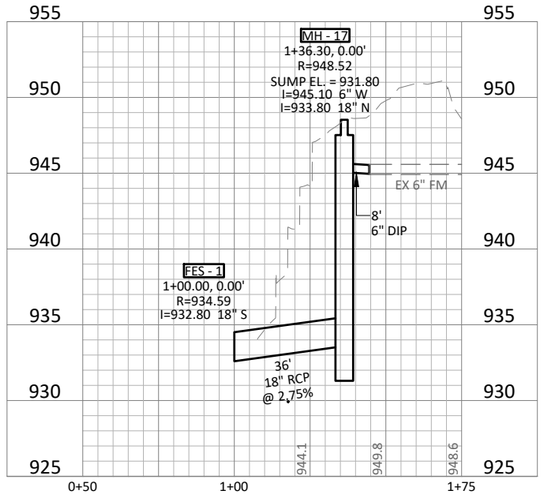
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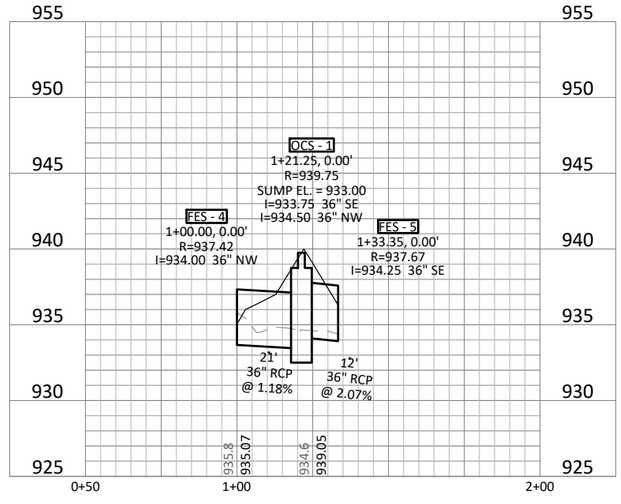


ALTERNATE 1 OR 2 OR 3

ALIGNMENT: STORMWATER POND
PROFILE VIEW: PV-STORMWATER POND
DRAWING SCALE: 25
VERTICAL SCALE: 5



ALIGNMENT: Alignment - 3
PROFILE VIEW: PV-ALIGNMENT
DRAWING SCALE: 25
VERTICAL SCALE: 5



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VERT. 0 5 10 SCALE FEET

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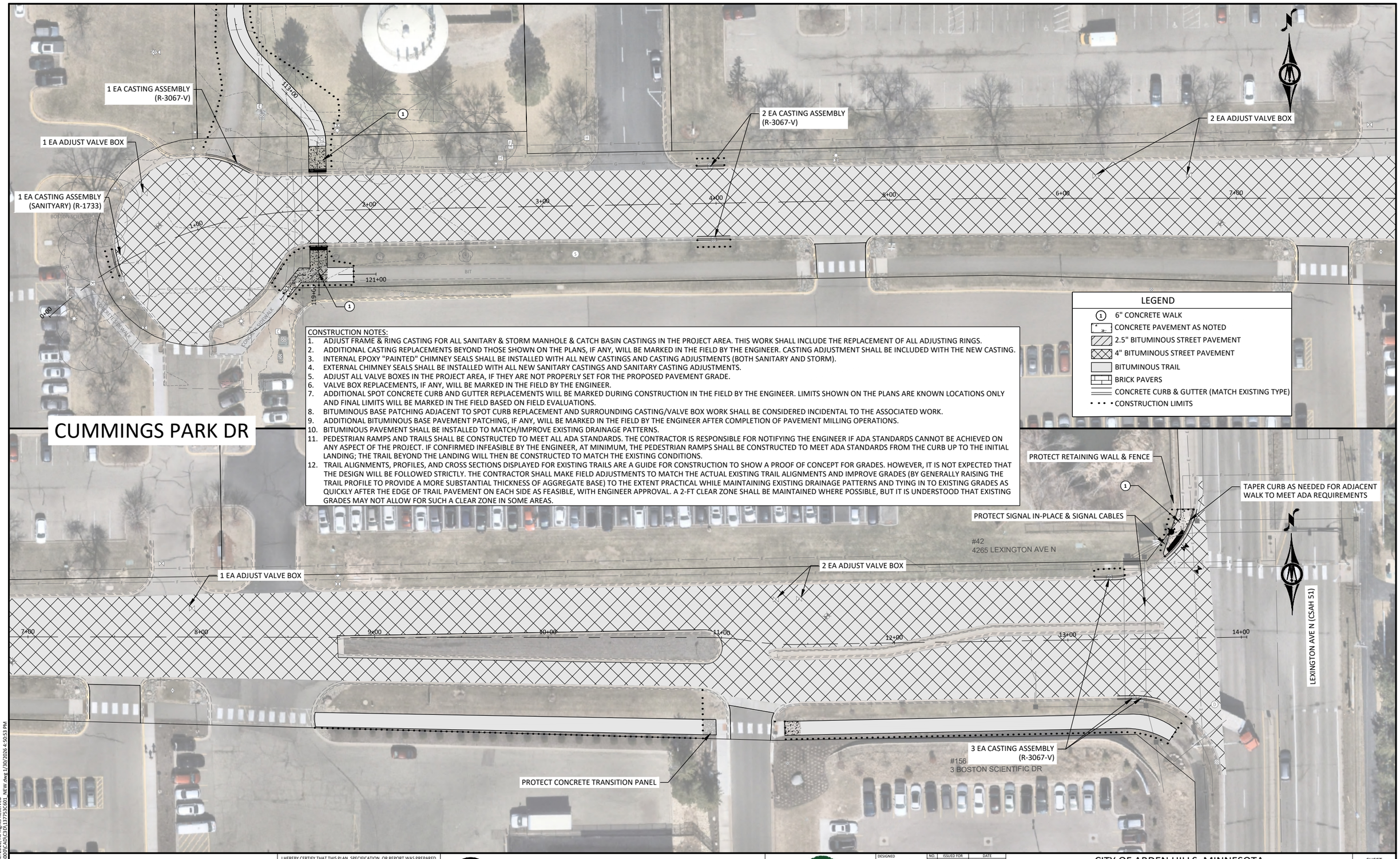
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STORM SEWER PLAN & PROFILE

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CONSTRUCTION NOTES:

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2. ADDITIONAL CASTING REPLACEMENTS BEYOND THOSE SHOWN ON THE PLANS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER. CASTING ADJUSTMENT SHALL BE INCLUDED WITH THE NEW CASTING.
3. INTERNAL EPOXY "PAINTED" CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW CASTINGS AND CASTING ADJUSTMENTS (BOTH SANITARY AND STORM).
4. EXTERNAL CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW SANITARY CASTINGS AND SANITARY CASTING ADJUSTMENTS.
5. ADJUST ALL VALVE BOXES IN THE PROJECT AREA, IF THEY ARE NOT PROPERLY SET FOR THE PROPOSED PAVEMENT GRADE.
6. VALVE BOX REPLACEMENTS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER.
7. ADDITIONAL SPOT CONCRETE CURB AND GUTTER REPLACEMENTS WILL BE MARKED DURING CONSTRUCTION IN THE FIELD BY THE ENGINEER. LIMITS SHOWN ON THE PLANS ARE KNOWN LOCATIONS ONLY AND FINAL LIMITS WILL BE MARKED IN THE FIELD BASED ON FIELD EVALUATIONS.
8. BITUMINOUS BASE PATCHING ADJACENT TO SPOT CURB REPLACEMENT AND SURROUNDING CASTING/VALVE BOX WORK SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED WORK.
9. ADDITIONAL BITUMINOUS BASE PAVEMENT PATCHING, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER AFTER COMPLETION OF PAVEMENT MILLING OPERATIONS.
10. BITUMINOUS PAVEMENT SHALL BE INSTALLED TO MATCH/IMPROVE EXISTING DRAINAGE PATTERNS.
11. PEDESTRIAN RAMPS AND TRAILS SHALL BE CONSTRUCTED TO MEET ALL ADA STANDARDS. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE ENGINEER IF ADA STANDARDS CANNOT BE ACHIEVED ON ANY ASPECT OF THE PROJECT. IF CONFIRMED INFEASIBLE BY THE ENGINEER, AT MINIMUM, THE PEDESTRIAN RAMPS SHALL BE CONSTRUCTED TO MEET ADA STANDARDS FROM THE CURB UP TO THE INITIAL LANDING; THE TRAIL BEYOND THE LANDING WILL THEN BE CONSTRUCTED TO MATCH THE EXISTING CONDITIONS.
12. TRAIL ALIGNMENTS, PROFILES, AND CROSS SECTIONS DISPLAYED FOR EXISTING TRAILS ARE A GUIDE FOR CONSTRUCTION TO SHOW A PROOF OF CONCEPT FOR GRADES. HOWEVER, IT IS NOT EXPECTED THAT THE DESIGN WILL BE FOLLOWED STRICTLY. THE CONTRACTOR SHALL MAKE FIELD ADJUSTMENTS TO MATCH THE ACTUAL EXISTING TRAIL ALIGNMENTS AND IMPROVE GRADES (BY GENERALLY RAISING THE TRAIL PROFILE TO PROVIDE A MORE SUBSTANTIAL THICKNESS OF AGGREGATE BASE) TO THE EXTENT PRACTICAL WHILE MAINTAINING EXISTING DRAINAGE PATTERNS AND TYING IN TO EXISTING GRADES AS QUICKLY AFTER THE EDGE OF TRAIL PAVEMENT ON EACH SIDE AS FEASIBLE, WITH ENGINEER APPROVAL. A 2-FT CLEAR ZONE SHALL BE MAINTAINED WHERE POSSIBLE, BUT IT IS UNDERSTOOD THAT EXISTING GRADES MAY NOT ALLOW FOR SUCH A CLEAR ZONE IN SOME AREAS.

LEGEND

- 1 — 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

HORZ. SCALE 0 25 50 FEET

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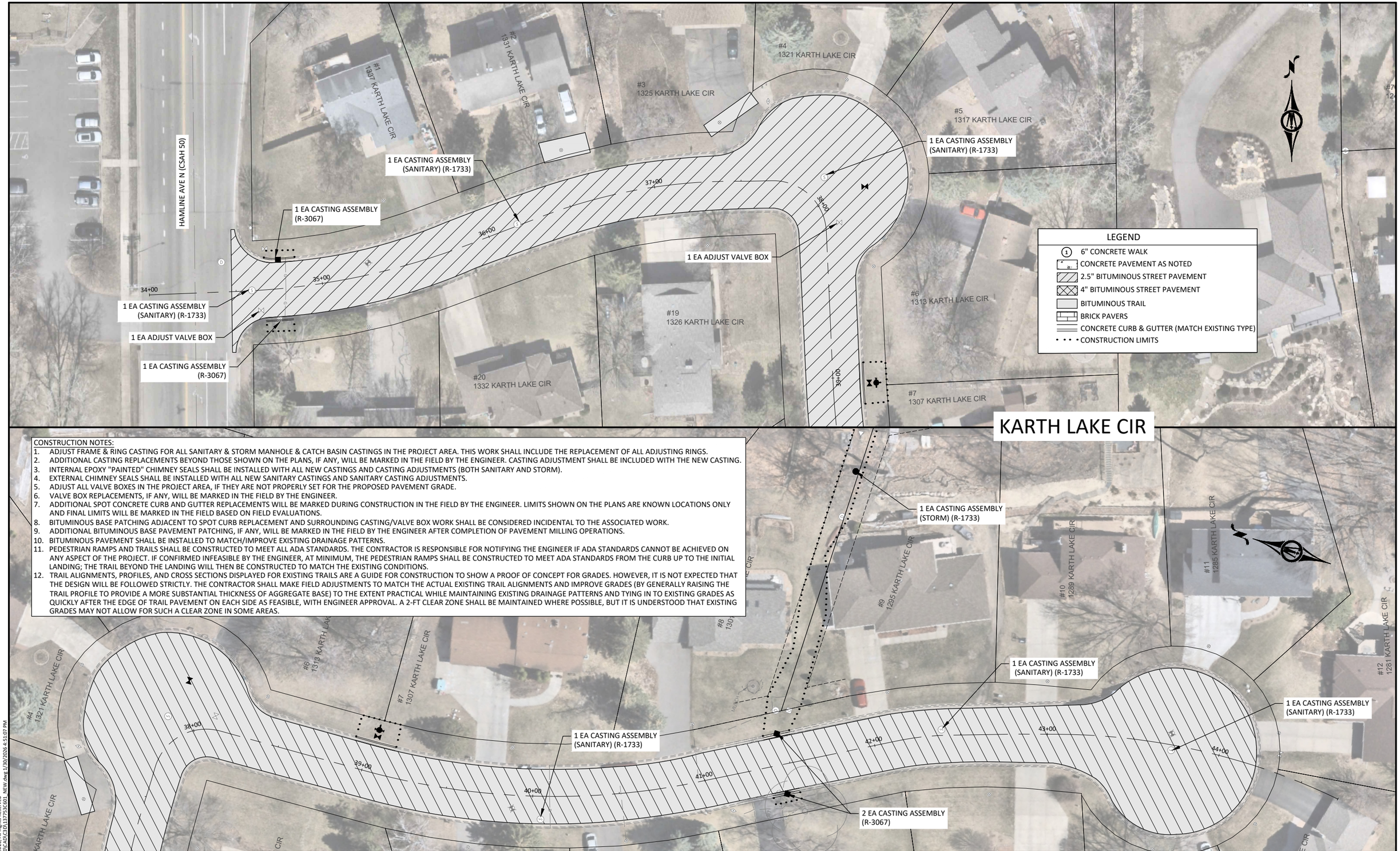
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
CUMMINGS PARK DR

SHEET C6.01

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CONSTRUCTION NOTES:

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HORZ. SCALE 0 25 50 FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
KARTH LAKE CIR

SHEET C6.02

KARTH LAKE DR

LEGEND

- 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST VALVE BOX

1 EA ADJUST VALVE BOX

1 EA ADJUST VALVE BOX

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

2 EA CASTING ASSEMBLY (R-3067-V)

1 EA CASTING ASSEMBLY (STORM) (R-1733)

9 LF INSTALL FENCE

23 LF INSTALL FENCE

11 LF INSTALL FENCE

#72 1241 KARTH LAKE DR

#73 1233 KARTH LAKE DR

#74 1226 KARTH LAKE DR

#76 1209 KARTH LAKE DR

#77 1201 KARTH LAKE DR

#78 1191 KARTH LAKE DR

#79 1181 KARTH LAKE DR

#80 1173 KARTH LAKE DR

#81 1163 KARTH LAKE DR

#82 1155 KARTH LAKE DR

#83 1147 KARTH LAKE DR

#84 1139 KARTH LAKE DR

#85 1131 KARTH LAKE DR

#86 4633 PLEAS

#69 1250 KARTH LAKE DR

#67 1236 KARTH LAKE DR

#66 1228 KARTH LAKE DR

#78 1191 KARTH LAKE DR

AMBLE DR

CONCRETE

BIT

45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00

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12. TRAIL ALIGNMENTS, PROFILES, AND CROSS SECTIONS DISPLAYED FOR EXISTING TRAILS ARE A GUIDE FOR CONSTRUCTION TO SHOW A PROOF OF CONCEPT FOR GRADES. HOWEVER, IT IS NOT EXPECTED THAT THE DESIGN WILL BE FOLLOWED STRICTLY. THE CONTRACTOR SHALL MAKE FIELD ADJUSTMENTS TO MATCH THE ACTUAL EXISTING TRAIL ALIGNMENTS AND IMPROVE GRADES (BY GENERALLY RAISING THE TRAIL PROFILE TO PROVIDE A MORE SUBSTANTIAL THICKNESS OF AGGREGATE BASE) TO THE EXTENT PRACTICAL WHILE MAINTAINING EXISTING DRAINAGE PATTERNS AND TYING IN TO EXISTING GRADES AS QUICKLY AFTER THE EDGE OF TRAIL PAVEMENT ON EACH SIDE AS FEASIBLE, WITH ENGINEER APPROVAL. A 2-FT CLEAR ZONE SHALL BE MAINTAINED WHERE POSSIBLE, BUT IT IS UNDERSTOOD THAT EXISTING GRADES MAY NOT ALLOW FOR SUCH A CLEAR ZONE IN SOME AREAS.

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I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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ARDEN HILLS

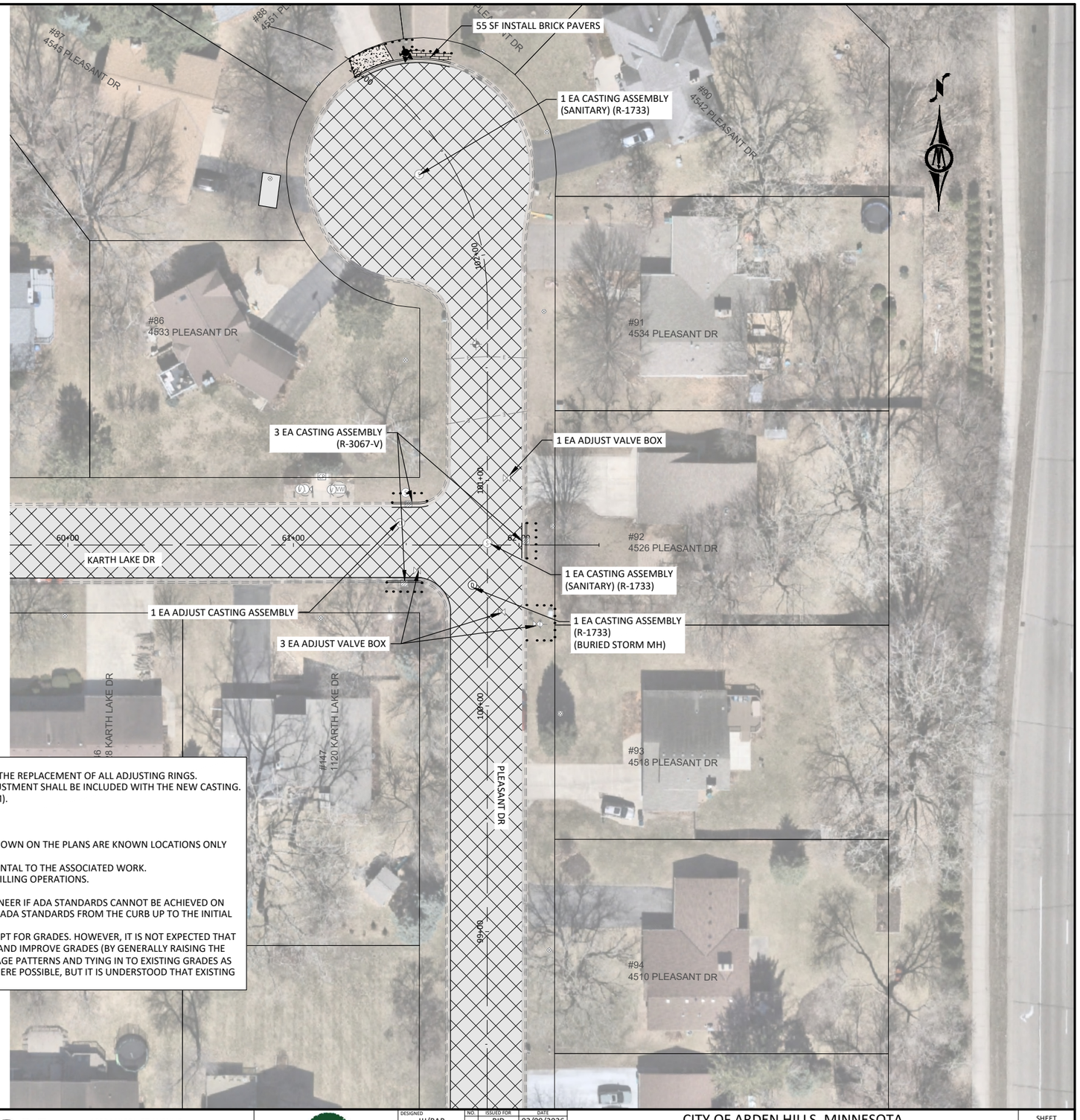
DESIGNED	JJJ/BAP
DRAWN	BAP
CHECKED	BJF
CLIENT PROJ. NO.	PW-26-0100

NO.	ISSUED FOR	DATE
	BID	02/09/2026

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
KARTH LAKE DR

SHEET C6.03

LEGEND	
1	6" CONCRETE WALK
4"	CONCRETE PAVEMENT AS NOTED
	2.5" BITUMINOUS STREET PAVEMENT
	4" BITUMINOUS STREET PAVEMENT
	BITUMINOUS TRAIL
	BRICK PAVERS
	CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
	CONSTRUCTION LIMITS



CONSTRUCTION NOTES:

1. ADJUST FRAME & RING CASTING FOR ALL SANITARY & STORM MANHOLE & CATCH BASIN CASTINGS IN THE PROJECT AREA. THIS WORK SHALL INCLUDE THE REPLACEMENT OF ALL ADJUSTING RINGS.
2. ADDITIONAL CASTING REPLACEMENTS BEYOND THOSE SHOWN ON THE PLANS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER. CASTING ADJUSTMENT SHALL BE INCLUDED WITH THE NEW CASTING.
3. INTERNAL EPOXY "PAINTED" CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW CASTINGS AND CASTING ADJUSTMENTS (BOTH SANITARY AND STORM).
4. EXTERNAL CHIMNEY SEALS SHALL BE INSTALLED WITH ALL NEW SANITARY CASTINGS AND SANITARY CASTING ADJUSTMENTS.
5. ADJUST ALL VALVE BOXES IN THE PROJECT AREA, IF THEY ARE NOT PROPERLY SET FOR THE PROPOSED PAVEMENT GRADE.
6. VALVE BOX REPLACEMENTS, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER.
7. ADDITIONAL SPOT CONCRETE CURB AND GUTTER REPLACEMENTS WILL BE MARKED DURING CONSTRUCTION IN THE FIELD BY THE ENGINEER. LIMITS SHOWN ON THE PLANS ARE KNOWN LOCATIONS ONLY AND FINAL LIMITS WILL BE MARKED IN THE FIELD BASED ON FIELD EVALUATIONS.
8. BITUMINOUS BASE PATCHING ADJACENT TO SPOT CURB REPLACEMENT AND SURROUNDING CASTING/VALVE BOX WORK SHALL BE CONSIDERED INCIDENTAL TO THE ASSOCIATED WORK.
9. ADDITIONAL BITUMINOUS BASE PAVEMENT PATCHING, IF ANY, WILL BE MARKED IN THE FIELD BY THE ENGINEER AFTER COMPLETION OF PAVEMENT MILLING OPERATIONS.
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ARDEN HILLS

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
KARTH LAKE DR

SHEET C6.04

LEGEND

- 1 — 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (R-3067-V)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (R-3067-V)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST VALVE BOX

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

CONSTRUCTION NOTES:

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BRADLEY J. FISHER
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ARDEN HILLS

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
AMBLE DR

SHEET C6.05

LEGEND

- 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST CASTING ASSEMBLY

3 EA ADJUST CASTING ASSEMBLY

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST VALVE BOX

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

ADJUST CASTING (BY OTHERS)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST VALVE BOX

1 EA ADJUST VALVE BOX

#111 4419 AMBLE CIR

#110 4415 AMBLE CIR

#109 1121 AMBLE DR

#108 1127 AMBLE DR

#107 1131 AMBLE DR

#114 4408 AMBLE CIR

#113 4414 AMBLE CIR

#116 1113 AMBLE DR

#115 1105 AMBLE DR

#43 1104 AMBLE DR

#44 1108 AMBLE DR

#45 1112 AMBLE DR

AMBLE DR

AMBLE CIR

LEXINGTON AVE N (CSAH 51)

76+00 77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

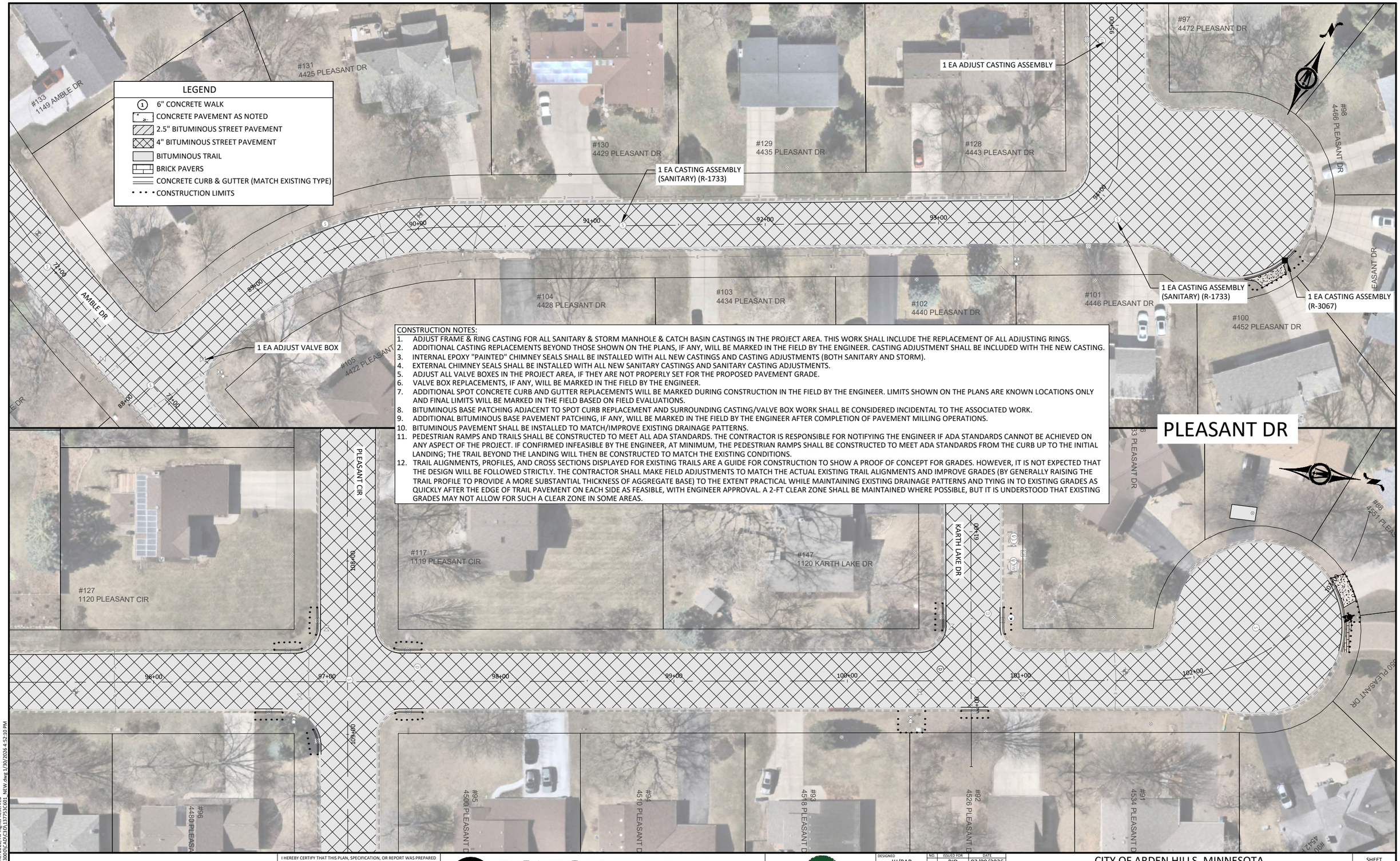
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
AMBLE DR & AMBLE CIR

SHEET C6.06


LEGEND
6" CONCRETE WALK
CONCRETE PAVEMENT AS NOTED
2.5" BITUMINOUS STREET PAVEMENT
4" BITUMINOUS STREET PAVEMENT
BITUMINOUS TRAIL
BRICK PAVERS
CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
CONSTRUCTION LIMITS
1 EA ADJUST CASTING ASSEMBLY
1 EA CASTING ASSEMBLY (SANITARY) (R-1733)
1 EA CASTING ASSEMBLY (SANITARY) (R-3067)
1 EA ADJUST VALVE BOX
PLEASANT DR
AMBLE DR
KARTH LAKE DR
PLEASANT CIR
#133 1149 AMBLE DR
#131 4425 PLEASANT DR
#130 4429 PLEASANT DR
#129 4435 PLEASANT DR
#128 4443 PLEASANT DR
#97 4472 PLEASANT DR
#98 4466 PLEASANT DR
#104 4428 PLEASANT DR
#103 4434 PLEASANT DR
#102 4440 PLEASANT DR
#101 4446 PLEASANT DR
#100 4452 PLEASANT DR
#105 4422 PLEASANT DR
#127 1120 PLEASANT CIR
#117 1119 PLEASANT CIR
#147 1120 KARTH LAKE DR
#96 4480 PLEASANT DR
#95 4500 PLEASANT DR
#94 4510 PLEASANT DR
#93 4518 PLEASANT DR
#92 4526 PLEASANT DR
#91 4534 PLEASANT DR
#88 4551 PLEASANT DR
#50 PLEASANT DR
88+00
89+00
90+00
91+00
92+00
93+00
94+00
95+00
96+00
97+00
98+00
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102+00
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105+00
106+00
107+00
108+00
109+00
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113+00
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116+00
117+00
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00

CONSTRUCTION NOTES:

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2 EA CASTING ASSEMBLY (R-3067-V)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST CASTING ASSEMBLY

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

1 EA ADJUST VALVE BOX

2 EA CASTING ASSEMBLY (R-3067-V)

1 EA ADJUST VALVE BOX

2 EA CASTING ASSEMBLY (R-3067-V)

1 EA CASTING ASSEMBLY (SANITARY) (R-1733)

PLEASANT CIR

PLEASANT DR

LEXINGTON AVE N (CSAH 51)

#120 1149 PLEASANT CIR

#119 1139 PLEASANT CIR

#118 1129 PLEASANT CIR

#117 1119 PLEASANT CIR

#94 4510 PLEASANT DR

#95 4500 PLEASANT DR

#96 4480 PLEASANT DR

#97 4472 PLEASANT DR

#124 1150 PLEASANT CIR

#127 1120 PLEASANT CIR

#131 PLEASANT DR

104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00

99+00 98+00 97+00 96+00 95+00

LEGEND

- 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

HORZ. SCALE 0 25 50 FEET

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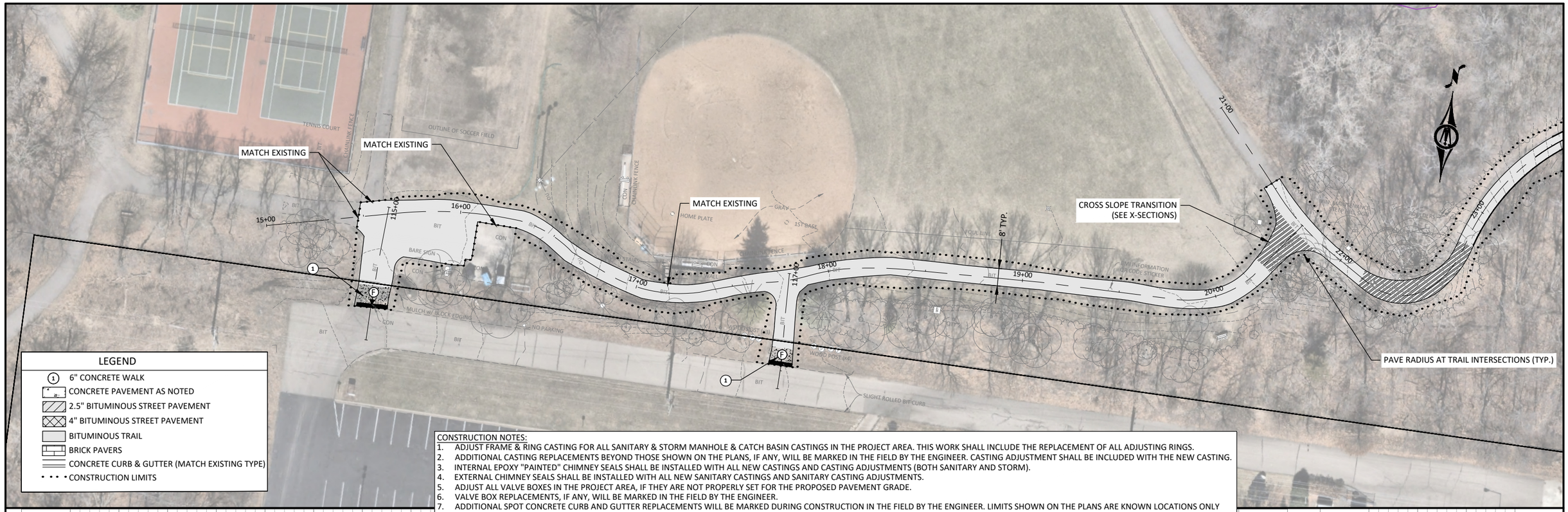
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CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
STREET PLAN
PLEASANT CIR

SHEET C6.08

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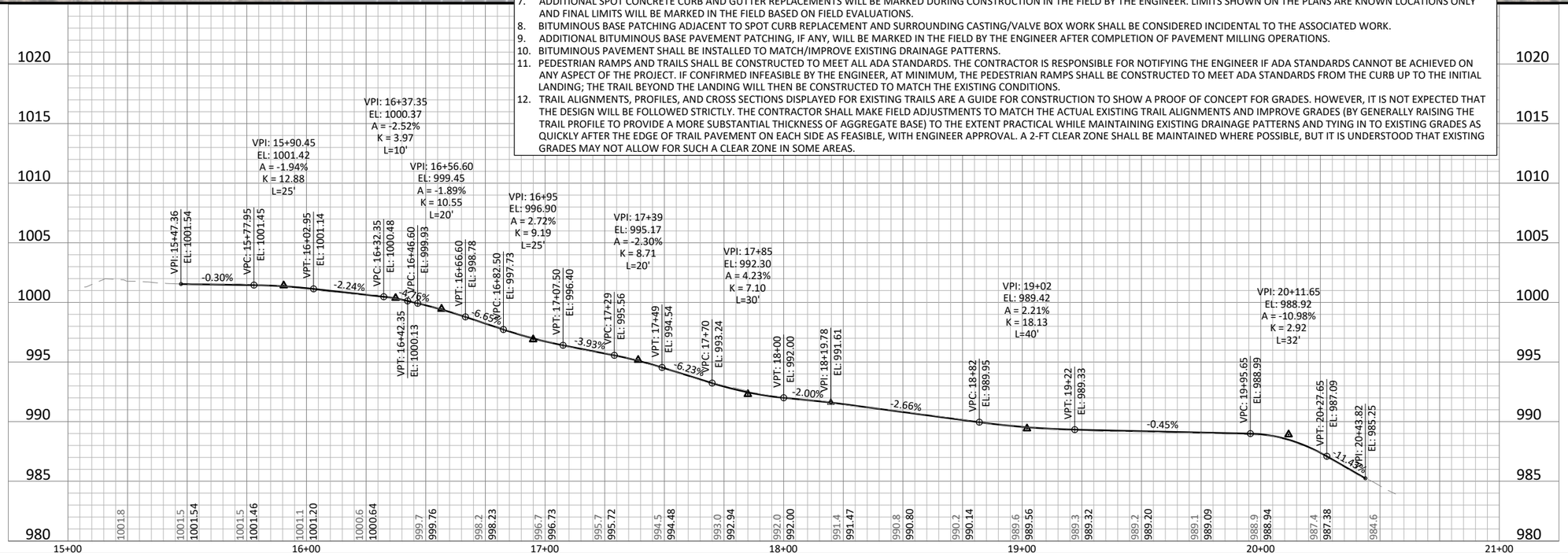


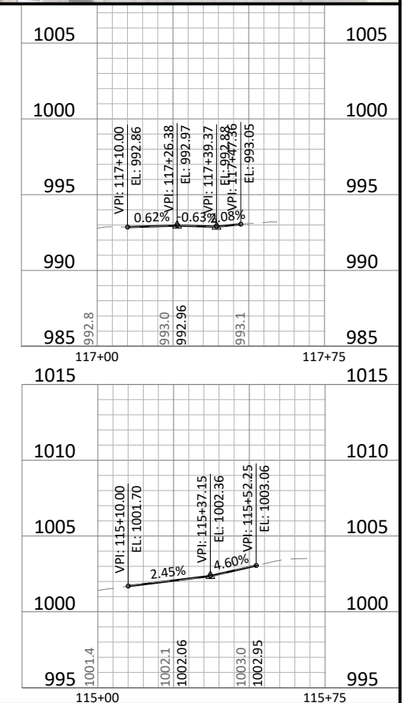
LEGEND

- (1) 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
- BITUMINOUS TRAIL
- BRICK PAVERS
- CONCRETE CURB & GUTTER (MATCH EXISTING TYPE)
- CONSTRUCTION LIMITS

CONSTRUCTION NOTES:

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HORZ. SCALE 0 25 50 FEET
VERT. SCALE 0 5 10 FEET

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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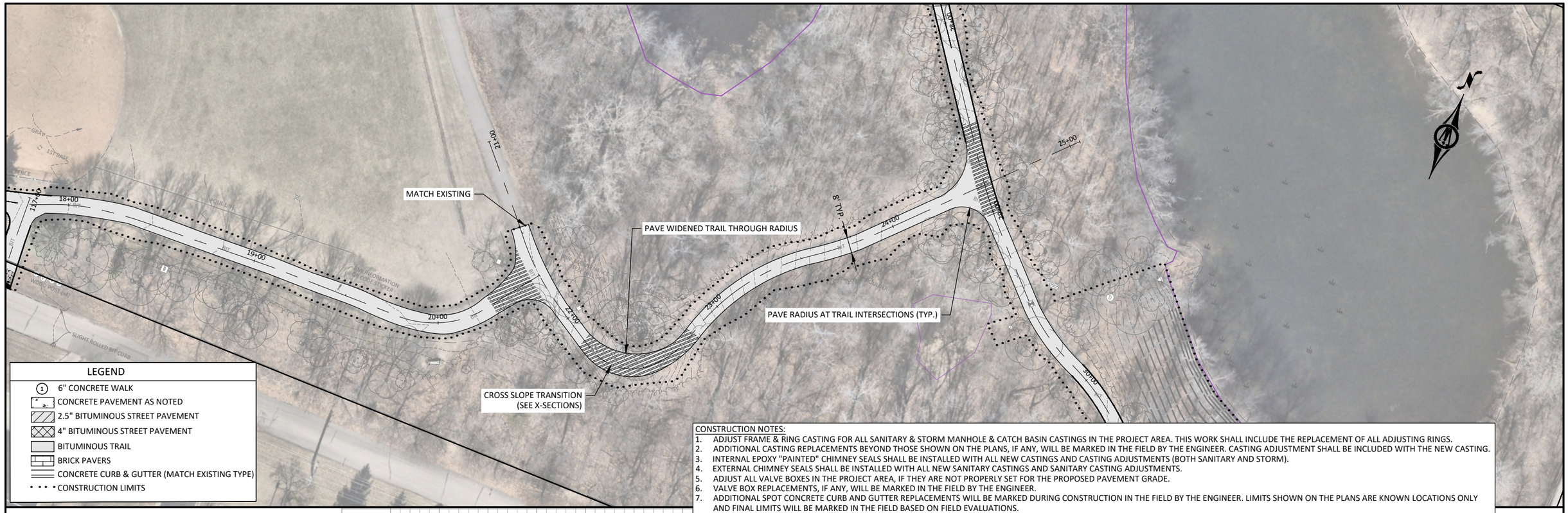
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2026 PMP STREET & UTILITY IMPROVEMENTS
TRAIL PLAN & PROFILE
KARTH LAKE PARK TRAIL SW

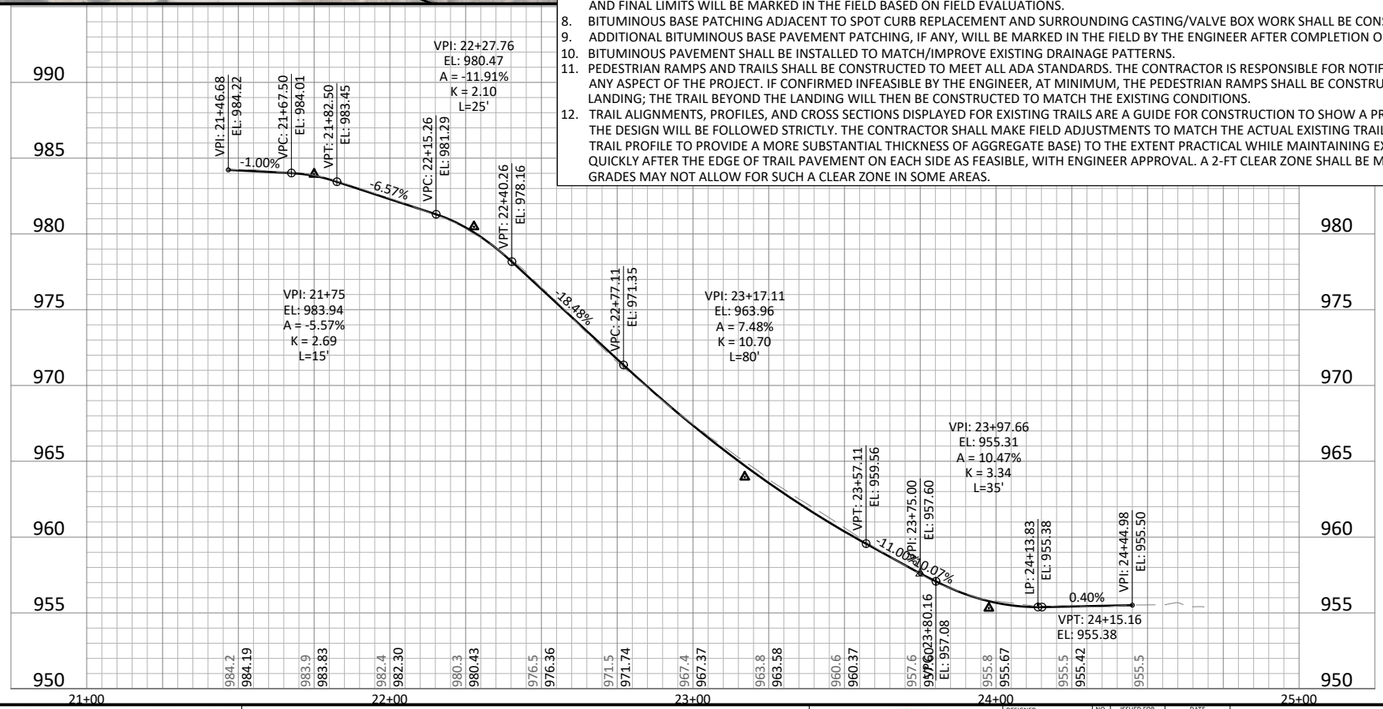
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CONSTRUCTION NOTES:

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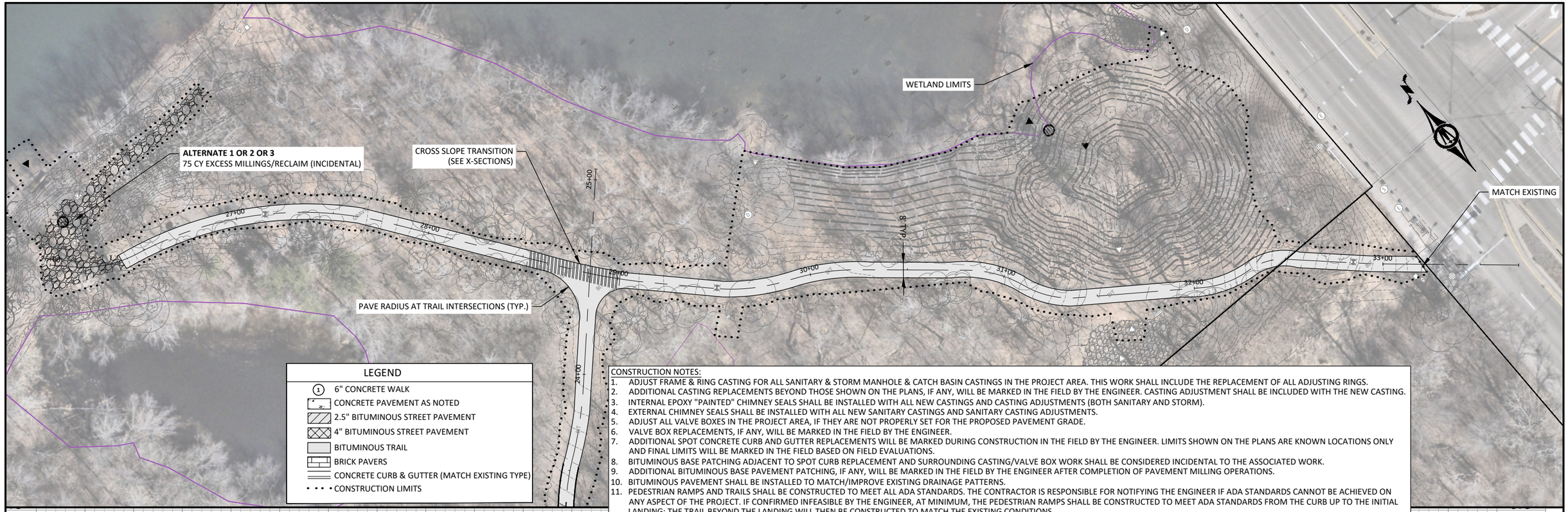
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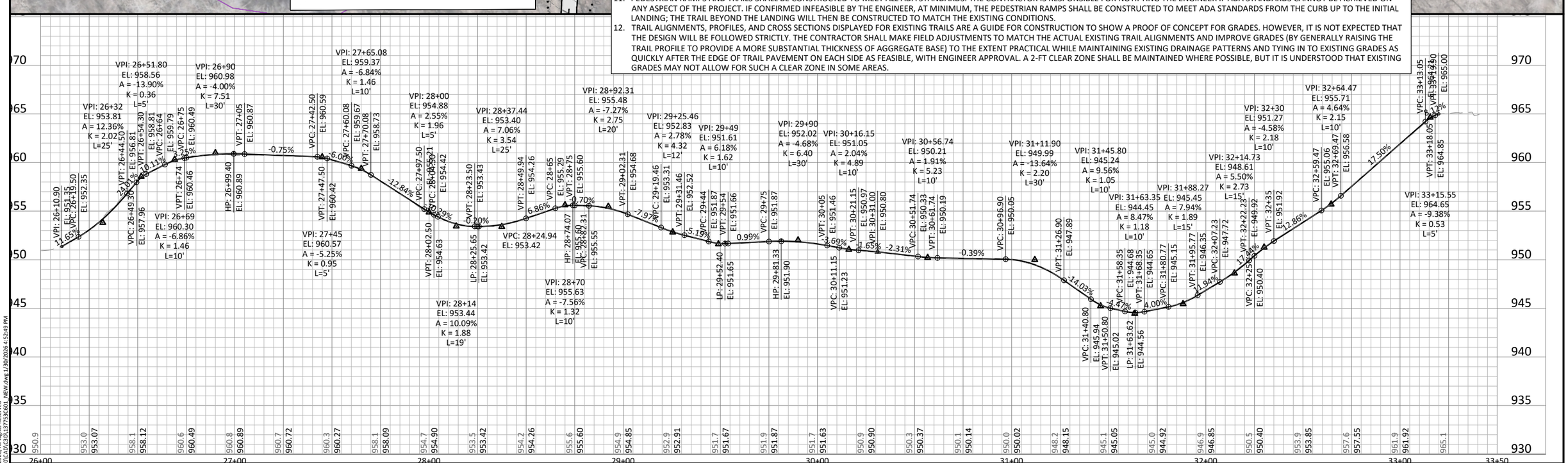
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
TRAIL PLAN & PROFILE
KARTH LAKE PARK TRAIL MIDDLE

SHEET C6.10



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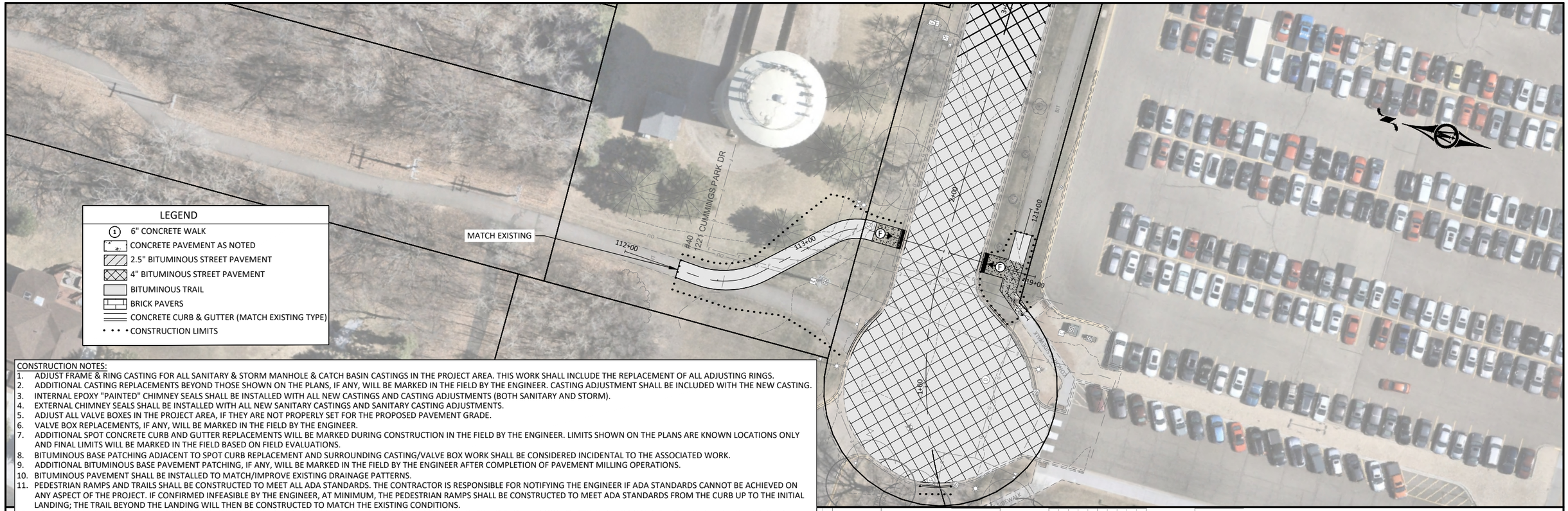
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2026 PMP STREET & UTILITY IMPROVEMENTS
TRAIL PLAN & PROFILE
KARTH LAKE PARK TRAIL NORTH

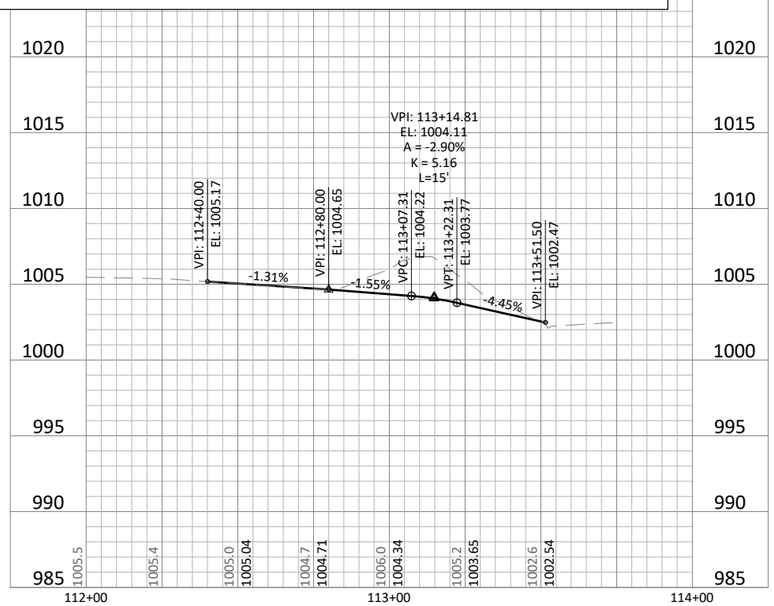
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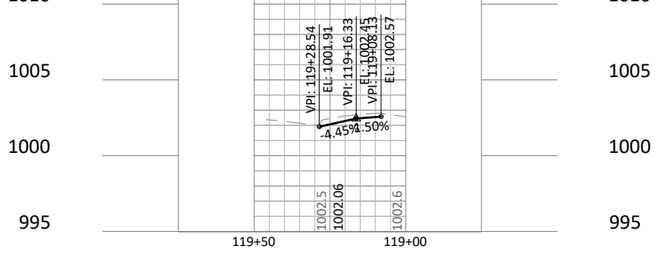
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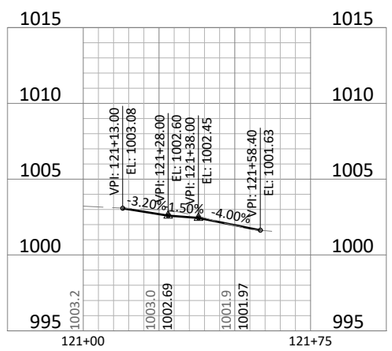


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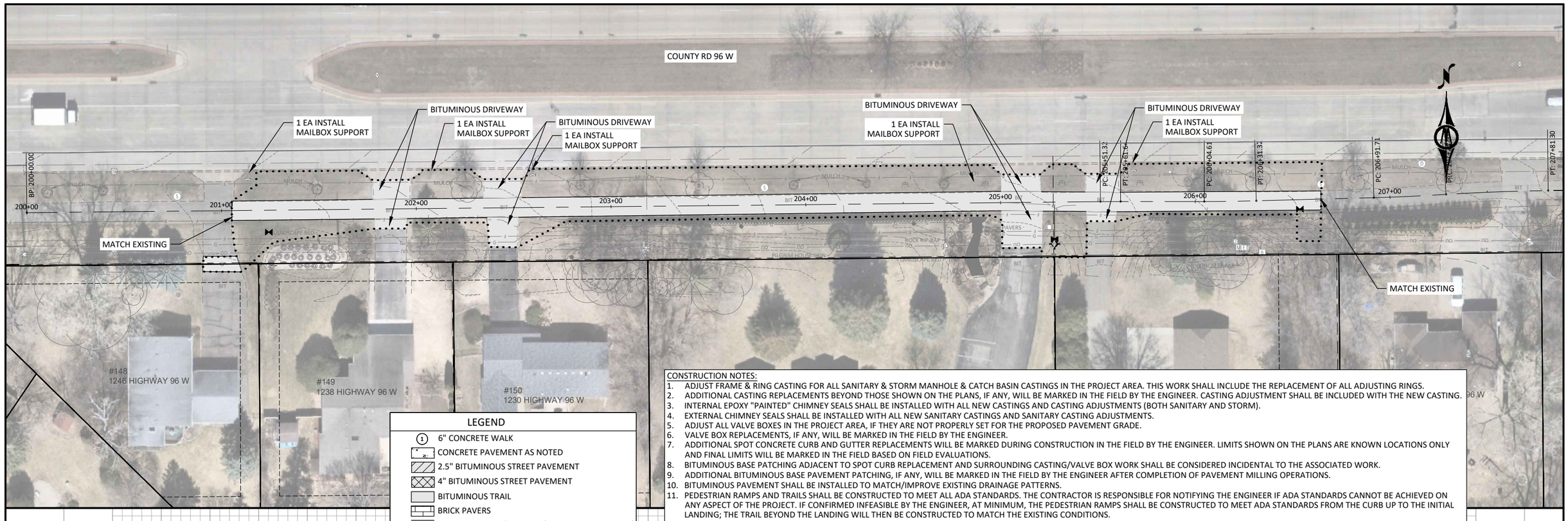
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TRAIL PLAN & PROFILE
CUMMINGS PARK TRAIL

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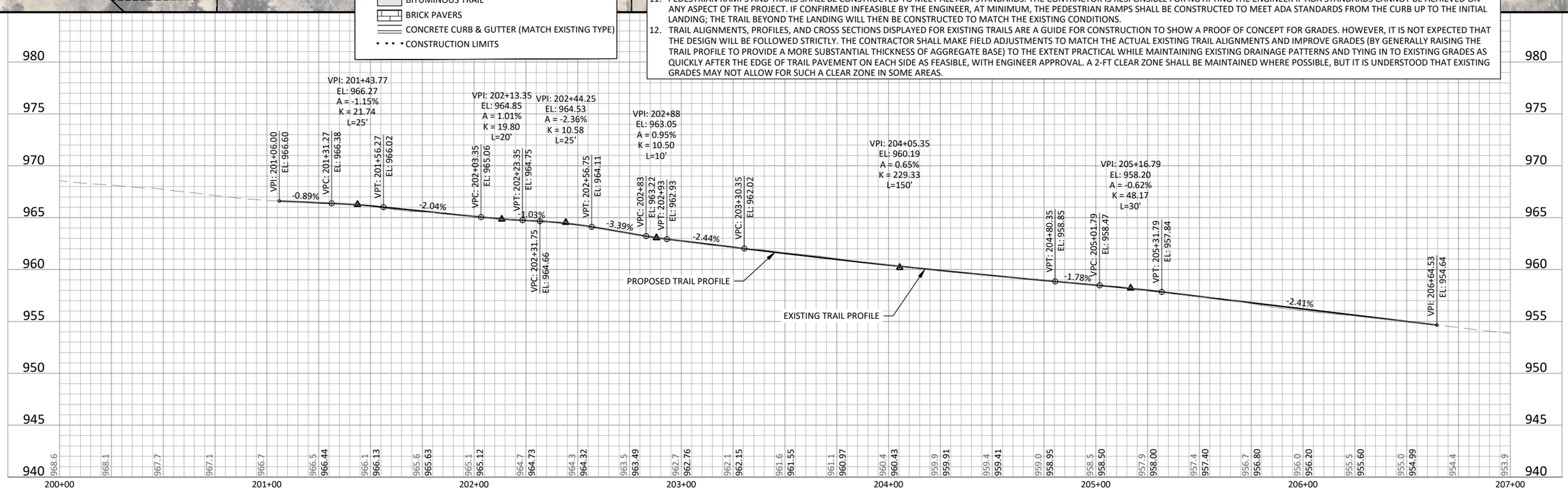


LEGEND

- 6" CONCRETE WALK
- CONCRETE PAVEMENT AS NOTED
- 2.5" BITUMINOUS STREET PAVEMENT
- 4" BITUMINOUS STREET PAVEMENT
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LIC. NO. 56595 DATE 02/09/2026

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Email: Burnsville@bolton-menk.com
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ARDEN HILLS

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DRAWN	BAP
CHECKED	BJF
CLIENT PROJ. NO.	PW-26-0100

NO.	ISSUED FOR	DATE
	BID	02/09/2026

CITY OF ARDEN HILLS, MINNESOTA

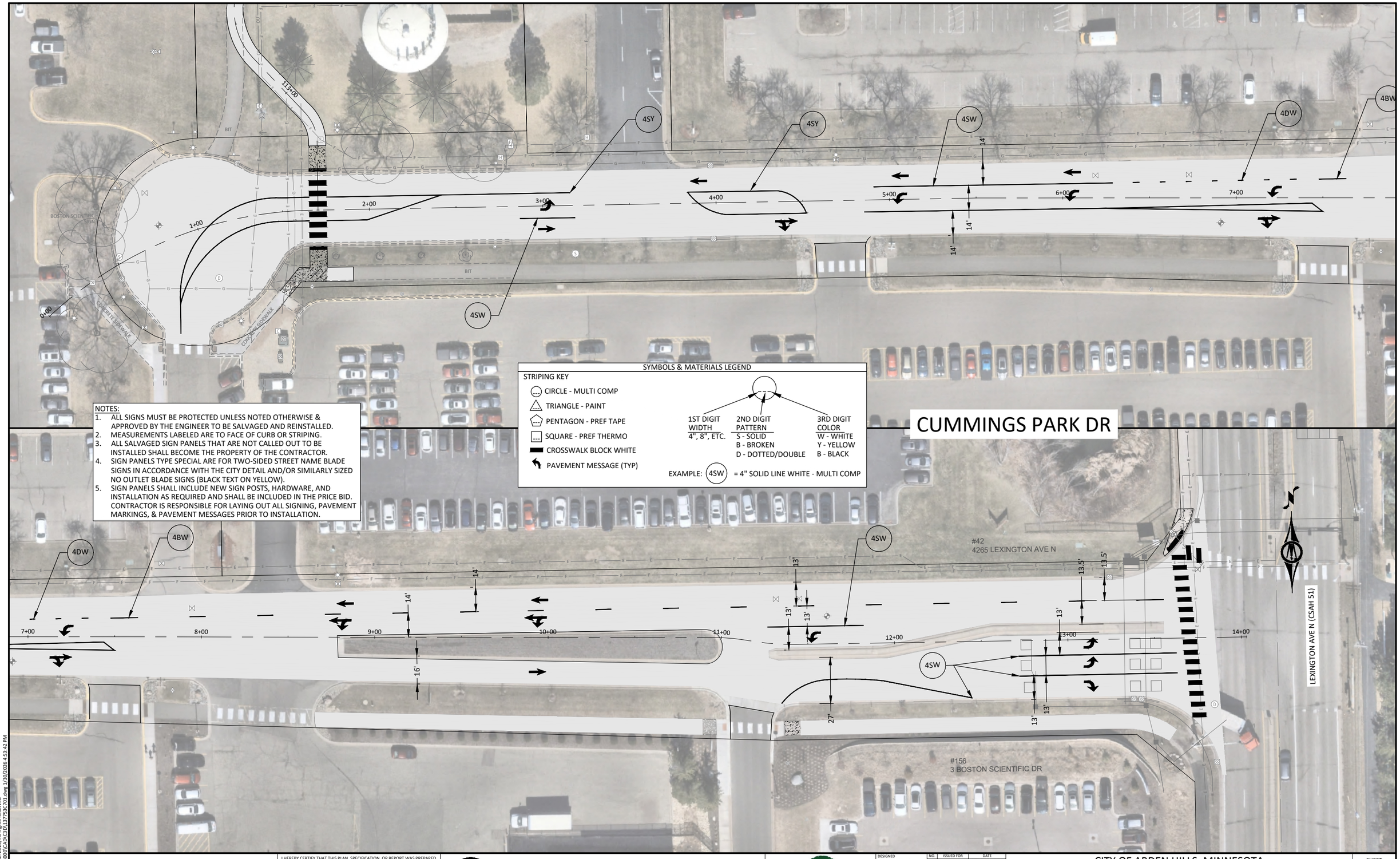
2026 PMP STREET & UTILITY IMPROVEMENTS

TRAIL PLAN & PROFILE

HWY 96 TRAIL

SHEET C6.13

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NOTES:
1. ALL SIGNS MUST BE PROTECTED UNLESS NOTED OTHERWISE & APPROVED BY THE ENGINEER TO BE SALVAGED AND REINSTALLED.
2. MEASUREMENTS LABELED ARE TO FACE OF CURB OR STRIPING.
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SYMBOLS & MATERIALS LEGEND

STRIPING KEY
- CIRCLE - MULTI COMP
- TRIANGLE - PAINT
- PENTAGON - PREF TAPE
- SQUARE - PREF THERMO
- CROSSWALK BLOCK WHITE
- PAVEMENT MESSAGE (TYP)

1ST DIGIT	2ND DIGIT	3RD DIGIT
WIDTH	PATTERN	COLOR
4", 8", ETC.	S - SOLID	W - WHITE
	B - BROKEN	Y - YELLOW
	D - DOTTED/DOUBLE	B - BLACK

EXAMPLE: 4SW = 4" SOLID LINE WHITE - MULTI COMP

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BRADLEY J. FISHER
LIC. NO. 56595 DATE 02/09/2026

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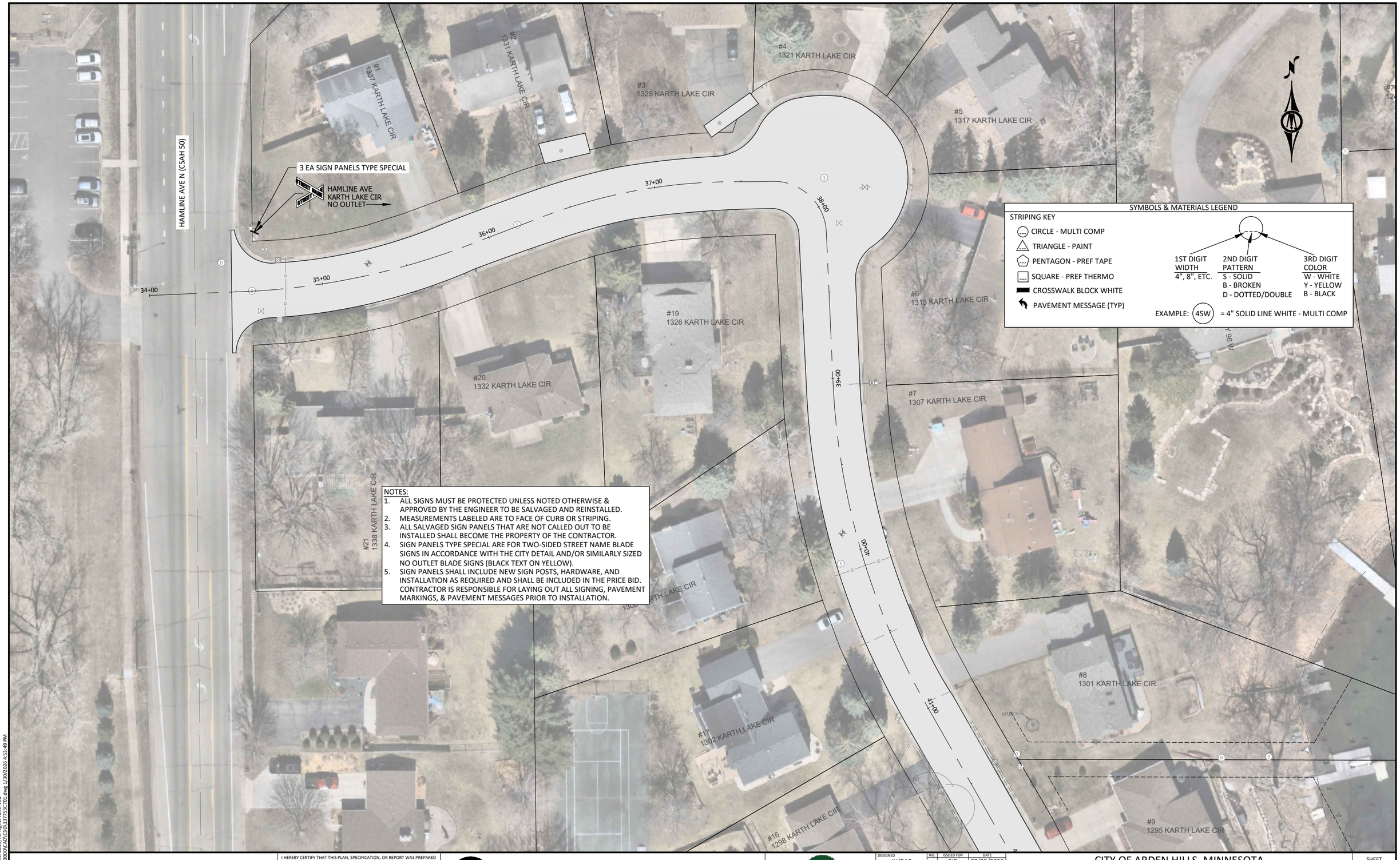
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
CUMMINGS PARK DR

SHEET C7.01



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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
KARTH LAKE CIR

SHEET C7.02

NOTES:
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EXAMPLE: (4SW) = 4" SOLID LINE WHITE - MULTI COMP

3 EA SIGN PANELS TYPE SPECIAL
AMBLE DR
KARTH LAKE DR
NO OUTLET

2 EA SIGN PANELS TYPE SPECIAL
PLEASANT DR
AMBLE DR

KARTH LAKE DR
AMBLE DR
PLEASANT DR

#72 1241 KARTH LAKE DR
#73 1233 KARTH LAKE DR
#74 1226 KARTH LAKE DR
#76 1209 KARTH LAKE DR
#77 1201 KARTH LAKE DR
#78 1191 KARTH LAKE DR
#69 1250 KARTH LAKE DR
#68 1244 KARTH LAKE DR
#67 1236 KARTH LAKE DR
#66 1228 KARTH LAKE DR
#63 1218 KARTH LAKE DR
#133 1149 AMBLE DR
#132 1145 AMBLE DR
#65 1148 AMBLE DR
#64 1144 AMBLE DR
#53 1142 AMBLE DR
#105 4422 PLEASANT DR
#106 1137 AMBLE DR
#107 1131 AMBLE DR
#108 1127 AMBLE DR
#109 1121 AMBLE

45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53 64+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00 78+00 88+00 89+00

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
KARTH LAKE DR & AMBLE DR

SHEET C7.03

SYMBOLS & MATERIALS LEGEND

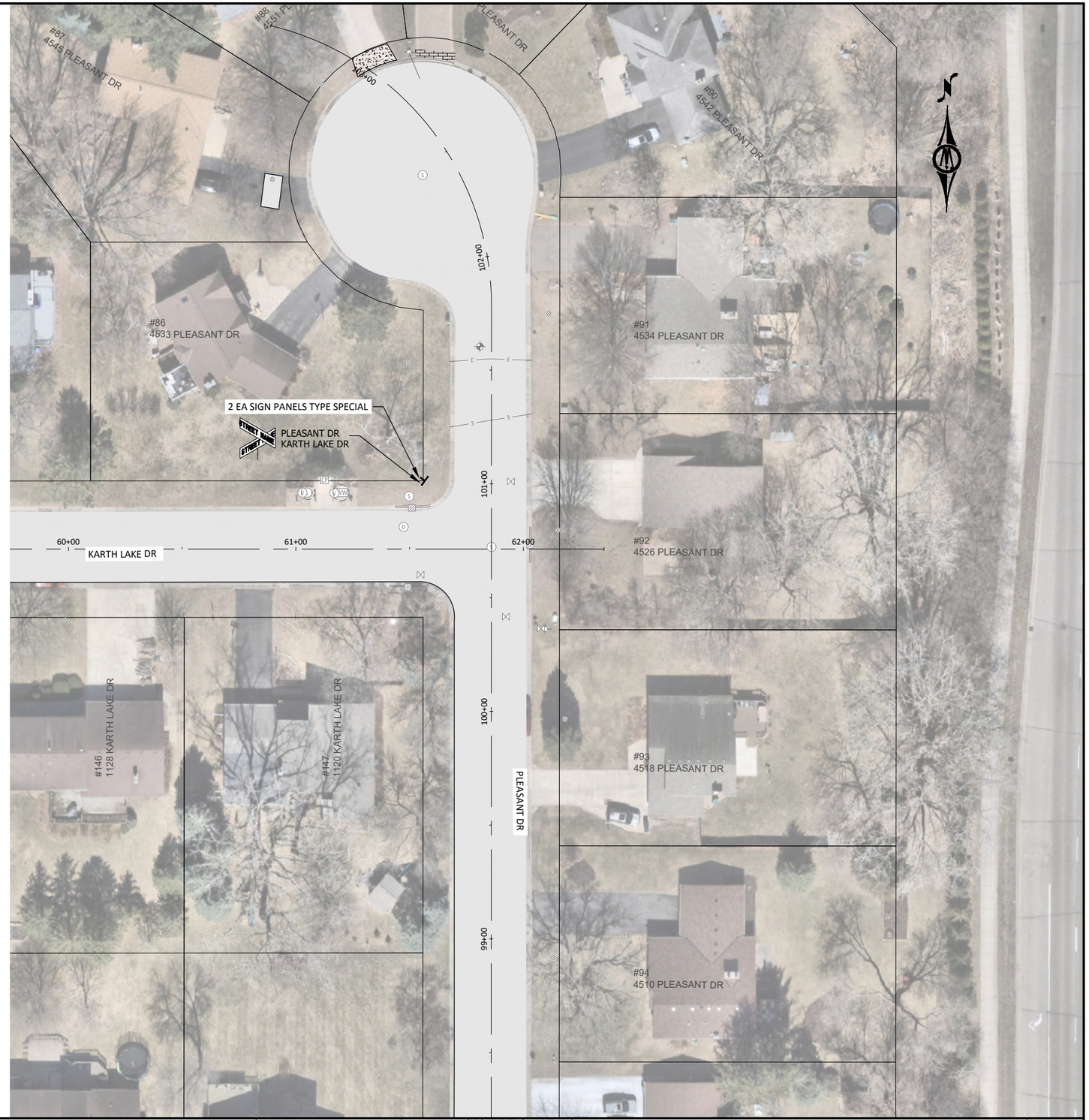
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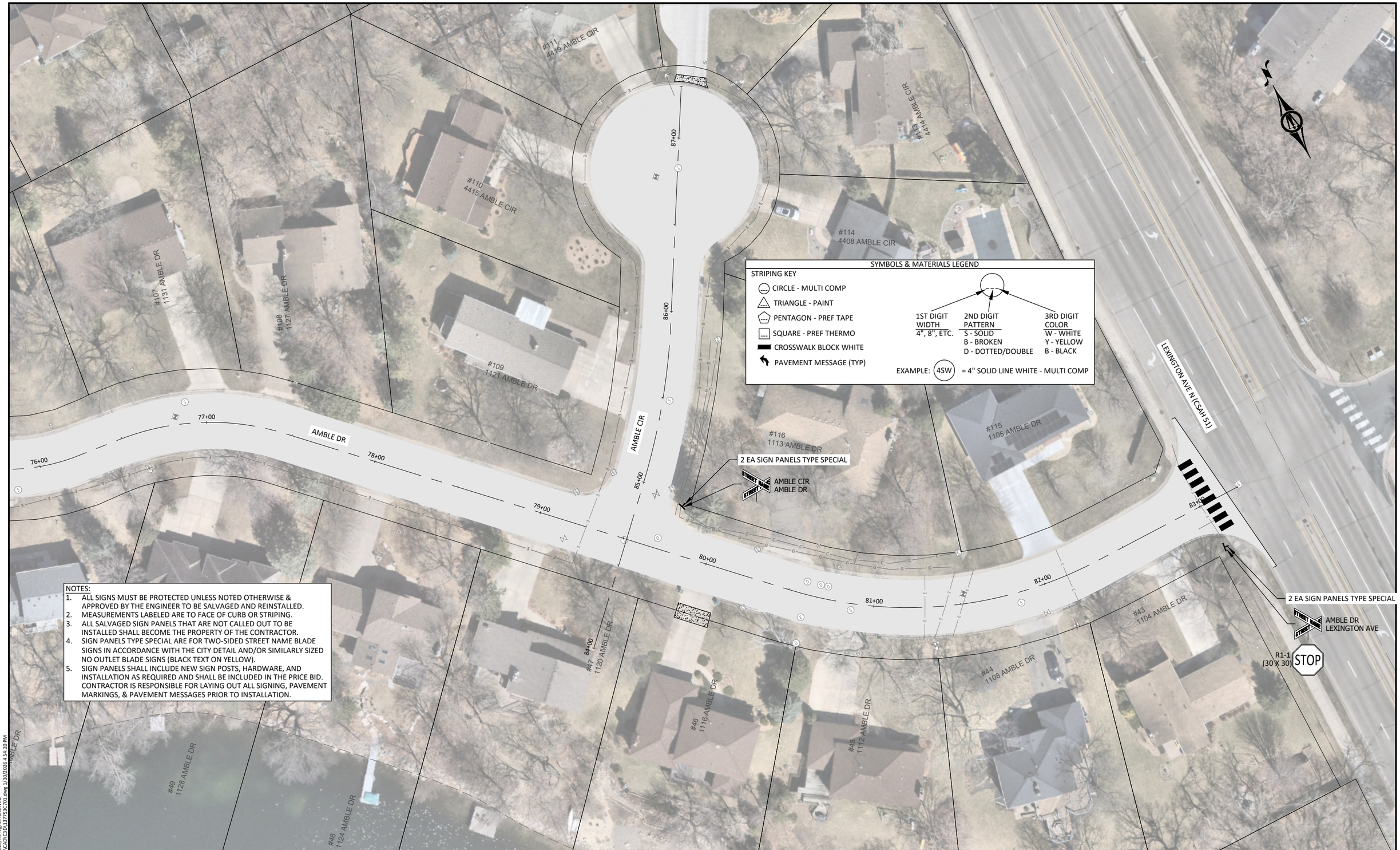
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
KARTH LAKE DR

SHEET C7.04



SYMBOLS & MATERIALS LEGEND

STRIPING KEY

- CIRCLE - MULTI COMP
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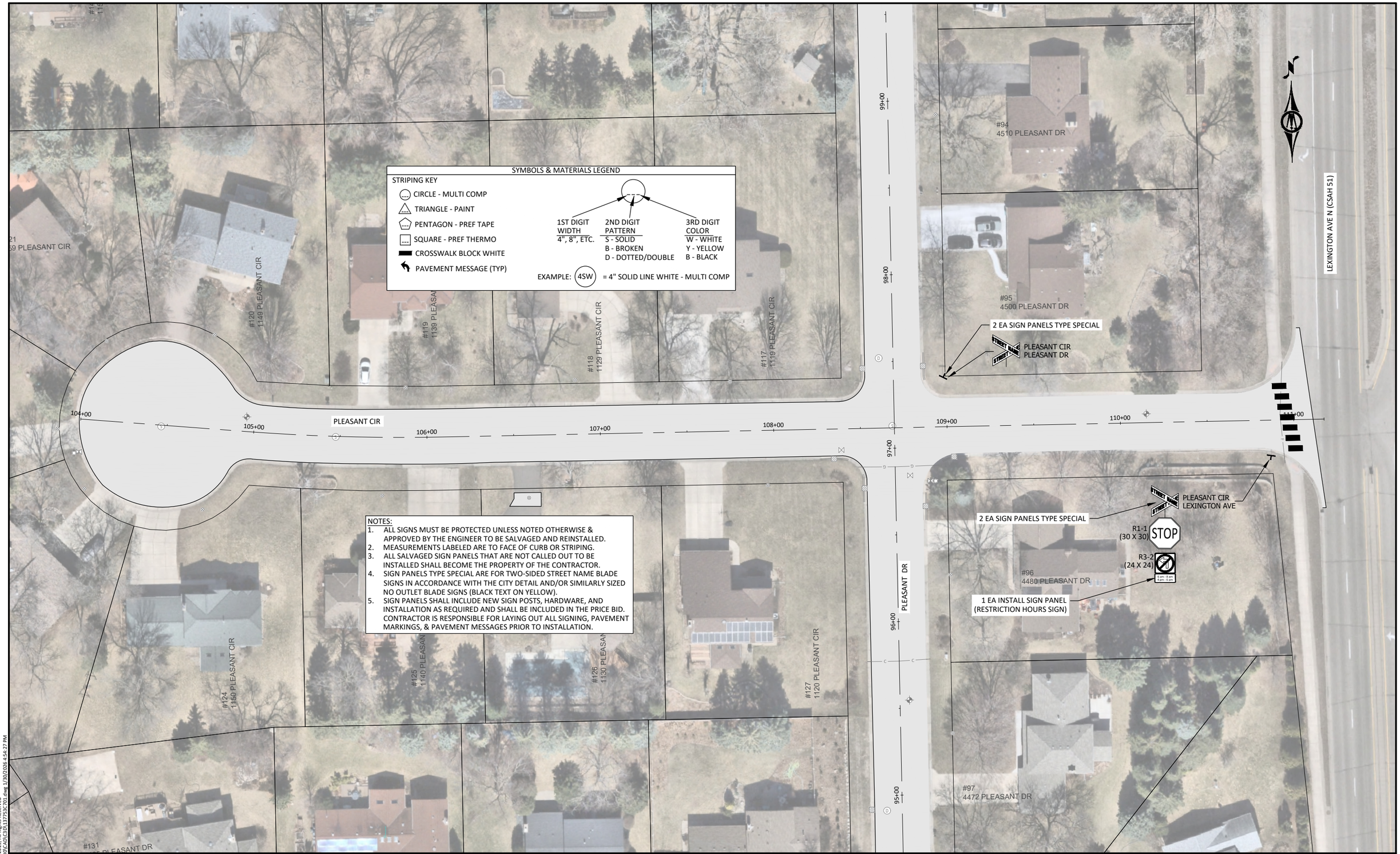
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
AMBLE DR & AMBLE CIR

SHEET C7.05



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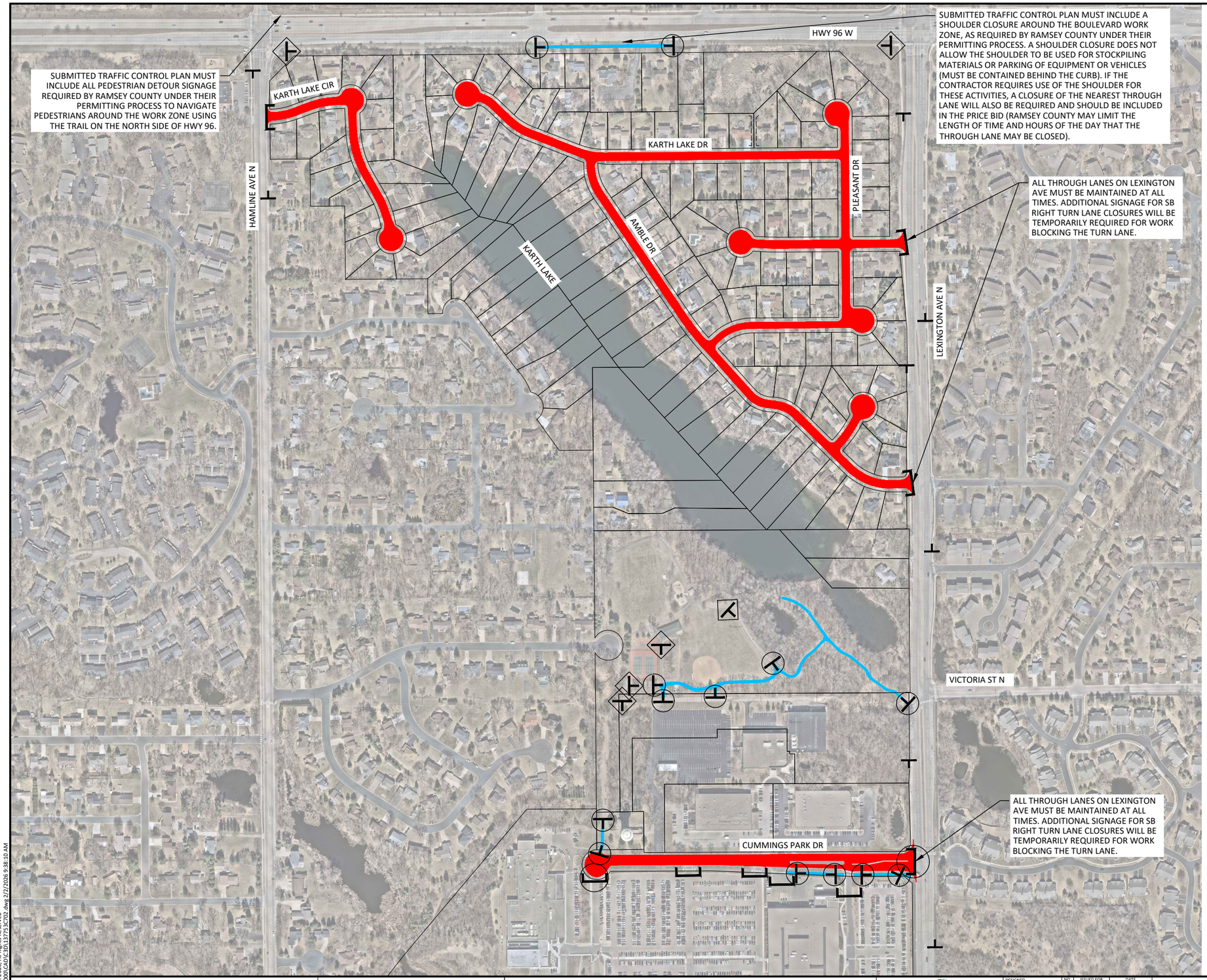
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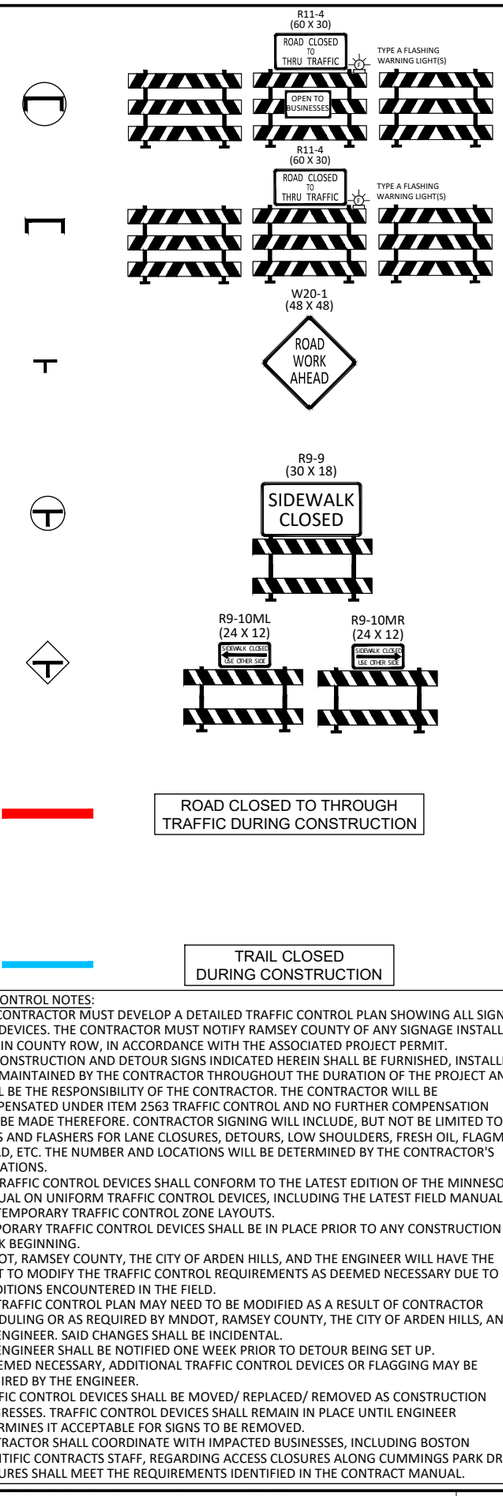
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNING & STRIPING PLAN
PLEASANT CIR

SHEET C7.06





TRAFFIC CONTROL NOTES:

1. THE CONTRACTOR MUST DEVELOP A DETAILED TRAFFIC CONTROL PLAN SHOWING ALL SIGNS AND DEVICES. THE CONTRACTOR MUST NOTIFY RAMSEY COUNTY OF ANY SIGNAGE INSTALLED WITHIN COUNTY ROW, IN ACCORDANCE WITH THE ASSOCIATED PROJECT PERMIT.
2. ALL CONSTRUCTION AND DETOUR SIGNS INDICATED HEREIN SHALL BE FURNISHED, INSTALLED, AND MAINTAINED BY THE CONTRACTOR THROUGHOUT THE DURATION OF THE PROJECT AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE COMPENSATED UNDER ITEM 2563 TRAFFIC CONTROL AND NO FURTHER COMPENSATION WILL BE MADE THEREFORE. CONTRACTOR SIGNING WILL INCLUDE, BUT NOT BE LIMITED TO, SIGNS AND FLASHERS FOR LANE CLOSURES, DETOURS, LOW SHOULDERS, FRESH OIL, FLAGMAN AHEAD, ETC. THE NUMBER AND LOCATIONS WILL BE DETERMINED BY THE CONTRACTOR'S OPERATIONS.
3. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE LATEST EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING THE LATEST FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS.
4. TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO ANY CONSTRUCTION WORK BEGINNING.
5. MNDOT, RAMSEY COUNTY, THE CITY OF ARDEN HILLS, AND THE ENGINEER WILL HAVE THE RIGHT TO MODIFY THE TRAFFIC CONTROL REQUIREMENTS AS DEEMED NECESSARY DUE TO CONDITIONS ENCOUNTERED IN THE FIELD.
6. THE TRAFFIC CONTROL PLAN MAY NEED TO BE MODIFIED AS A RESULT OF CONTRACTOR SCHEDULING OR AS REQUIRED BY MNDOT, RAMSEY COUNTY, THE CITY OF ARDEN HILLS, AND THE ENGINEER. SAID CHANGES SHALL BE INCIDENTAL.
7. THE ENGINEER SHALL BE NOTIFIED ONE WEEK PRIOR TO DETOUR BEING SET UP.
8. IF DEEMED NECESSARY, ADDITIONAL TRAFFIC CONTROL DEVICES OR FLAGGING MAY BE REQUIRED BY THE ENGINEER.
9. TRAFFIC CONTROL DEVICES SHALL BE MOVED/ REPLACED/ REMOVED AS CONSTRUCTION PROGRESSES. TRAFFIC CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL ENGINEER DETERMINES IT ACCEPTABLE FOR SIGNS TO BE REMOVED.
10. CONTRACTOR SHALL COORDINATE WITH IMPACTED BUSINESSES, INCLUDING BOSTON SCIENTIFIC CONTRACTS STAFF, REGARDING ACCESS CLOSURES ALONG CUMMINGS PARK DR. CLOSURES SHALL MEET THE REQUIREMENTS IDENTIFIED IN THE CONTRACT MANUAL.

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HORZ. SCALE 0 200 400 FEET

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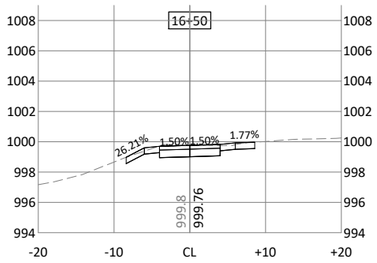
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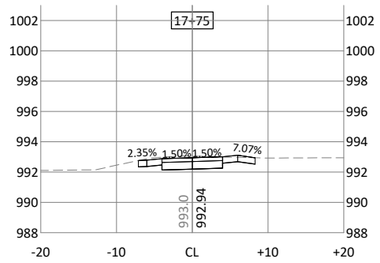
ARDEN HILLS

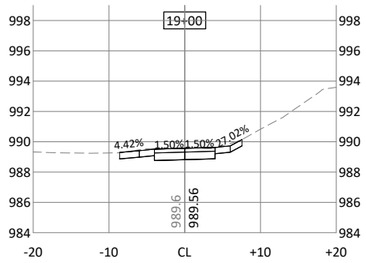
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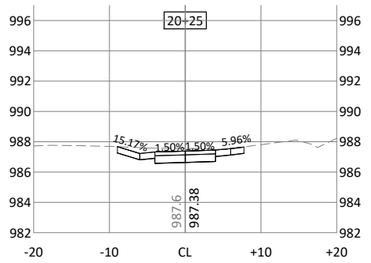
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
TRAFFIC CONTROL PLAN

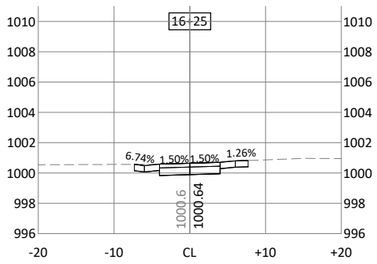
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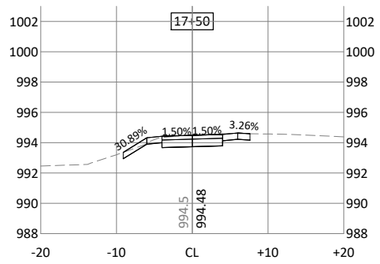


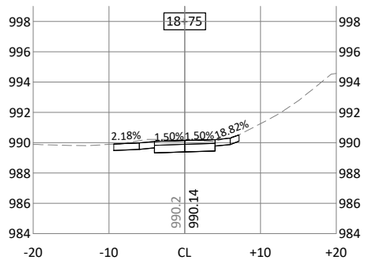


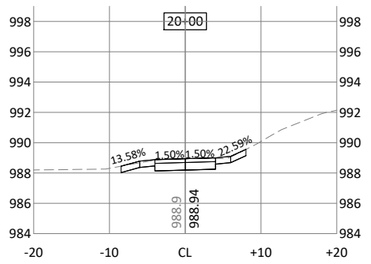


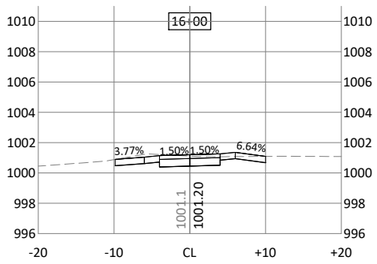


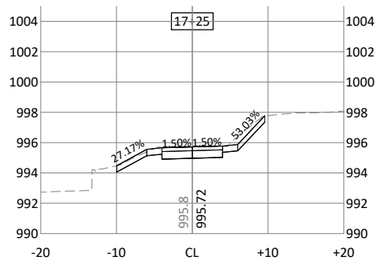


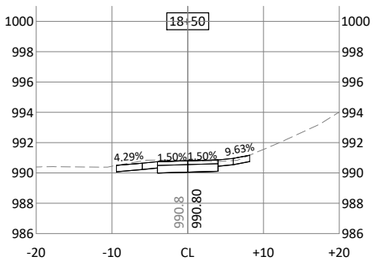


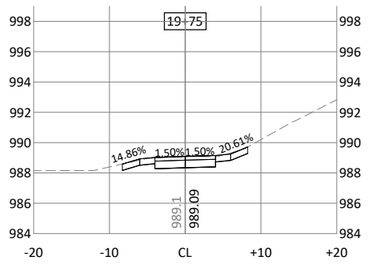


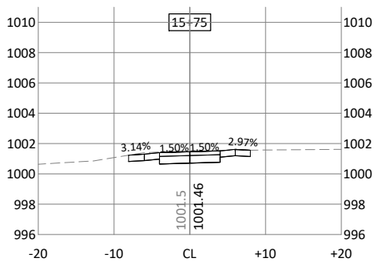


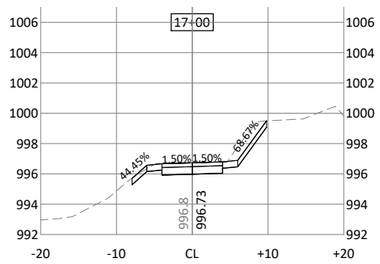


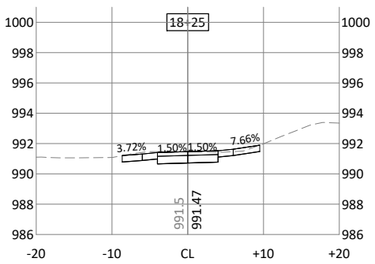


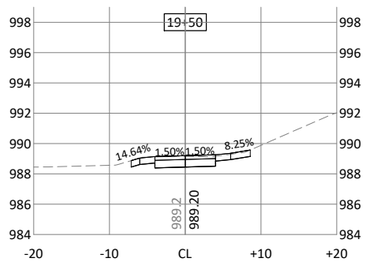


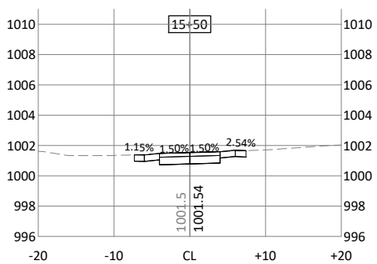


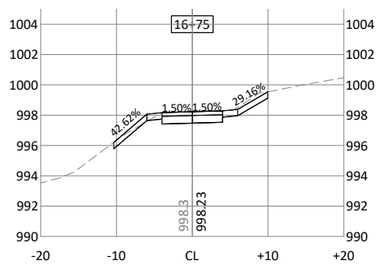


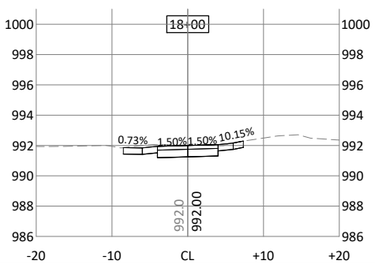


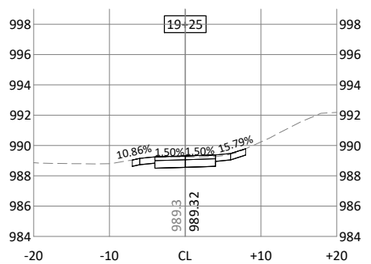












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BRADLEY J. FISHER

LIC. NO. 56595 DATE 02/09/2026

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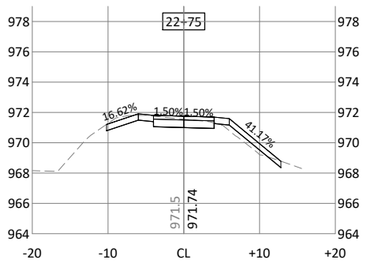
ARDEN HILLS

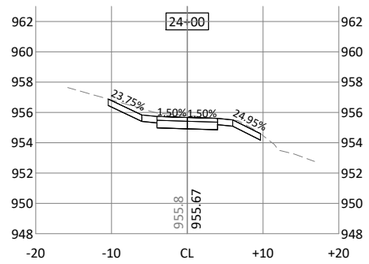
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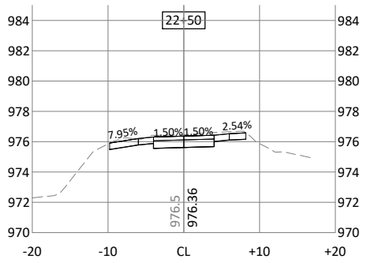
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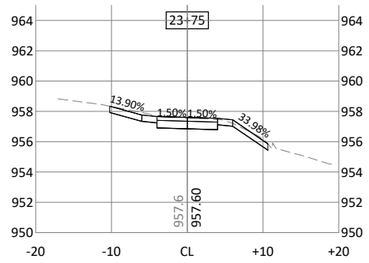
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
CROSS SECTIONS
KARTH LAKE PARK TRAIL SW

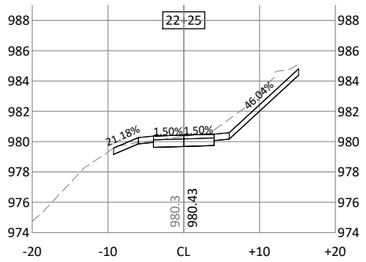
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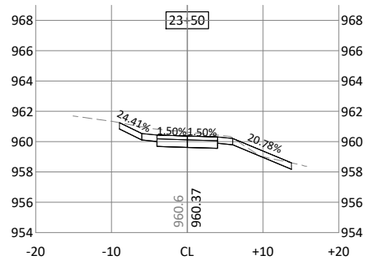


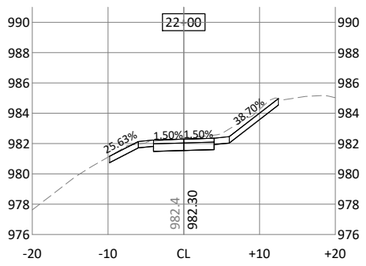


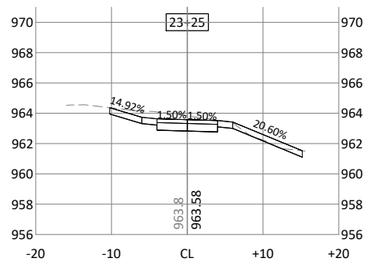


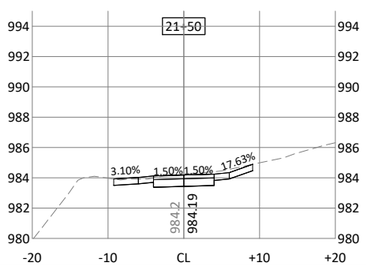


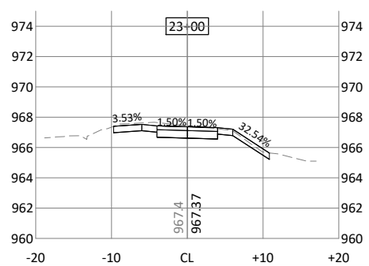


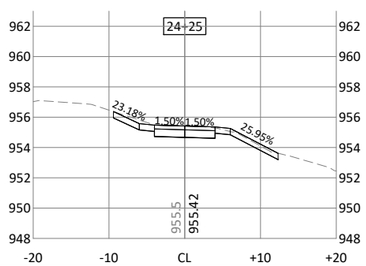












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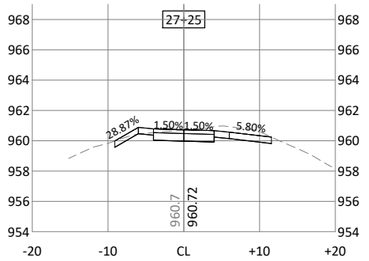
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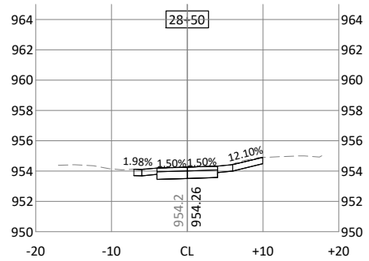
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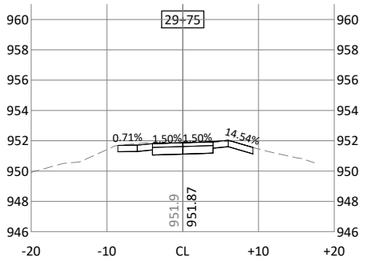
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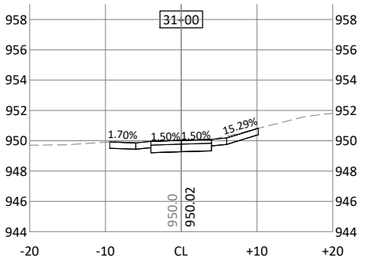
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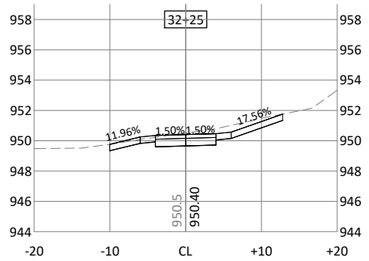
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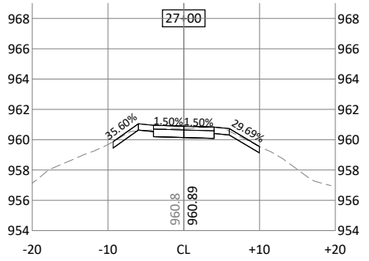


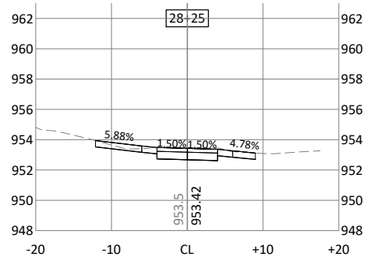


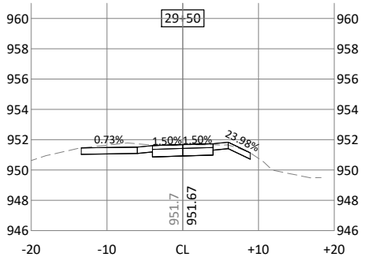


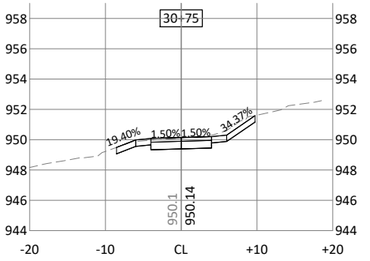


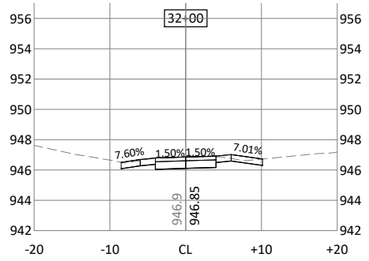


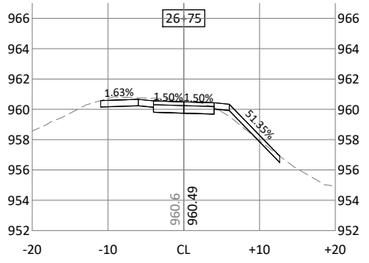


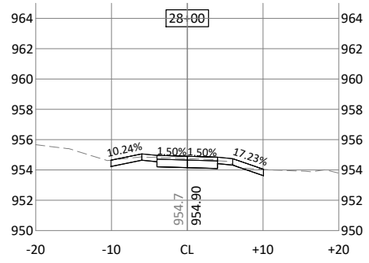


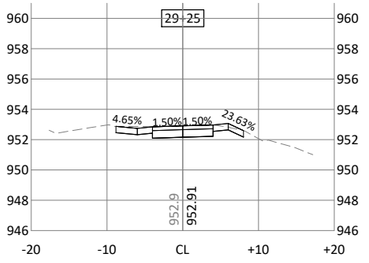


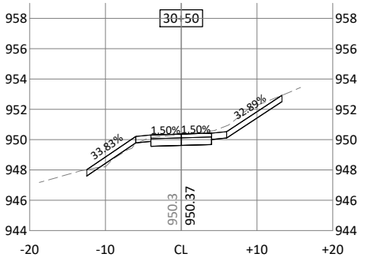


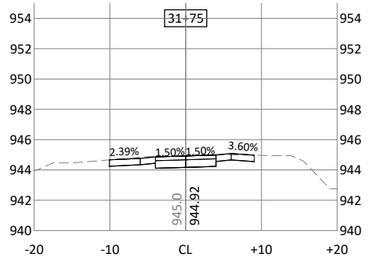


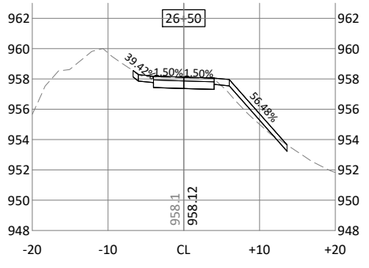


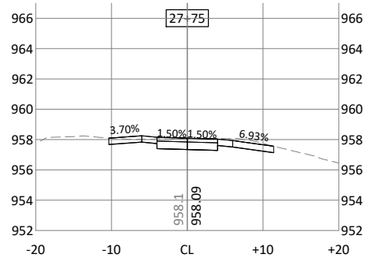


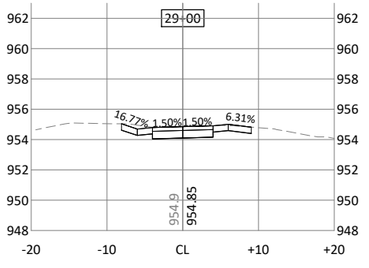


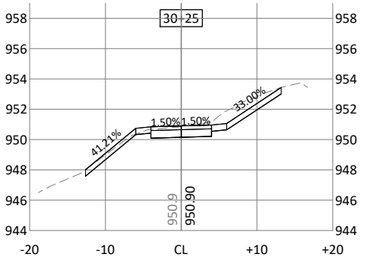


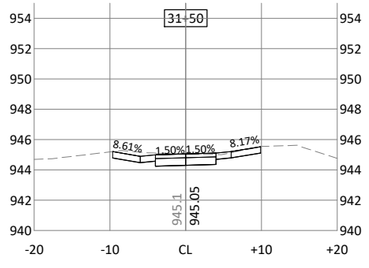


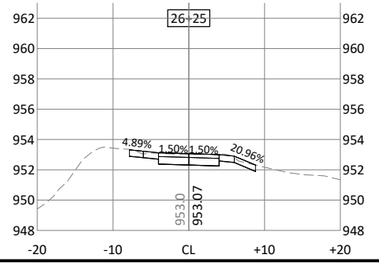


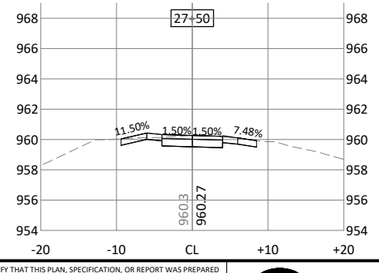


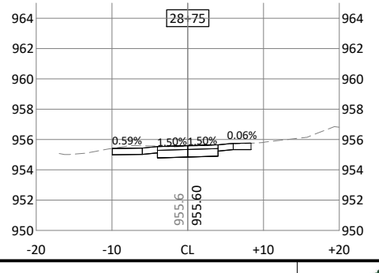


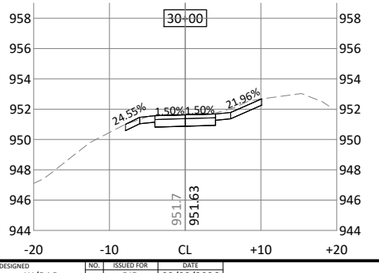


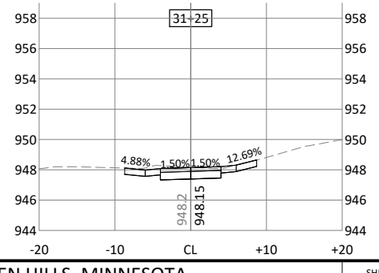












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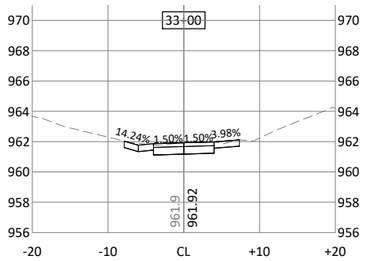
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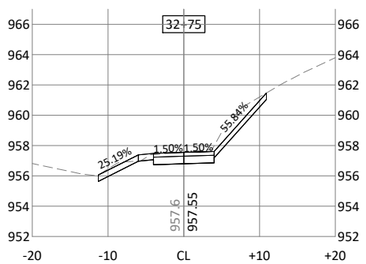
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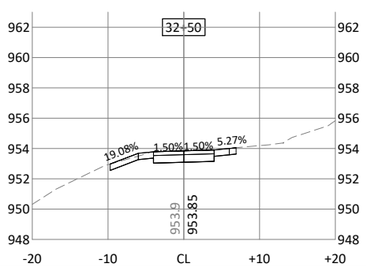
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
CROSS SECTIONS
KARTH LAKE PARK TRAIL NORTH

SHEET C8.03







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BRADLEY J. FISHER

LIC. NO. 56595 DATE 02/09/2026

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ARDEN HILLS

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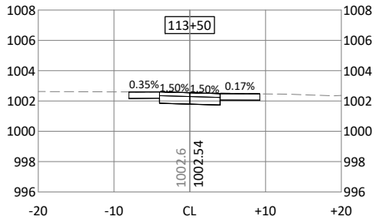
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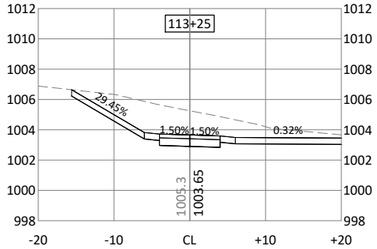
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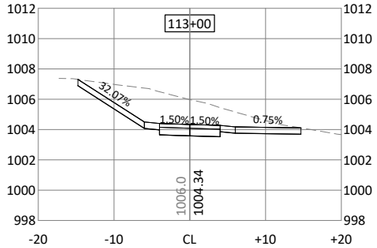
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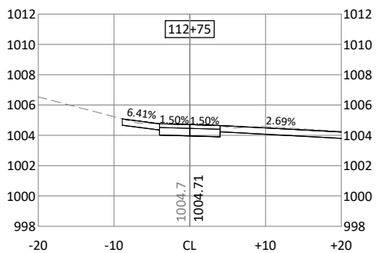
KARTH LAKE PARK TRAIL NORTH

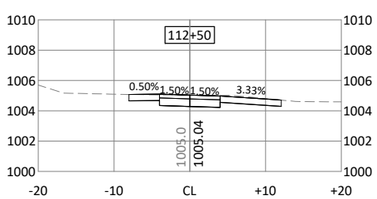
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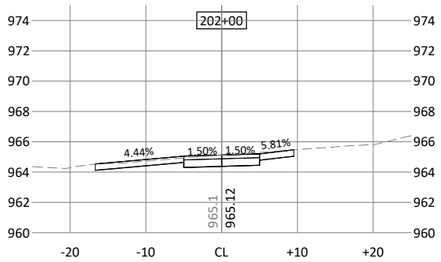
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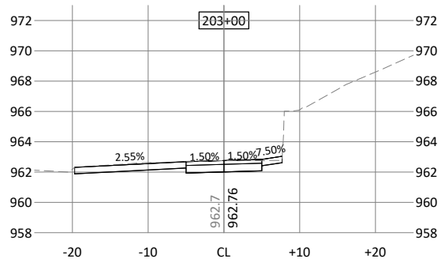
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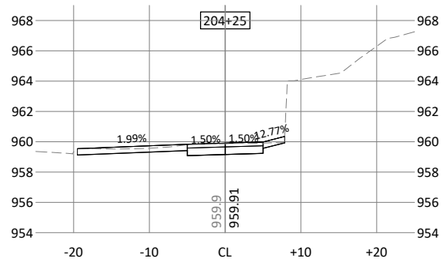
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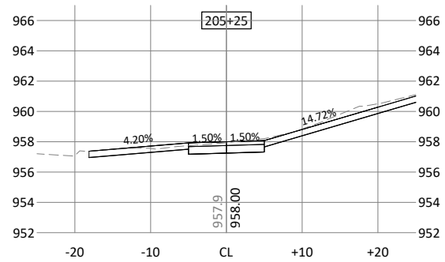
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
CROSS SECTIONS
CUMMINGS PARK TRAIL

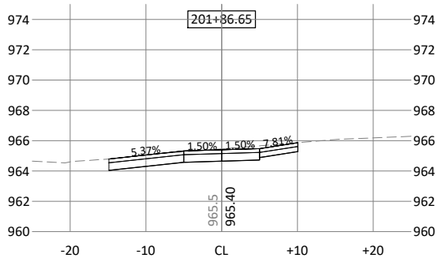
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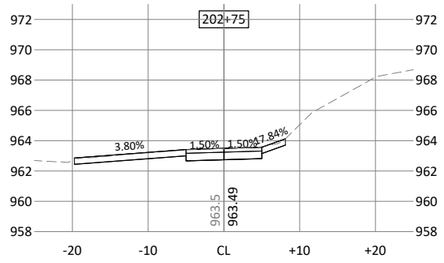


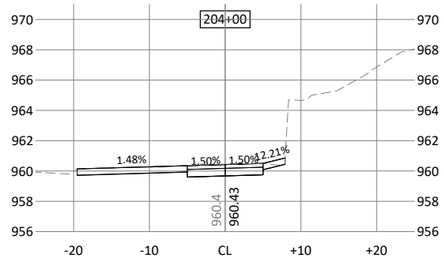


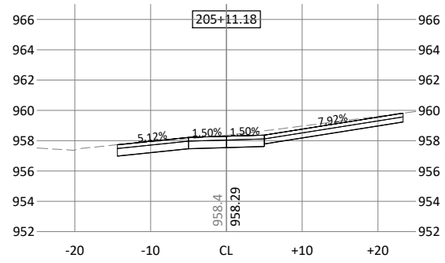


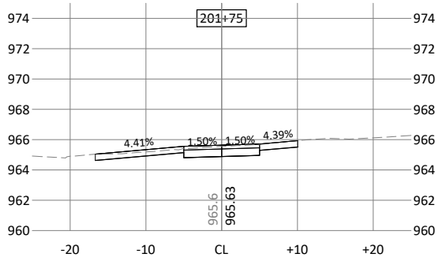


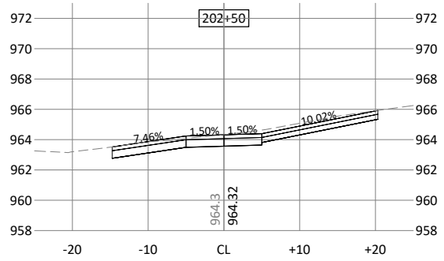


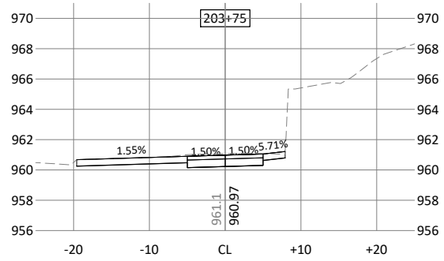


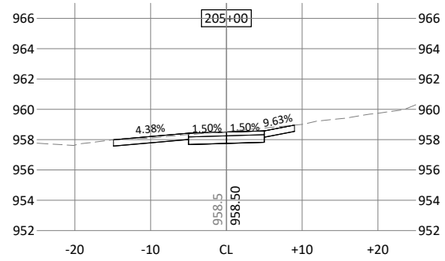


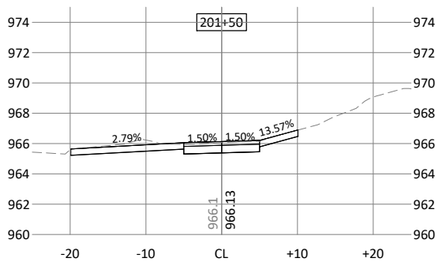


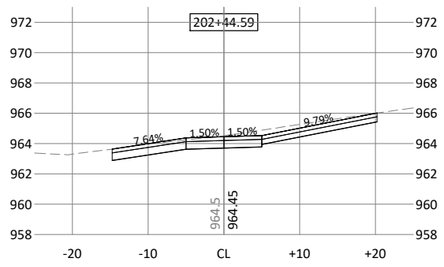


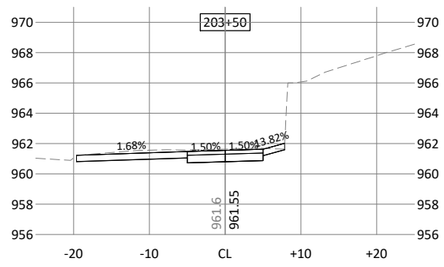


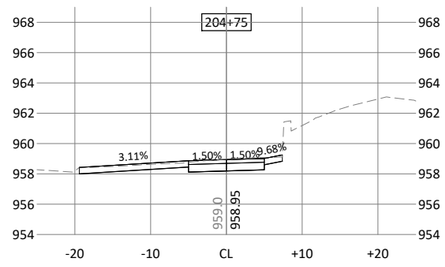


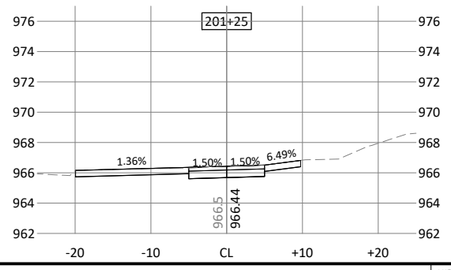


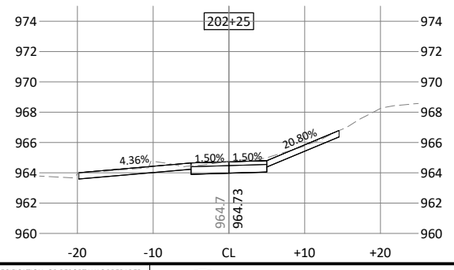


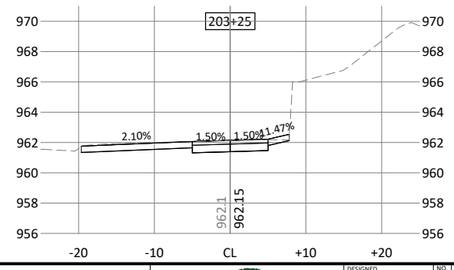


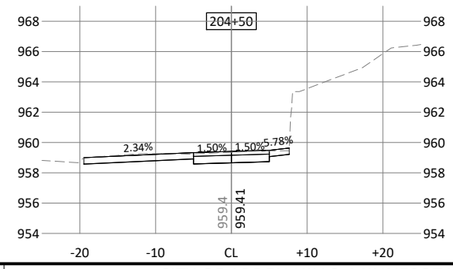












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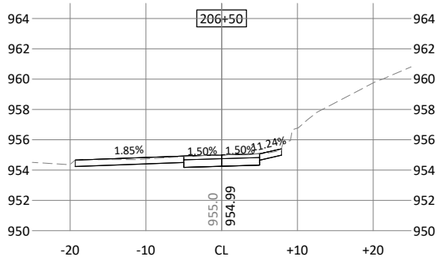
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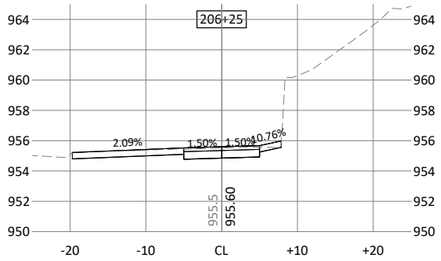
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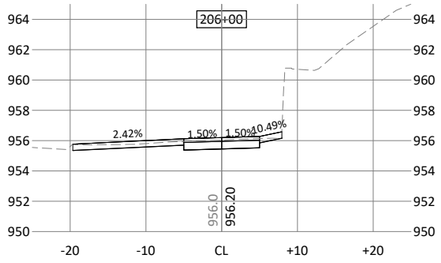
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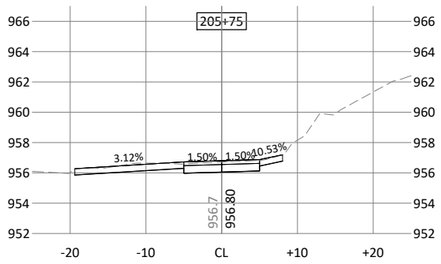
CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
CROSS SECTIONS
HWY 96 TRAIL

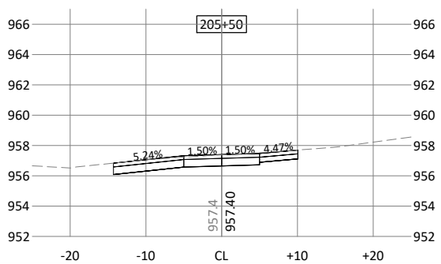
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
CROSS SECTIONS
HWY 96 TRAIL

SHEET C8.07

LIGHTING

- LUMINAIRE LEGEND
  - FIXTURE ID
  - 'E' DESIGNATES EMERGENCY LIGHT
  - CIRCUIT NUMBER
  - SWITCH CIRCUIT ID
- RECESSED LUMINAIRE
- EMERGENCY EGRESS/LIFE SAFETY SYMBOL
- NIGHT LIGHT SYMBOL
- NIGHT LIGHT AND EMERGENCY EGRESS
- PENDANT MOUNTED
- CRITICAL POWER
- RECESSED DOWNLIGHT (ROUND & SQUARE)
- RECESSED WALL WASH DOWNLIGHT
- SURFACE MOUNT LIGHT
- SURFACE MOUNT LIGHT
- WALL MOUNT LUMINAIRE
- TRACK LIGHTING
- EMERGENCY LIGHTING UNIT
- EXIT SIGN
  - SHADED REGION INDICATES FACE
  - STEM INDICATES WALL MOUNT
- EXIT SIGN, WITH EMERGENCY LIGHTING
- POLE MOUNTED LUMINAIRE
- LIGHT CONTROL DEVICE LABELS
  - DESCRIPTORS, REFER TO ABBREVIATIONS
  - SWITCH CIRCUIT IDENTIFIER
  - SWITCH TYPE:
    2=TWO POLE, SINGLE THROW
    3=THREE WAY
    4=FOUR WAY
    D=DIMMER
    P=WITH PILOT LIGHT
    T=TIMER
    SP=SPEED CONTROL
    K=KEYED
    M=MOTOR HORSE POWER RATED
    MS=MANUAL MOTOR STARTER
    H/L=HIGH/LOW CONTROL
- SWITCH
- OCCUPANCY SENSOR, CEILING MOUNT
- OCCUPANCY SENSOR, WALL MOUNT
- DAYLIGHT SENSOR, CEILING MOUNT
- DAYLIGHT SENSOR, WALL MOUNT
- LIGHTING CONTROL STATION
- EMERGENCY LIGHTING REMOTE HEAD

POWER

- RECEPTACLE LABELS
  - DESCRIPTORS, REFER TO ABBREVIATIONS:
    G = GROUND FAULT CIRCUIT INTERRUPTER
    GFCI = GROUND FAULT CIRCUIT INTERRUPTER
    AC = MOUNT ABOVE COUNTER TOP
    USB = DEVICE WITH USB CHARGING PORT(S)
    OC = OCCUPANCY CONTROLLED
    X" = MOUNTING HEIGHT AFF
  - CIRCUIT IDENTIFIER
- DUPLEX RECEPTACLE
- DOUBLE DUPLEX RECEPTACLE
- ISOLATED GROUND
- SWITCHED (SPLIT) RECEPTACLE
- GENERATOR POWER CIRCUIT
- CEILING MOUNT RECEPTACLE
- FLOOR MOUNT
- SPECIAL PURPOSE RECEPTACLE
- SIMPLEX RECEPTACLE
- MOTOR, SINGLE PHASE
- MOTOR, THREE PHASE
- DISCONNECT SWITCH
- DISCONNECT SWITCH, FUSED
- DISCONNECT SWITCH, ENCLOSED BREAKER
- COMBINATION MOTOR STARTER
- ELECTRIC HAND DRYER
- POWER POLE
- RETRACTABLE CORD REEL
- MULTI-OUTLET ASSEMBLY
- GROUNDING/ELECTRODE BOND POINT
- RECEPTACLE PEDESTAL
- IN-GRADE HANDHOLE
- WALL-MOUNT GROUND BUS
- RECESSED PANELBOARD
- PANELBOARD

COMMUNICATIONS

- TELEPHONE OUTLET
  - NUMBER OF PORTS (TYPICAL)
- DATA OUTLET
- DATA OUTLET, FLOOR MOUNT
- TELEVISION OUTLET
- AUDIO/VIDEO OUTLET
- MICROPHONE OUTLET
- SPEAKER, WALL MOUNT
- SPEAKER, CEILING MOUNT
- PROJECTOR/SMART BOARD WALL MOUNT
- PROJECTOR, CEILING MOUNT
- PROJECTOR CONTROL OUTLET
- SMARTBOARD CONTROL OUTLET
- INTERCOM STATION
- BELL/CHIME
- CABLE TRAY

SECURITY

- CARD READER
- KEY PAD
- DOOR CONTACT
- MOTION DETECTOR
- GLASS BREAK
- REQUEST TO EXIT
- ELECTRIFIED DOOR LOCK
- CAMERA
- ELECTRIFIED DOOR HARDWARE

FIRE ALARM

- ALARM STROBE, WALL MOUNT
- ALARM STROBE, CEILING MOUNT
- ALARM STROBE & HORN/SPEAKER, WALL MOUNT
- ALARM STROBE & HORN/SPEAKER, CEILING MOUNT
- ALARM HORN/SPEAKER, WALL MOUNT
- ALARM HORN/SPEAKER, CEILING MOUNT
- PULL STATION
- BELL/CHIME
- SMOKE DETECTOR
- HEAT DETECTOR
- DUCT SMOKE DETECTOR
- MAGNETIC DOOR HOLD
- ALARM CONTROL RELAY
- FLOW SWITCH
- TAMPER SWITCH
- ELECTRIC DAMPER
- REMOTE ANNUNCIATOR
- CONTROL PANEL
- NOTIFICATION APPLIANCE CONTROL PANEL

HEALTH CARE

- NURSE CALL LIGHT, WALL MOUNT
- NURSE CALL LIGHT, CEILING MOUNT
- PULL CORD
- STANDARD ROOM STATION
- BED AUDIO STATION
- GRAPHIC TERMINAL
  - SCREEN SIZE
- MARQUEE
- NURSE LOCATOR

GENERAL

- CONDUIT/WIRE RUN, EXPOSED
- CONDUIT/WIRE RUN, CONCEALED/UNDERGROUND
- JUNCTION BOX, WALL MOUNT
- JUNCTION BOX, CEILING MOUNT
- JUNCTION BOX, FLOOR MOUNT
- KEYED NOTE
- EQUIPMENT TAG
- REVISION TAG
- CONDUIT/WIRE TAG
- CONDUIT STUB W/BUSHING

PROCESS

- LEVEL TRANSDUCER
- FLOW METER
- TEMPERATURE TRANSDUCER
- SUSPENDED SOLIDS SENSOR
- DISSOLVED OXYGEN SENSOR
- GAS DETECTION SENSOR
- SLUDGE BLANKET SENSOR
- PH SENSOR
- SOLENOID
- MOTORIZED VALVE
- LIMIT SWITCH
- PRESSURE SWITCH
- THERMOSTAT
- FLOOD SWITCH
- FLOAT SWITCH
- MOTORIZED DAMPER
- SPEED SWITCH
- PROXIMITY SENSOR
- FLOW SWITCH
- TORQUE SWITCH
- HUMIDISTAT
- EMERGENCY STOP PUSHBUTTON
- CONTROL STATION
- CORD & PLUG

ONE-LINE DIAGRAM

- INCOMING LINE
- CIRCUIT BREAKER
- FUSE
- SWITCH
- DISCONNECT SWITCH
  - TYPE DESIGNATION
- STARTER / CONTACTOR
- CAPACITOR
- MOTOR STARTER OVERLOADS
- MOTOR
  - HORSE POWER RATING
- TRANSFORMER
- CURRENT TRANSFORMER
- METER
- GENERATOR
- VFD MOTOR CONTROLLER
- SSRV MOTOR CONTROLLER
- SURGE PROTECTION DEVICE
- AUTOMATIC TRANSFER SWITCH
- LIGHTNING ARRESTOR
- HEATER

SCHEMATIC SYMBOLS

- RELAY COIL (NUMBER DENOTED)
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- THREE POSITION SELECTOR SWITCH (HAND-OFF-AUTO DENOTED
- TWO POSITION SELECTOR SWITCH (RUN-OFF DENOTED)
- PUSH TO TEST PILOT LIGHT (COLOR DENOTED)
- PILOT LIGHT (COLOR DENOTED)
- PUSH BUTTON - NORMALLY CLOSED
- PUSH BUTTON - NORMALLY OPEN
- TIMING RELAY
- CLOSED SWITCH - TIME DELAY OPEN
- OPEN SWITCH - TIME DELAY CLOSED
- CLOSED SWITCH, TIME DELAY CLOSED
- OPEN SWITCH, TIME DELAY OPEN
- TEMPERATURE SWITCH - CLOSE ON RISING TEMPERATURE
- TEMPERATURE SWITCH - OPEN ON RISING TEMPERATURE
- SOLENOID
- CONTROL POWER TRANSFORMER
- GROUND
- HEATER
- TERMINAL BLOCK
- CONNECTION NODE

PANELBOARD NAMING LEGEND:

DP = DISTRIBUTION PANEL
LP = LIGHTING PANELBOARD

DP-X-Y : X= FLOOR LEVEL PANEL IS LOCATED
Y= # OF PANEL ON THE FLOOR LEVEL

ELECTRICAL ABBREVIATIONS

1P	1 POLE
2P	2 POLE
3P	3 POLE
4P	4 POLE
A	AMPERE OR AMP
A/C	AIR CONDITIONER
AC	ABOVE COUNTER
ACLG	ABOVE CEILING
ADO	AUTOMATIC DOOR OPENER
AIC	AMPERE INTERRUPTING CAPACITY
AF	ARC FAULT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
AMPL	AMPLIFIER
ANNUN	ANNUNCIATOR
APPROX	APPROXIMATELY
AQSTAT	AQUASTAT
ARCH	ARCHITECT, ARCHITECTURAL
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AUDIO VISUAL
AWG	AMERICAN WIRE GAUGE
BAT	BATTERY
BD	BOARD
BLDG	BUILDING
BMS	BUILDING MANAGEMENT SYSTEM
C	CONDUIT
CAB	CABINET
CAT	CATALOG
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CKT	CIRCUIT
CLG	CEILING
COMB	COMBINATION
CMPR	COMPRESSOR
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUATION OR CONTINUOUS
CONTR	CONTRACTOR
CONV	CONVECTOR
CP	CIRCULATING PUMP
CT	CURRENT TRANSFORMER
CTR	CENTER
CU	COPPER
D	DAMPER
DC	DIRECT CURRENT
DCP	DOMESTIC WATER CIRCULATING PUMP
DEPT	DEPARTMENT
DET	DETAIL
DIA	DIAMETER
DISC	DISCONNECT
DIST	DISTRIBUTION
DIV	DIVISION
DN	DOWN
DPR	DAMPER
DS	DISCONNECT/SAFETY SWITCH
DT	DOUBLE THROW
DWG	DRAWING
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EP	ELECTRIC PNEUMATIC
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXH	EXHAUST
EXP	EXPLOSION PROOF
F	FUSED OR FUSE
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FCU	FAN COIL UNIT
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLR	FLOOR
FLUOR	FLUORESCENT
FU	FUSE
FVR	FULL VOLTAGE REVERSING
FVNR	FULL VOLTAGE NON-REVERSING
G	GROUND FAULT CIRCUIT INTERRUPTER
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTOR
GND	GROUND
GRS	GALVANIZED RIGID STEEL (CONDUIT)
GYPBD	GYPSUM BOARD
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPF	HIGH POWER FACTOR
HSP	HIGH SERVICE PUMP
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HV	HIGH VOLTAGE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWP	HYDRONIC WATER PUMP
HZ	HERTZ
IC	INTERRUPTING CURRENT
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
INCAND	INCANDESCENT
IR	INFRARED
I/W	INTERLOCK WITH
J	JUNCTION BOX
J-BOX	JUNCTION BOX
JB	JUNCTION BOX
KAIC	KILOAMPS INTERUPPTING CAPACAITY
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KVAR	KILOVOLT-AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
LCP	LIGHTING CONTROL PANEL
LCS	LOCAL CONTROL STATION
LOC	LOCATE OR LOCATION
LT	LIGHT
LTG	LIGHTING
LTNG	LIGHTNING
LV	LOW VOLTAGE
MAX	MAXIMUM
M/C	MOMENTARY CONTACT
MC	MECHANICAL CONTRACTOR
MCA	MAX CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDC	MAIN DISTRIBUTION CENTER
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MIC	MICROPHONE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MOA	MULTIOUTLET ASSEMBLY
MS	MANUAL MOTOR STARTER
MSBD	MAIN SWITCHBOARD
MT	MOUNT
MTS	MANUAL TRANSFER SWITCH
MTR	MOTOR, MOTORIZED
N.C.	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NIC	NOT IN CONTRACT
NIU	NETWORK INTERFACE UNIT
NL	NIGHT LIGHT
N.O.	NORMALLY OPEN
NPF	NORMAL POWER FACTOR
NTS	NOT TO SCALE
OC	OCCUPANCY CONTROLLED
OH	OVERHEAD
OIT	OPERATOR INTERFACE TERMINAL
OL	OVERLOADS
PA	PUBLIC ADDRESS
PB	PULL BOX OR PUSHBUTTON
PE	PNEUMATIC ELECTRIC
PED	PEDESTAL
PF	POWER FACTOR
PH	PHASE
PIV	POST INDICATING VALVE
PLMG	PLUMBING CONTRACTOR
PNL	PANEL
PP	POWER POLE
PR	PAIR
PRI	PRIMARY
PROJ	PROJECTION
PRV	POWER ROOF VENTILATOR
PT	POTENTIAL TRANSFORMER
PTR	PRINTER
PVC	POLYVINYL CHLORIDE (CONDUIT)
PWR	POWER
QTY	QUANTITY
QZ	QUARTZ
RCPT	RECEPTACLE
RQD	REQUIRED
RM	ROOM
RSC	RIGID STEEL CONDUIT
RTU	ROOF TOP UNIT
RTU	REMOTE TELEMETRY UNIT
SC	SURFACE CONDUIT
SCP	SUPERVISORY CONTROL PANEL
SEC	SECONDARY
SHT	SHEET
SIM	SIMILAR
S/N	SOLID NEUTRAL
SPEC	SPECIFICATION
SPKR	SPEAKER
SP	SPARE
SR	SURFACE RACEWAY
SS	STAINLESS STEEL
SSRV	SOLID STATE REDUCED VOLTAGE
SST	SOLID STATE
SSW	SELECTOR SWITCH
S/S	STOP/START PUSHBUTTONS
STA	STATION
STD	STANDARD
SURF	SURFACE MOUNTED
SW	SWITCH
SWBD	SWITCHBOARD
SYM	SYMMETRICAL
SYS	SYSTEM
TEL	TELEPHONE
TERM	TERMINAL
TL	TWIST LOCK
TR	TAMPER RESISTANT
TSTAT	THERMOSTAT
TTC	TELEPHONE TERMINAL CABINET
TV	TELEVISION
TVTC	TELEVISION TERMINAL CABINET
TYP	TYPICAL
UC	UNDER COUNTER
UE	UNDERGROUND ELECTRICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
USB	WITH USB CHARGING PORT
UT	UNDERGROUND TELEPHONE
UTIL	UTILITY
UV	UNIT VENTILATOR OR ULTRAVIOLET
V	VOLT
VA	VOLT-AMPERES
VDT	VIDEO DISPLAY TERMINAL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VFY	VERIFY
VOL	VOLUME
W	WATT OR WIRE
W/	WITH
WG	WIRE GUARD
WH	WATER HEATER
W/O	WITHOUT
WP	WEATHERPROOF
XFMR	TRANSFORMER
XFR	TRANSFER
∠	ANGLE
@	AT
Δ	DELTA
'	FEET
"	INCHES
#	NUMBER
Ø	PHASE
℄	CENTER LINE
P	PLATE
X"	MOUNTING HEIGHT AFF

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2026 PMP STREET & UTILITY IMPROVEMENTS
ELECTRICAL SYMBOLS AND ABBREVIATIONS

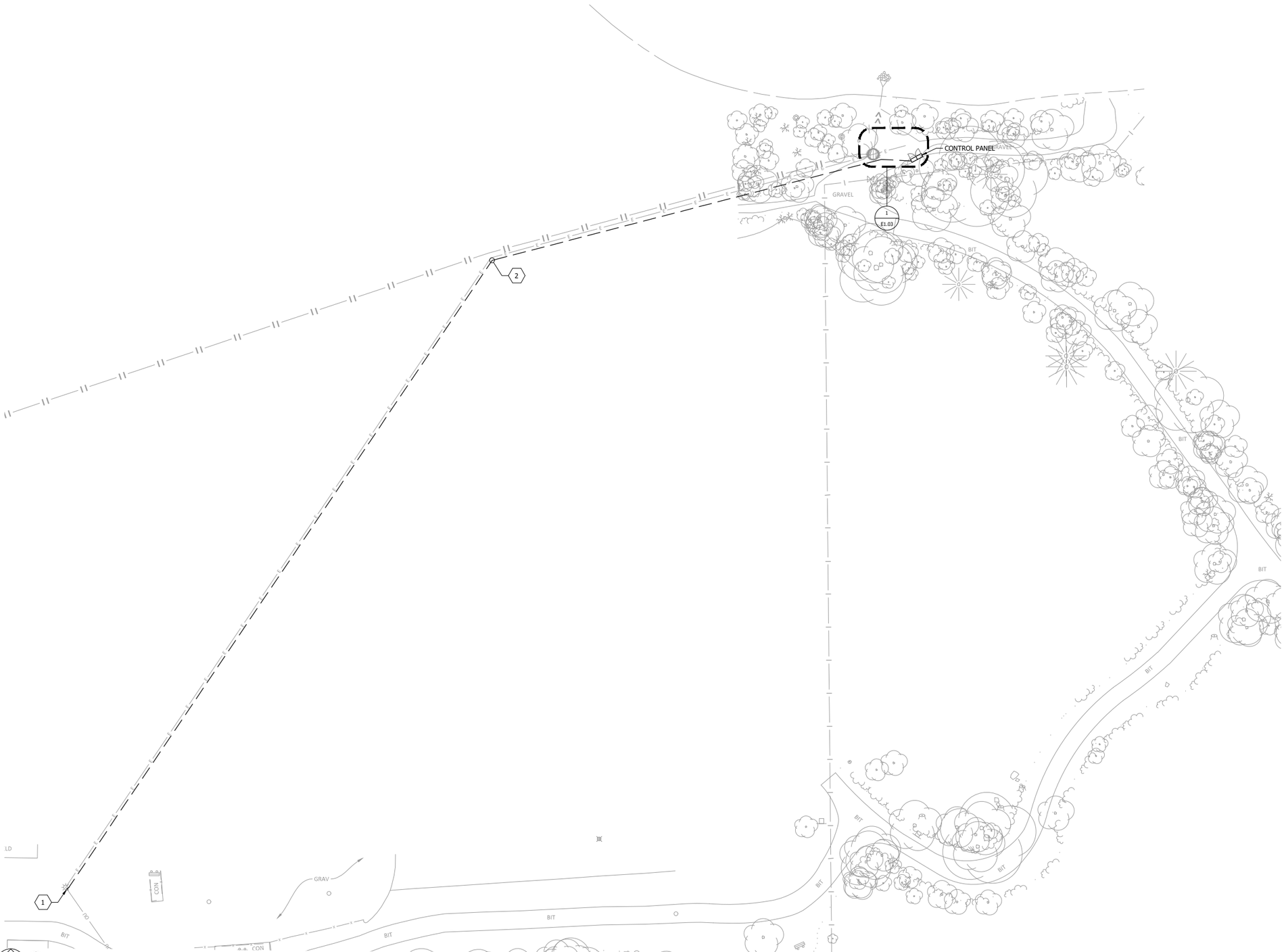
SHEET E1.01

GENERAL NOTES:

1. VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO PLACEMENT OF EQUIPMENT AND ANY EARTHWORK.
2. COORDINATE FINAL LOCATION OF CONTROL PANEL WITH THE OWNER'S ON-SITE REPRESENTATIVE PRIOR TO INSTALLATION.
3. COORDINATE DIMENSIONS OF ANY EQUIPMENT THAT REQUIRES A CONCRETE FOUNDATION OR PAD WITH CONCRETE SUPPLIER.
4. WETWELL INTERIOR IS CLASSIFIED AS A CLASS 1, DIVISION 2, GROUP D HAZARDOUS LOCATION.
5. DO NOT INSTALL ELECTRICAL EQUIPMENT IN HAZARDOUS LOCATIONS OTHER THAN CONDUIT TO WETWELL AND DEVICES/CABLING IN WETWELL.

KEYEDNOTES:

1. EXISTING UTILITY METER LOCATED ON EXISTING SPORTS FIELD LIGHTING STRUCTURE TO REMAIN, SEE PHOTO INCLUDED ON THIS DRAWING.
2. UNDER ALTERNATE 4 PROVIDE A NEW 1.25"C-3#2,1#6G FED FROM EXISTING UTILITY METER TO NEW LIFT STATION CONTROL PANEL. ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3 IS TO REUSE THE EXISTING CONDUIT AND WIRE AND RECONNECT TO NEW LIFT STATION CONTROL PANEL.



N 1 ELECTRICAL SITE PLAN

0 12.5' 25' 50'



2 EXISTING UTILITY METER PHOTO
NOT TO SCALE

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ELECTRICAL SITE PLAN

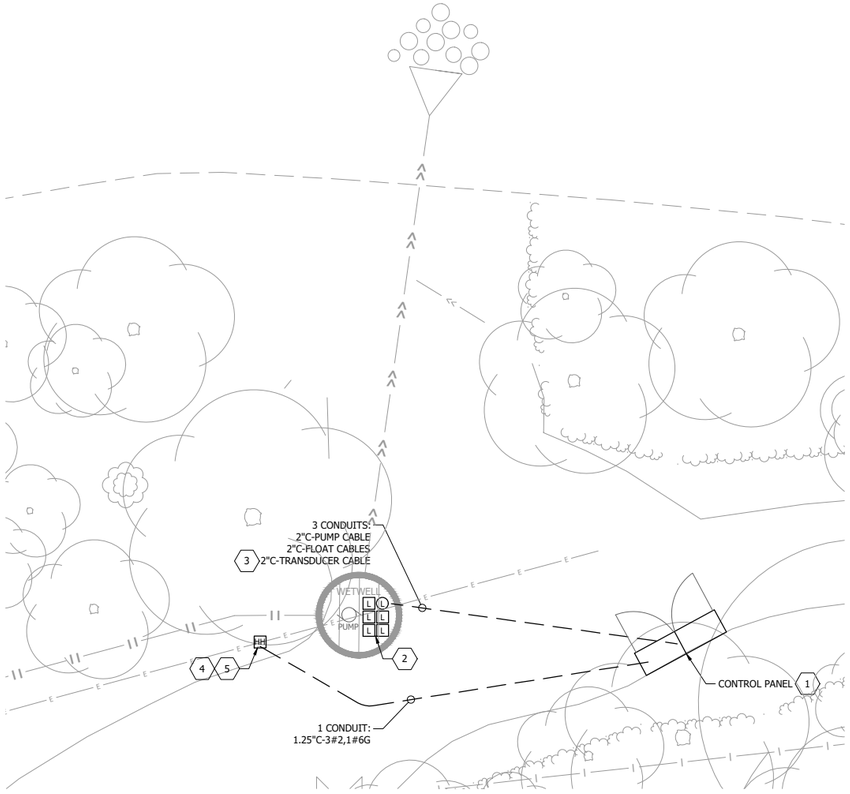
SHEET
E1.02

GENERAL NOTES:

1. VERIFY LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO PLACEMENT OF EQUIPMENT AND ANY EARTHWORK.
2. COORDINATE FINAL LOCATION OF CONTROL PANEL WITH THE OWNER'S ON-SITE REPRESENTATIVE PRIOR TO INSTALLATION.
3. COORDINATE DIMENSIONS OF ANY EQUIPMENT THAT REQUIRES A CONCRETE FOUNDATION OR PAD WITH CONCRETE SUPPLIER.
4. WETWELL INTERIOR IS CLASSIFIED AS A CLASS 1, DIVISION 2, GROUP D HAZARDOUS LOCATION.
5. DO NOT INSTALL ELECTRICAL EQUIPMENT IN HAZARDOUS LOCATIONS OTHER THAN CONDUIT TO WETWELL AND DEVICES/CABLING IN WETWELL.
6. ALL CABLES IN THE WETWELL SHALL BE PROTECTED BY A TECHFLEX FLEXO RODENT RESISTANT BRAIDED SLEEVE, OR EQUAL PRODUCT TO PROTECT CABLES FROM RODENT DAMAGE.

KEYEDNOTES:

1. DEMOLISH EXISTING CONTROL PANEL AND PROVIDE NEW LIFT STATION CONTROL PANEL IN ITS PLACE. PROVIDE NEW CONCRETE PAD FOR NEW LIFT STATION CONTROL PANEL. UNDER ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3 CONNECT NEW LIFT STATION CONTROL PANEL TO EXISTING ELECTRICAL FEED VIA NEW HANDHOLE AND EXTENSION OF EXISTING ELECTRICAL. UNDER ALTERNATE 4 PROVIDE NEW ELECTRICAL FEED AS SHOWN ON DRAWING E1.02. SEE PHOTOS OF EXISTING CONTROL PANEL INCLUDED ON THIS DRAWING. TURN OVER THE EXISTING VFD AND ANY OTHER CONTROL PANEL COMPONENTS THE OWNER WOULD LIKE TO SALVAGE AND KEEP IN THEIR STOCK AS SPARES TO THE OWNER.
2. REFER TO LIFT STATION CONTROL SYSTEM SPECIFICATIONS FOR DETAILS OF CONTROL SYSTEM PROJECT ALTERNATES.
3. THIS CONDUIT WOULD BECOME A SPARE CONDUIT UNDER ALTERNATE 1.
4. UNDER ALTERNATE 1, ALTERNATE 2, AND ALTERNATE 3, INTERCEPT EXISTING ELECTRICAL FEED AND PROVIDE HANDHOLE TO CONNECT NEW CONDUIT AND WIRE TO EXISTING TO EXTEND THE ELECTRICAL FEED TO THE NEW CONTROL PANEL LOCATION.
5. UNDER ALTERNATE 4 ELIMINATE THE PROPOSED HANDHOLE AND RUN NEW CONDUIT AND WIRE DIRECTLY TO THE NEW CONTROL PANEL LOCATION.



N 1 ELECTRICAL SITE PLAN - LIFT STATION

0 2.5' 5' 10'



2 EXISTING PUMP CONTROL PANEL PHOTOS
NOT TO SCALE

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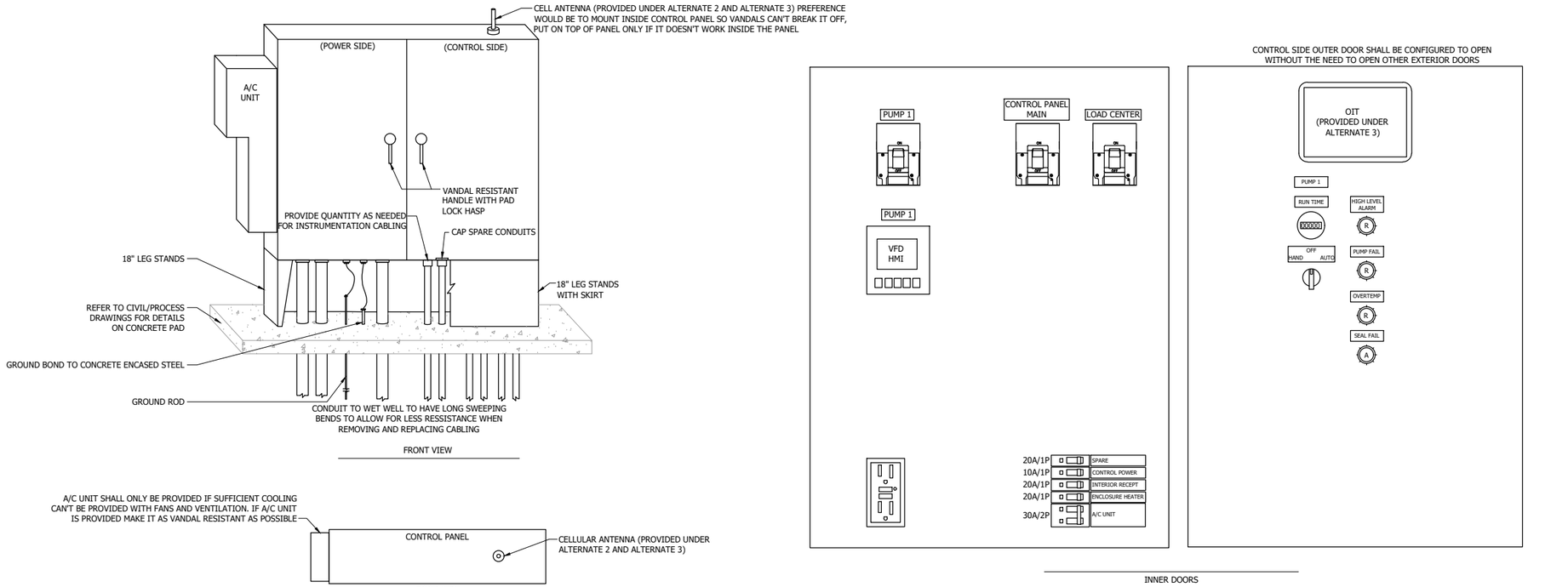
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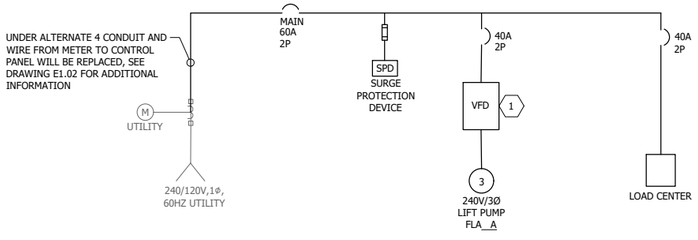
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ELECTRICAL SITE PLAN

SHEET
E1.03



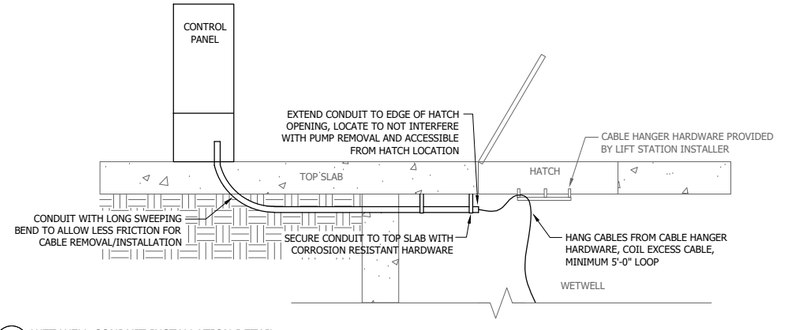
1 CONTROL PANEL ELEVATION
NOT TO SCALE



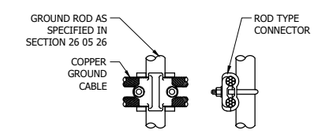
GENERAL NOTES:
1. ELECTRICAL EQUIPMENT SHOWN WITH DARK (BLACK) LINES IS NEW ELECTRICAL EQUIPMENT. ELECTRICAL EQUIPMENT SHOWN WITH LIGHT (GRAY) LINES IS EXISTING ELECTRICAL EQUIPMENT.

1 KEYED NOTES:
1. VFD TO BE USED FOR PHASE CONVERSION FROM 1Ø TO 3Ø.

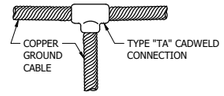
2 ONE-LINE DIAGRAM
NOT TO SCALE



6 WET WELL CONDUIT INSTALLATION DETAIL
NOT TO SCALE



3 CABLE TO ROD CONNECTION DETAIL
NOT TO SCALE

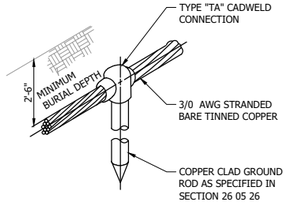


4 GROUND CABLE CONNECTION DETAIL
NOT TO SCALE

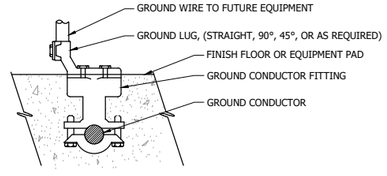


NOTE:
1. COPPER CONDUCTOR TAP TO HORIZONTAL REINFORCING BAR (REBAR) LOCATED NEAR THE BOTTOM OR VERTICALLY, WITHIN THAT PORTION OF CONCRETE FOUNDATION OR FOOTING. MAXIMUM CONDUCTOR SIZE IS 4/0 AWG. MINIMUM DIAMETER OF REBAR IS 1/2". MINIMUM LENGTH OF REBAR IS 20'-0".

5 GROUNDING CABLE CADWELDED TO REBAR DETAIL
NOT TO SCALE

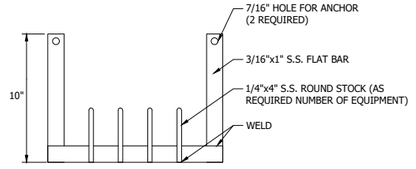


7 GROUND ROD DETAIL
NOT TO SCALE



NOTE:
1. BOLTS SHALL BE INSERTED IN BOLT HOLES BEFORE CONNECTOR IS EMBEDDED.

8 GROUNDING INSERT DETAIL
NOT TO SCALE



9 WET WELL CABLE HANGER DETAIL
NOT TO SCALE

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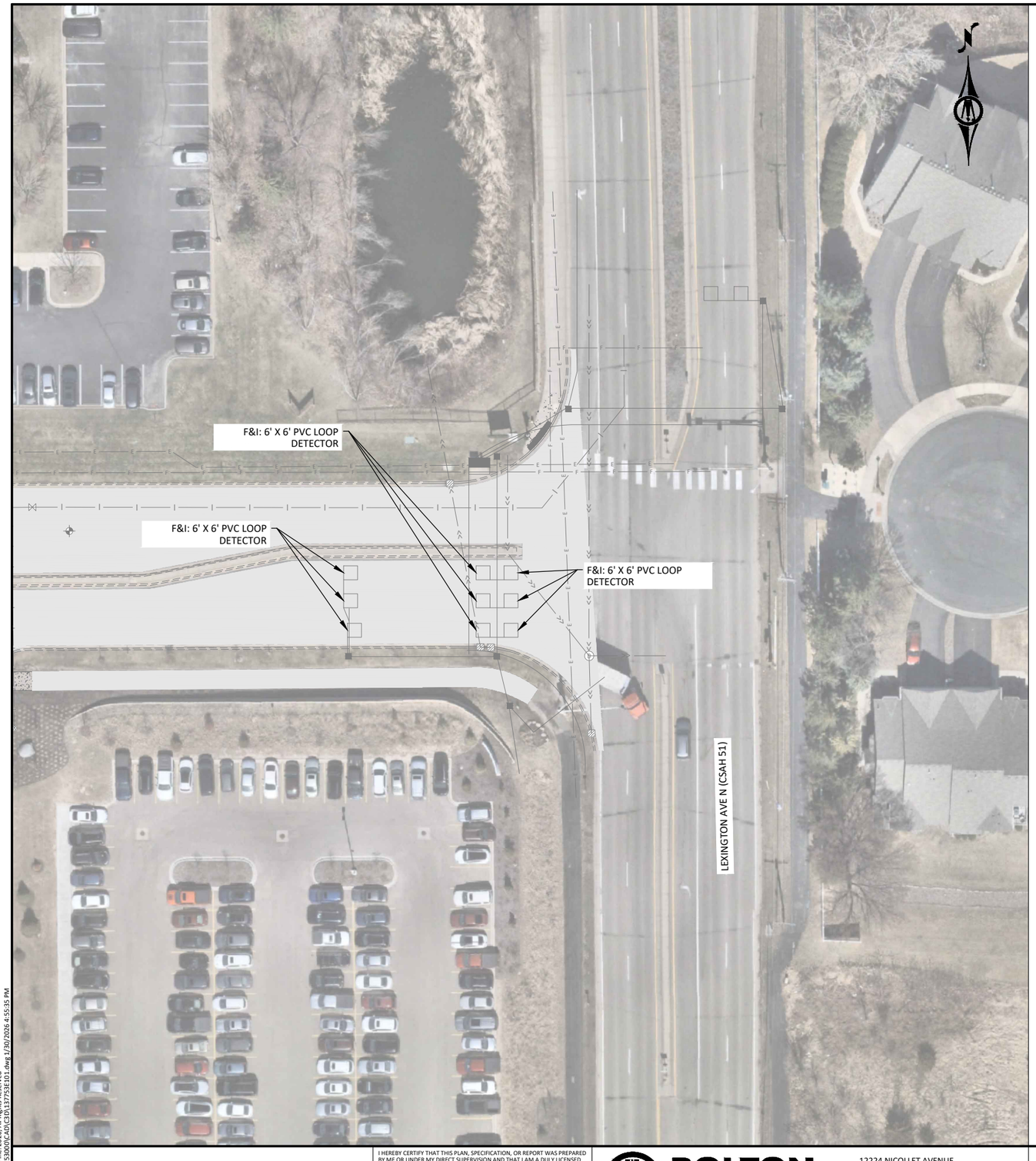
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2026 PMP STREET & UTILITY IMPROVEMENTS
ELECTRICAL DETAILS

SHEET
E1.04



GENERAL NOTES:
1. SPLICE NEW LOOP DETECTORS IN EXISTING HANDHOLES
2. COORDINATE CHANGE TO TIMED SIGNAL W/ RAMSEY COUNTY BEFORE REMOVING LOOP DETECTORS DURING RECLAMATION OPERATIONS

HORZ. 0 25 50
SCALE FEET

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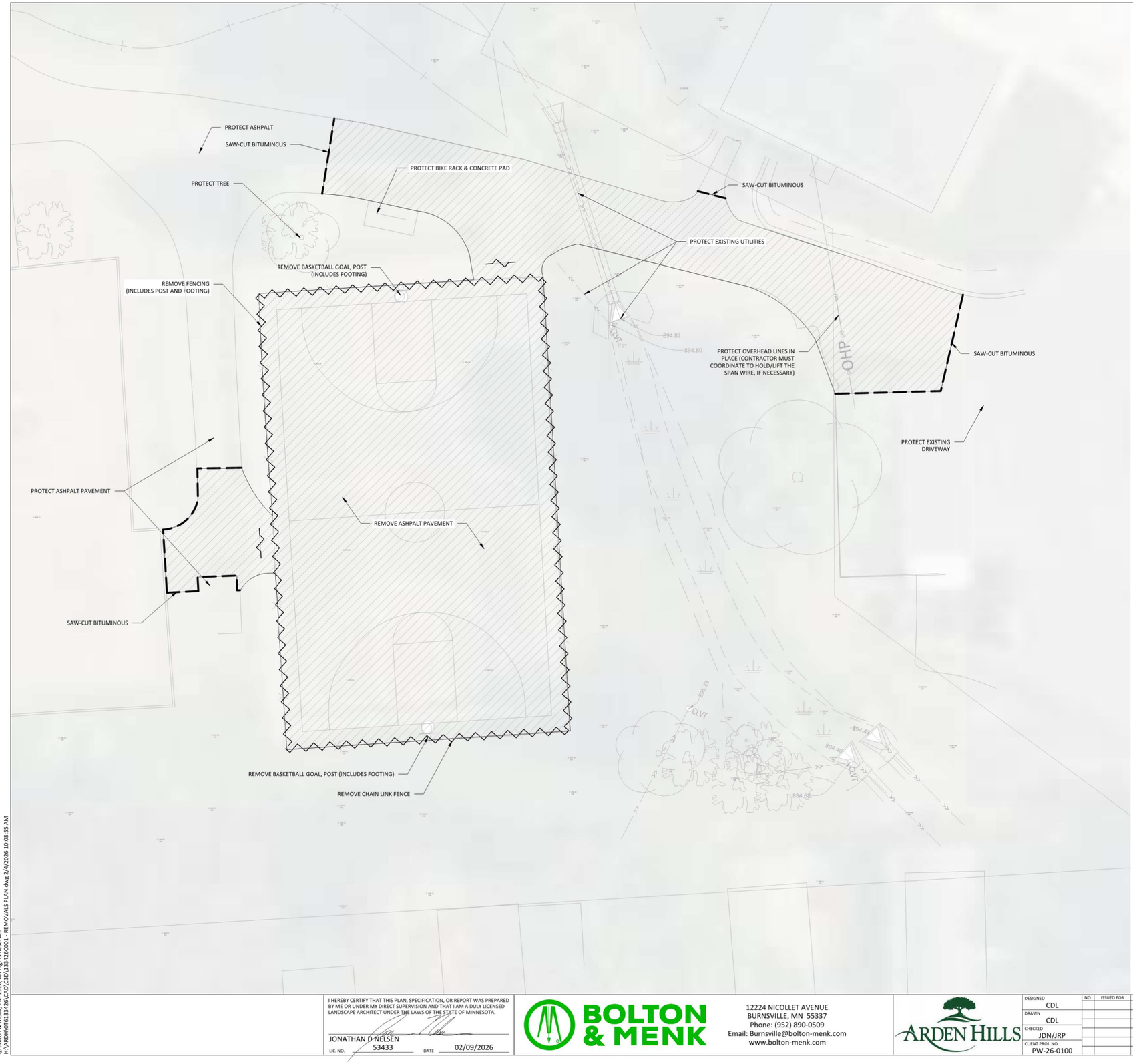
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
SIGNAL PLAN

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NOTES

1. MINIMIZE DISTURBANCE TO SITE AND PROTECT EXISTING VEGETATION AND SITE FEATURES (CURBS, WALKS, PAVEMENTS, OVERHEAD AND UNDERGROUND UTILITIES, SIGNAGE, FENCING, ROADWAYS, ETC.) WHICH ARE TO REMAIN.
2. REPAIR OR REPLACE EXISTING PROPERTY AND SITE FEATURES, INCLUDING GRASS AND VEGETATION, WHICH IS TO REMAIN THAT IS DAMAGED BY THE WORK, TO THE OWNER'S SATISFACTION AND AT NO ADDITIONAL COST TO THE OWNER.
3. VISIT THE SITE PRIOR TO BIDDING; BE FAMILIAR WITH ACTUAL CONDITIONS IN THE FIELD. EXTRA COMPENSATION WILL NOT BE ALLOWED FOR CONDITIONS WHICH COULD HAVE BEEN DETERMINED OR ANTICIPATED BY EXAMINATION OF THE SITE, THE CONTRACT DRAWINGS AND THE INFORMATION AVAILABLE PERTAINING TO EXISTING SOILS, UTILITIES AND OTHER SITE CHARACTERISTICS.
4. HIRE THE SERVICES OF A UTILITY LOCATOR COMPANY TO LOCATE ALL PRIVATELY OWNED UTILITIES THAT MAY BE DISTURBED BY CONSTRUCTION OPERATIONS.
5. THE ARDEN MANOR PARK PROJECT SITE IS REQUIRED TO HAVE SAFETY FENCE INSTALLED AROUND THE PERIMETER OF THE ENTIRE WORK AREA (INCLUDING ANY STAGING AREAS) AT THE CONCLUSION OF EACH WORK DAY. THIS SHALL BE INCLUDED IN THE LUMP SUM PRICE BID.

LEGEND

- ASPHALT PAVEMENT REMOVALS
- FENCING REMOVALS
- SAW CUT

HORZ. SCALE 0 10 20 FEET

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JONATHAN D NELSEN
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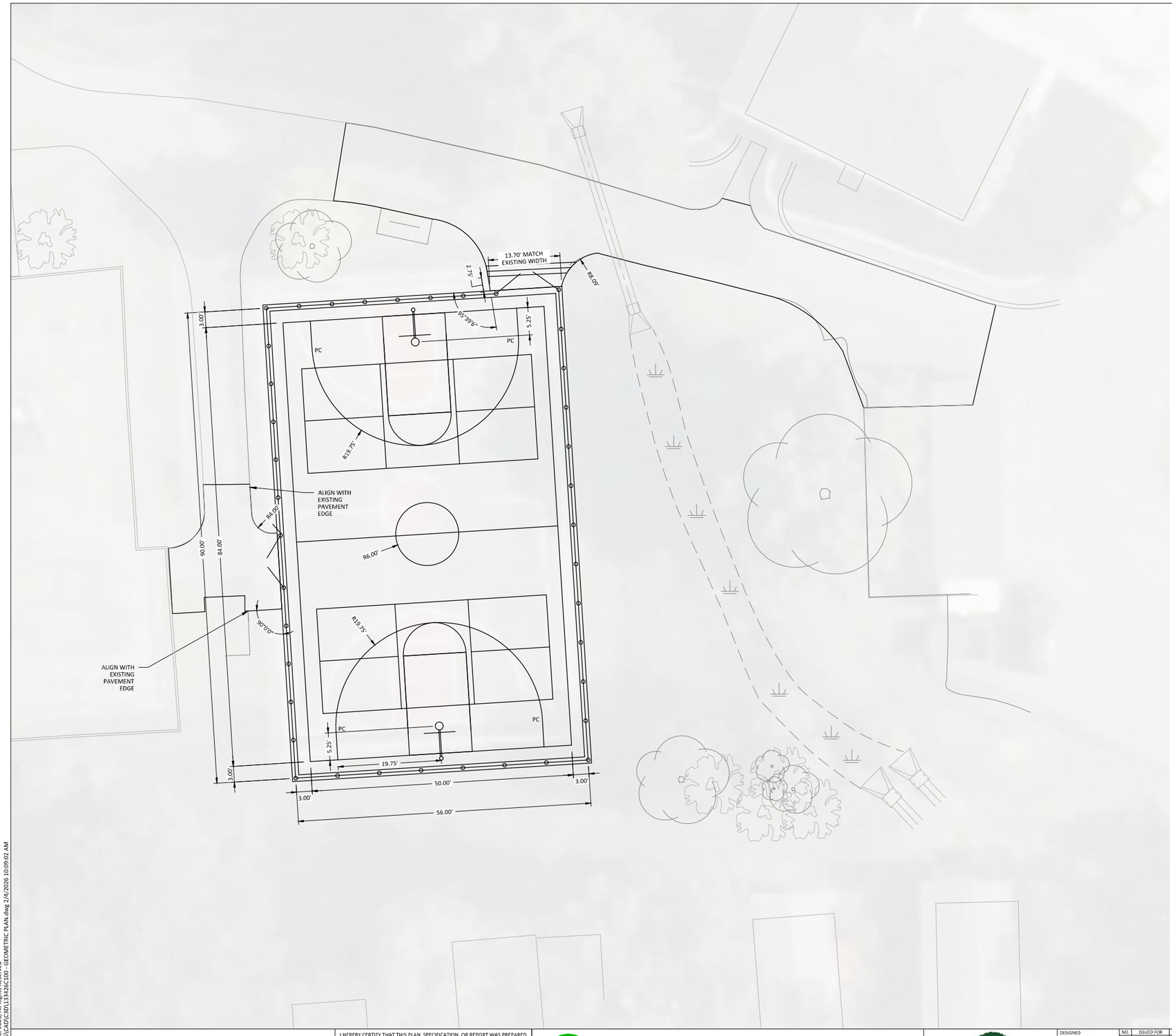
ARDEN HILLS

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DRAWN	CDL
CHECKED	JDN/JRP
CLIENT PROJ. NO.	PW-26-0100

NO.	ISSUED FOR	DATE

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET AND UTILITY IMPROVEMENTS
ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
REMOVALS PLAN

SHEET L1.00



NOTES

1. ALL APPLICABLE DIMENSIONS ARE TO EDGE OF PAVEMENT OR CENTERLINE OF FENCE UNLESS OTHERWISE NOTED.
2. CHECK ALL PLAN AND DETAIL DIMENSIONS AND VERIFY SAME BEFORE FIELD LAYOUT.
3. BASE FOR LAYOUT IS THE OLD COURTS

LEGEND

PC	POINT OF CURVATURE

0 10 20
HORZ. SCALE FEET

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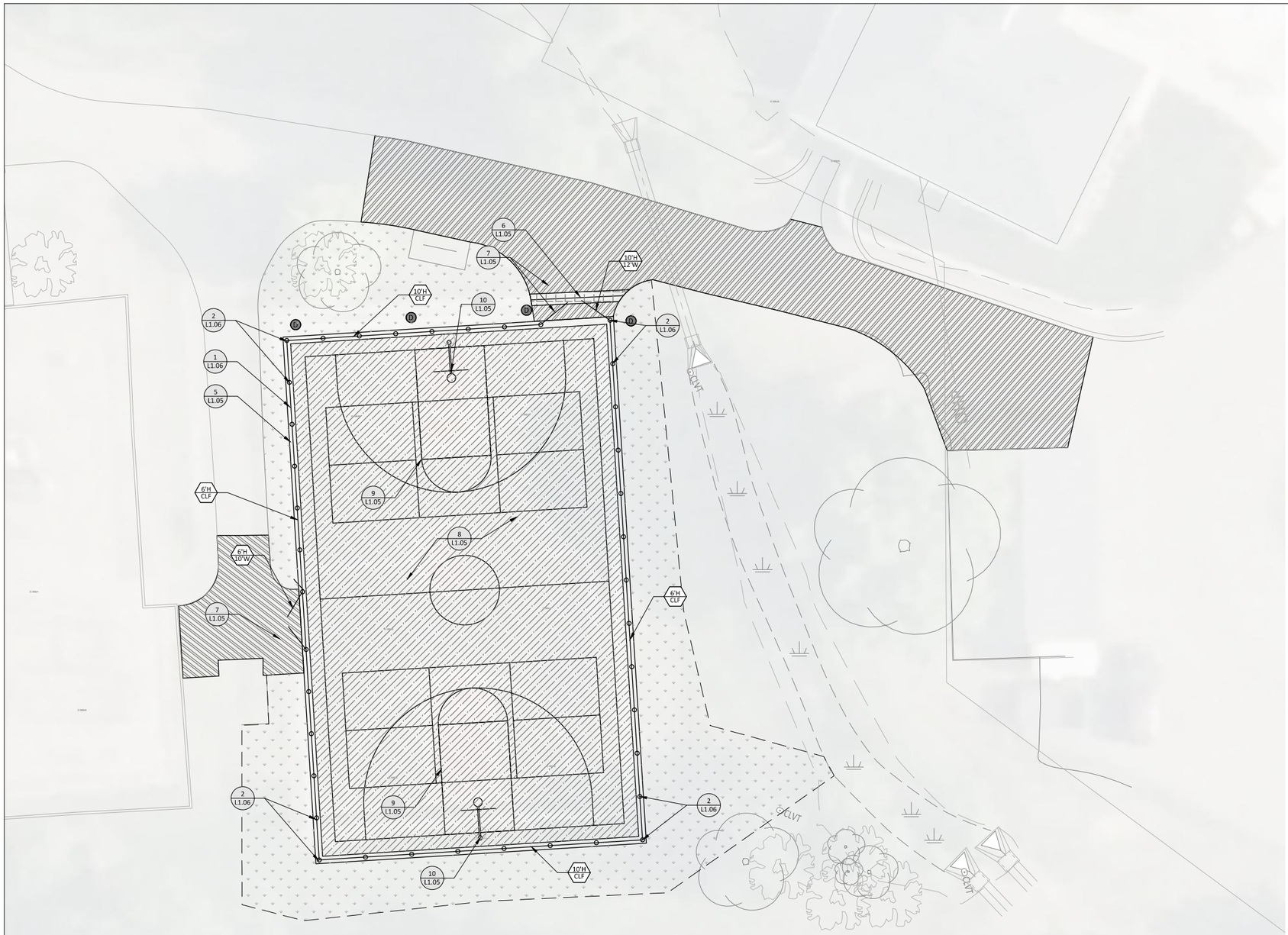
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET AND UTILITY IMPROVEMENTS
ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
GEOMETRIC PLAN

SHEET L1.01



NOTES

1. CHECK ALL PLAN AND DETAIL DIMENSIONS AND VERIFY SAME BEFORE FIELD LAYOUT.
2. ALL DISTURBED AREAS, WHICH ARE NOT DESIGNATED TO BE PAVED, SHALL RECEIVE AT LEAST 6" OF TOPSOIL AND SHALL BE SOD. ALL AREAS NOT DESIGNATED FOR SOD, WHICH ARE DISTURBED BY CONSTRUCTION, SHALL BE SEEDED WITH SEED MIX #1.
3. FAILURE OF TURF DEVELOPMENT: IN THE EVENT THE CONTRACTOR FAILS TO PROVIDE AN ACCEPTABLE TURF, RE-SOD ALL APPLICABLE AREAS, AT NO ADDITIONAL COST TO THE OWNER, TO THE SATISFACTION OF THE ENGINEER OR LANDSCAPE ARCHITECT.

LEGEND

- 1 / L1.05 — REFERENCE KEY TO SITE DETAILS (DETAIL I.D. NUMBER (TOP), DETAIL SHEET NUMBER (BOTTOM))
- PROPOSED MEDIUM DUTY ASPHALT PAVEMENT — 7 / L1.05
- PROPOSED ATHLETIC ASPHALT PAVEMENT WITH ACRYLIC SURFACING — 8 / L1.05
- PROPOSED CONCRETE VALLEY GUTTER — 6 / L1.05
- PROPOSED CHAIN LINK FENCING WITH MAINTENANCE STRIP — 5 / L1.06, 6 / L1.06, 1 / L1.06, 5 / L1.05
- 10'H CLF — FENCING KEY NOTE
- D — PROPOSED DRAINTILE CLEANOUT — 3 / L1.05
- APPROXIMATE TURF RESTORATION LIMITS

FENCING KEY NOTES

- 10'H CLF — 10' HIGH CHAIN LINK FENCE WITH TOP, MIDDLE AND BOTTOM RAIL (POST SPACING = 8' O.C. MAX) — 1 / L1.06, 5 / L1.06
- 6'H CLF — 6' HIGH CHAIN LINK FENCE WITH TOP, MIDDLE AND BOTTOM RAIL (POST SPACING = 8' O.C. MAX) — 1 / L1.06, 6 / L1.06
- 6'H 10'W — 6' HIGH, 10' WIDE DOUBLE SWING GATE WITH LOCKING DEVICE. — 4 / L1.06
- 10'H 12'W — 10' HIGH, 12' WIDE DOUBLE SWING GATE WITH LOCKING DEVICE. — 4 / L1.06

HORZ. SCALE 0 10 20 FEET

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET AND UTILITY IMPROVEMENTS
ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
SITE PLAN

SHEET L1.02



NOTES

1. MAINTAIN ADJACENT PROPERTY AND PUBLIC STREETS CLEAN FROM CONSTRUCTION CAUSED DIRT AND DEBRIS ON A DAILY BASIS. PROTECT DRAINAGE SYSTEMS FROM SEDIMENTATION AS A RESULT OF CONSTRUCTION RELATED DIRT AND DEBRIS.
2. MAINTAIN DUST CONTROL DURING GRADING OPERATIONS.
3. ALL EROSION CONTROL METHODS SHALL COMPLY WITH MPCA AND OTHER LOCAL REGULATIONS.
4. IF EROSION AND SEDIMENT CONTROL MEASURES TAKEN ARE NOT ADEQUATE AND RESULT IN DOWNSTREAM SEDIMENTATION, CLEAN OUT DOWNSTREAM STORM SEWERS AND OTHER CONVEYANCE DEVICES AS NECESSARY, INCLUDING ASSOCIATED RESTORATION.
5. INLET PROTECTION DEVICE AT STORM SEWER INLETS. AT THE INLETS TO ALL STORM SEWER STRUCTURES, PROVIDE A PRODUCT FROM THE FOLLOWING LIST OF APPROVED PRODUCTS:
   a. ROAD DRAIN "TOP SLAB", MANUFACTURED BY WIMCO
   b. ROAD DRAIN "CURB & GUTTER", MANUFACTURED BY WIMCO
   c. INFRASAFE "SEDIMENT CONTROL BARRIER", MANUFACTURED BY ROYAL ENVIRONMENTAL SYSTEMS, INC.
   d. INFRASAFE "DEBRIS COLLECTION DEVICE", MANUFACTURED BY ROYAL ENVIRONMENTAL SYSTEMS, INC.
   e. INFRASAFE "CULVERT INLET PROTECTOR", MANUFACTURED BY ROYAL ENVIRONMENTAL SYSTEMS, INC.
   f. DANDY SACK, MANUFACTURED BY DANDY PRODUCTS, INC.
   g. DANDY CURB SACK, MANUFACTURED BY DANDY PRODUCTS, INC.
   h. OR APPROVED EQUAL.
6. PRIOR TO CONSTRUCTION, DELINEATE TURF AND VEGETATED AREAS NOT TO BE DISTURBED WITH ORANGE SNOW FENCE. DO NOT ALLOW CONSTRUCTION TRAFFIC, EQUIPMENT, OR MATERIALS TO UTILIZE, ACCESS, OR OTHERWISE ENTER THE DELINEATED AREAS. MINIMIZE SOIL COMPACTION AND DISRUPTION OF TOPSOIL IN AREAS OUTSIDE THE CONSTRUCTION LIMITS TO COMPLY WITH THE MN CONSTRUCTION STORMWATER PERMIT.

LEGEND

- 1 / L1.05 — REFERENCE KEY TO SITE DETAILS (DETAIL I.D. NUMBER (TOP), DETAIL SHEET NUMBER (BOTTOM))
- 868 — EXISTING CONTOUR
- PROPOSED DRAIN TILE (DT) / SUBSURFACE DRAINS (SD)
- SF — PROPOSED SILT FENCE (1 / L1.05)
- PROPERTY LINE

N

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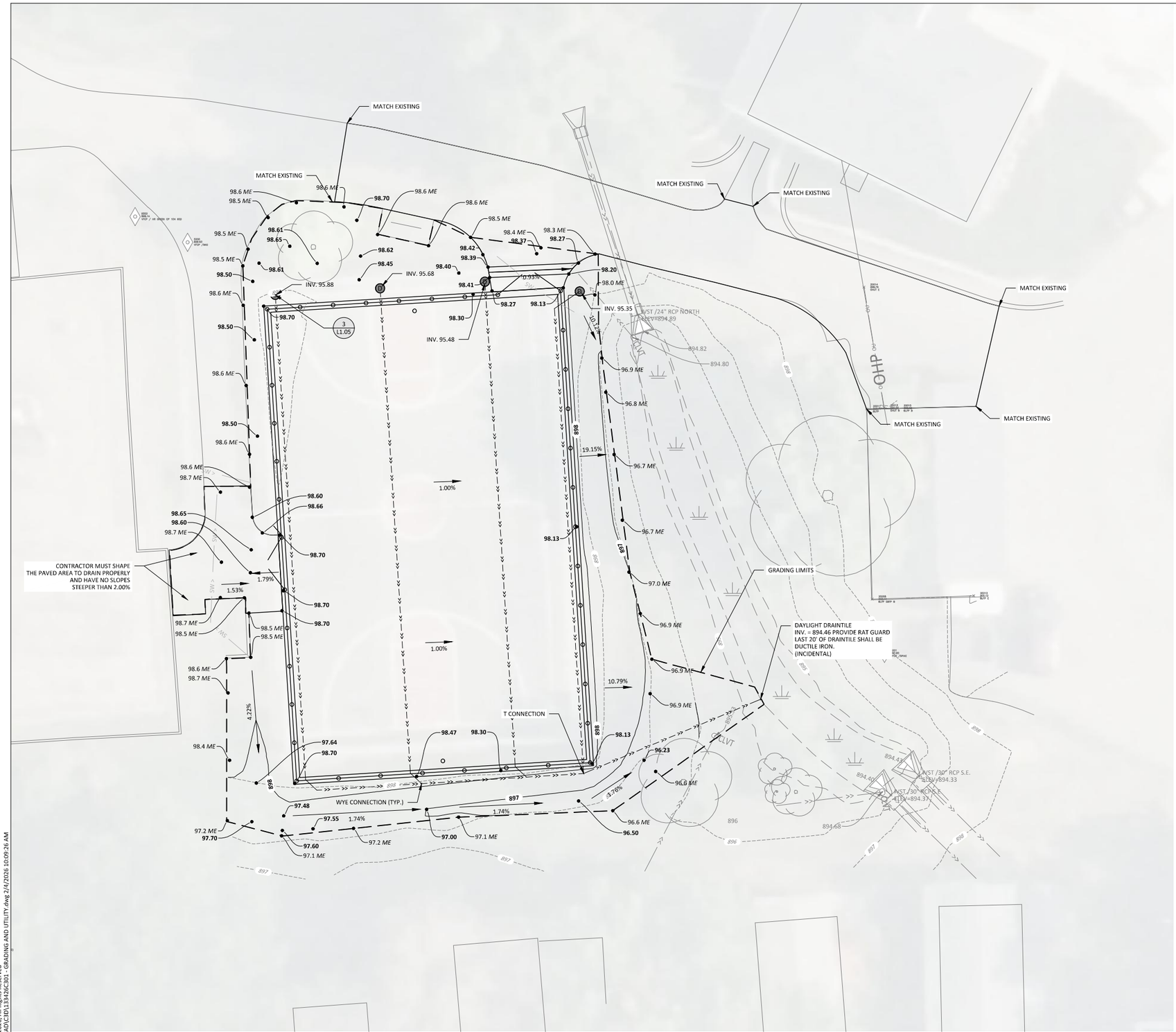
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET AND UTILITY IMPROVEMENTS
ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
EROSION CONTROL PLAN

SHEET L1.03



NOTES

1. LOCATE ALL EXISTING UTILITIES. VERIFY LOCATION, SIZE AND INVERT ELEVATION OF ALL EXISTING UTILITIES BEFORE BEGINNING CONSTRUCTION.

LEGEND

1 / L1.05	REFERENCE KEY TO SITE DETAILS DETAIL I.D. NUMBER (TOP) DETAIL SHEET NUMBER (BOTTOM)
898	EXISTING CONTOUR
898.80	EXISTING SPOT ELEVATION
898	PROPOSED CONTOUR
98.8	PROPOSED SPOT ELEVATION ME = MATCH EXISTING
	PROPOSED GRADING LIMITS
>> >>	PROPOSED DRAIN TILE (DT)
D	PROPOSED DRAINTILE CLEANOUT 5 / L1.05

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2026 PMP STREET AND UTILITY IMPROVEMENTS
ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
GRADING AND UTILITY PLAN

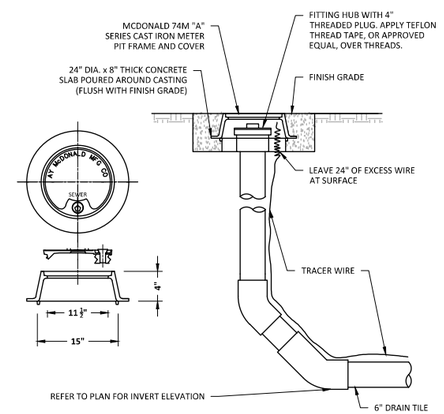
SHEET L1.04

1 L1.05 NOT USED

NOT TO SCALE

2 L1.05 NOT USED

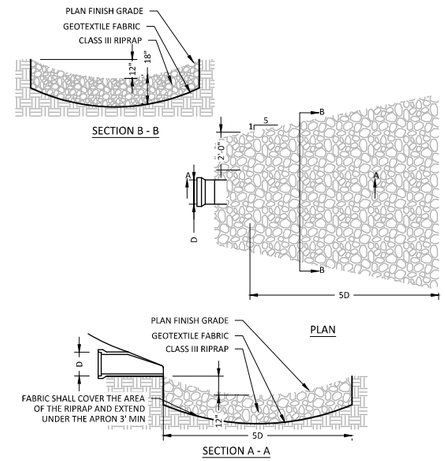
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NOTE:
ATTACH TRACER WIRE WITH BROWN STRIPE TO PIPE AT 3' O.C. WITH PLASTIC ZIP-TIES (OR APPROVED EQUAL).

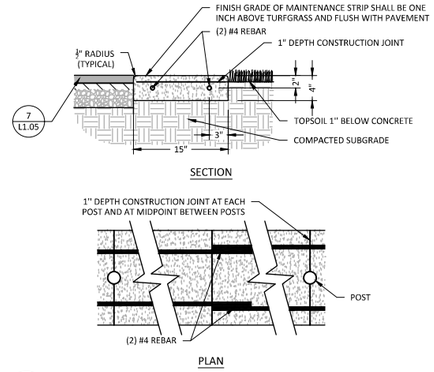
3 L1.05 CLEANOUT ASSEMBLY

NOT TO SCALE



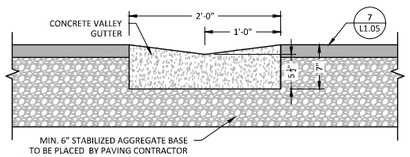
4 L1.05 RIPRAP AT DRAINTILE OUTLET

NOT TO SCALE



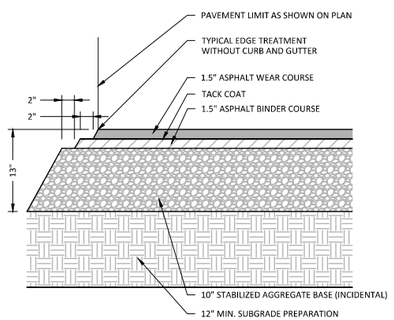
5 L1.05 CONCRETE MAINTENANCE STRIP

NOT TO SCALE



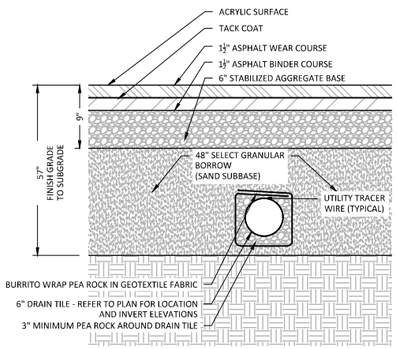
6 L1.05 CONCRETE VALLEY GUTTER

NOT TO SCALE



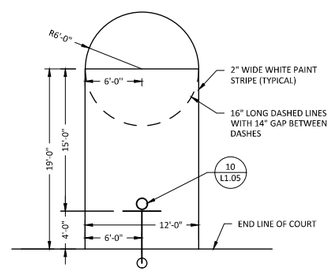
7 L1.05 MEDIUM DUTY ASPHALT PAVEMENT (EDGE CONDITION)

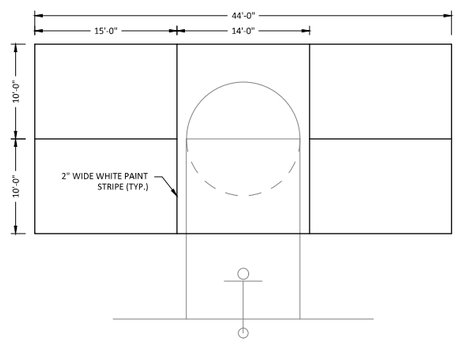
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8 L1.05 ATHLETIC ASPHALT PAVEMENT BASKETBALL COURTS

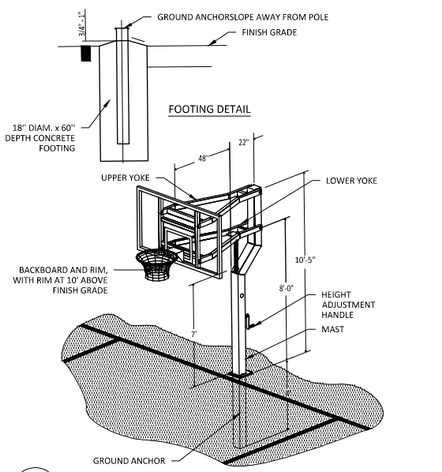
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9 L1.05 COURT STRIPING DETAILS

NOT TO SCALE



10 L1.05 BASKETBALL GOAL

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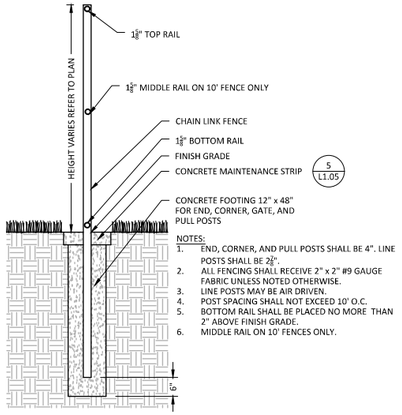
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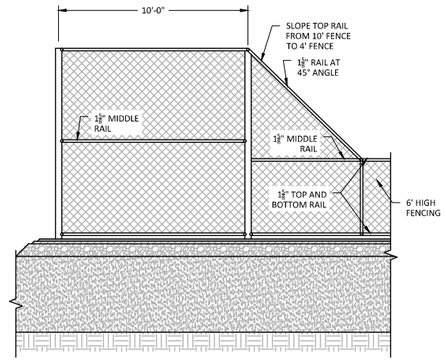
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CIVIL DETAILS

SHEET L1.05



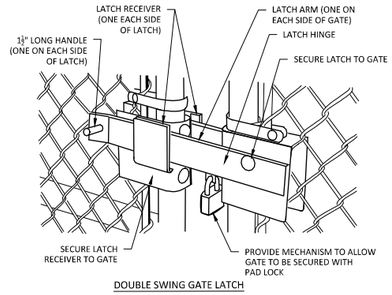
1 / L1.06 CHAIN LINK FENCE WITH MAINTENANCE STRIP

NOT TO SCALE



2 / L1.06 SLOPE FENCE AT BASKETBALL COURT

NOT TO SCALE

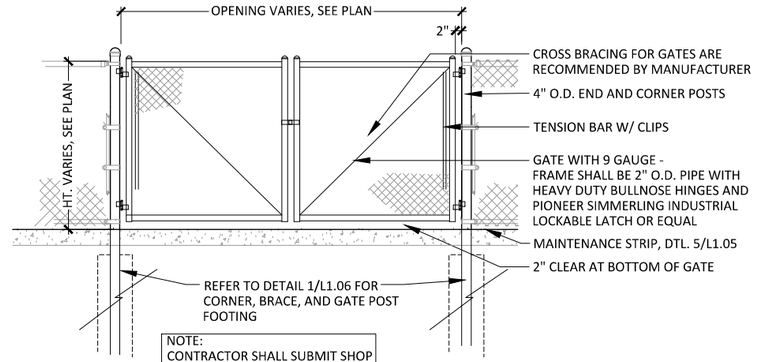


DOUBLE SWING GATE LATCH

NOTE:
PROVIDE ADEQUATE SPACE BETWEEN GATE POST AND GATE SUCH THAT GATE IS IN LINE WITH FENCING WHEN FULLY CLOSED AND LATCHED.

3 / L1.06 GATE LATCH

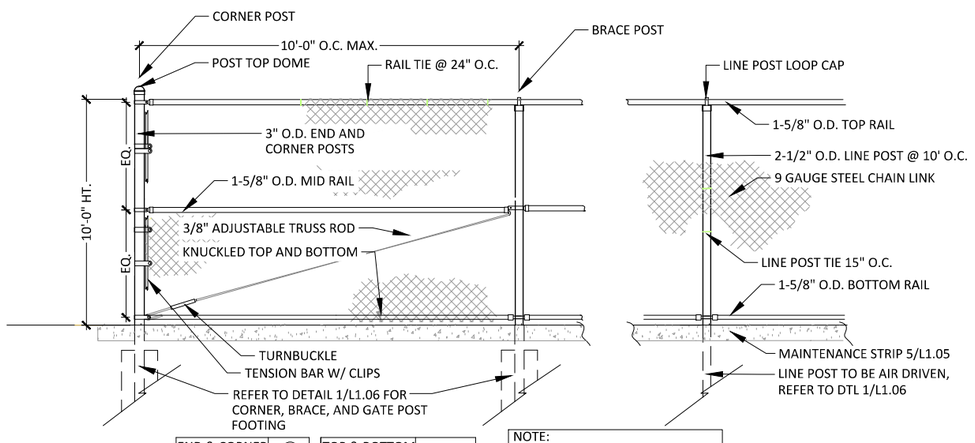
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NOTE:
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF CHAIN LINK FENCE AND GATES FOR APPROVAL.

4 / L1.06 TYPICAL SECTION: DOUBLE GATE

NOT TO SCALE

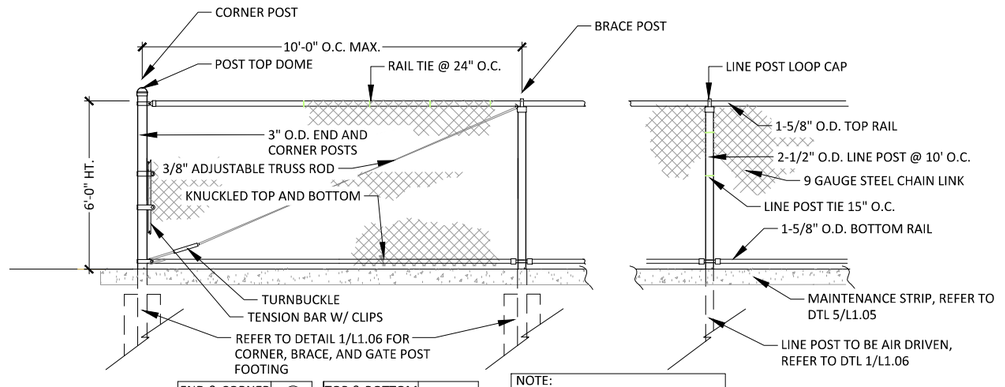


END & CORNER POST TOPS	TOP & BOTTOM FABRIC
DOME	KNUCKLE

NOTE:
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF CHAIN LINK FENCE AND GATES FOR APPROVAL.

5 / L1.06 TYPICAL SECTION: 10' HT. CHAIN LINK FENCE

NOT TO SCALE



END & CORNER POST TOPS	TOP & BOTTOM FABRIC
DOME	KNUCKLE

NOTE:
CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF CHAIN LINK FENCE AND GATES FOR APPROVAL.

6 / L1.06 TYPICAL SECTION: 6' HT. CHAIN LINK FENCE

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ALTERNATE 6: ARDEN MANOR PARK BASKETBALL IMPROVEMENTS
CIVIL DETAILS

SHEET L1.06



NOTES

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2. REPAIR OR REPLACE EXISTING PROPERTY AND SITE FEATURES, INCLUDING GRASS AND VEGETATION, WHICH IS TO REMAIN THAT IS DAMAGED BY THE WORK, TO THE OWNER'S SATISFACTION AND AT NO ADDITIONAL COST TO THE OWNER.
3. VISIT THE SITE PRIOR TO BIDDING; BE FAMILIAR WITH ACTUAL CONDITIONS IN THE FIELD. EXTRA COMPENSATION WILL NOT BE ALLOWED FOR CONDITIONS WHICH COULD HAVE BEEN DETERMINED OR ANTICIPATED BY EXAMINATION OF THE SITE, THE CONTRACT DRAWINGS AND THE INFORMATION AVAILABLE PERTAINING TO EXISTING SOILS, UTILITIES, AND OTHER SITE CHARACTERISTICS.

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BURNSVILLE, MN 55337
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Email: Burnsville@bolton-menk.com
www.bolton-menk.com

ARDEN HILLS

DESIGNED	NO.	ISSUED FOR	DATE
JDN/AJP		BID	02/09/2026
DRAWN AJP			
CHECKED JDN			
CLIENT PROJ. NO. PW-26-0100			

CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ALTERNATE 5: ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS
EXISTING CONDITIONS AND REMOVALS PLAN

SHEET L2.00



NOTES

1. MAINTAIN ADJACENT PROPERTY AND PUBLIC STREETS CLEAN FROM CONSTRUCTION CAUSED DIRT AND DEBRIS ON A DAILY BASIS. PROTECT DRAINAGE SYSTEMS FROM SEDIMENTATION AS A RESULT OF CONSTRUCTION RELATED DIRT AND DEBRIS.
2. MAINTAIN DUST CONTROL DURING GRADING OPERATIONS.
3. ALL EROSION CONTROL METHODS SHALL COMPLY WITH MPCA AND OTHER LOCAL REGULATIONS.
4. IF EROSION AND SEDIMENT CONTROL MEASURES TAKEN ARE NOT ADEQUATE AND RESULT IN DOWNSTREAM SEDIMENTATION, CLEAN OUT DOWNSTREAM STORM SEWERS AND OTHER CONVEYANCE DEVICES AS NECESSARY, INCLUDING ASSOCIATED RESTORATION.
5. PRIOR TO CONSTRUCTION, DELINEATE TURF AND VEGETATED AREAS NOT TO BE DISTURBED WITH ORANGE SNOW FENCE. DO NOT ALLOW CONSTRUCTION TRAFFIC, EQUIPMENT, OR MATERIALS TO UTILIZE, ACCESS, OR OTHERWISE ENTER THE DELINEATED AREAS. MINIMIZE SOIL COMPACTION AND DISRUPTION OF TOPSOIL IN AREAS OUTSIDE THE CONSTRUCTION LIMITS TO COMPLY WITH THE MN CONSTRUCTION STORMWATER PERMIT.
6. TURF RESTORATION LIMITS SHOWN ON PLANS ARE FOR ESTIMATING PURPOSES ONLY. CONTRACTOR RESPONSIBLE FOR RESTORATION OF ANY AREAS DISTURBED BY CONSTRUCTION ACTIVITIES.

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JONATHAN D. NELSEN
LIC. NO. 53433 DATE 02/09/2026

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ALTERNATE 5: ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS
TURF ESTABLISHMENT AND EROSION CONTROL PLAN

SHEET L2.01

ARDEN OAKS CT

ARDEN OAKS DR

GRADING LIMITS

943.13 943.09 1% 1%

942.92 942.86 942.96

942.58 ME 942.83 ME 1% 5%

942.50 942.75 942.78 942.92 942.94 942.95

942.86 942.88 1.5%

942.73 942.75

943.24 EG 943.36 EG

943.29 EG 943.33 EG

943.35 943.33 943.27 943.25 1.2%

942.97

PROVIDE OPENING FOR ACCESS. GRADING TO MATCH OPENING ELEVATION.

PROVIDE OPENING FOR ACCESS. GRADING TO MATCH OPENING ELEVATION.

ME 939.42 938.92 939.52 1% 1% 5% 1%

8 3% 2%

938.82 939.42 939.32 ME

942.93 942.94 1.5%

942.75 942.76

ARDEN OAKS DR

NOTES

1. LOCATE ALL EXISTING UTILITIES. VERIFY LOCATION, SIZE, AND INVERT ELEVATION OF ALL EXISTING UTILITIES BEFORE BEGINNING CONSTRUCTION.
2. ALL TRAILS TO HAVE A MINIMUM 1% CROSS SLOPE, 2% MAX, AND MEET ADA GUIDELINES.

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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ALTERNATE 5: ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS
GRADING PLAN

SHEET L2.02



NOTES

1. CHECK ALL PLAN AND DETAIL DIMENSIONS AND VERIFY THEY ARE THE SAME BEFORE FIELD LAYOUT.
2. ALL DISTURBED AREAS, WHICH ARE NOT DESIGNATED TO BE PAVED, SHALL RECEIVE AT LEAST 6" OF TOPSOIL AND SHALL BE SOD. ALL AREAS NOT DESIGNATED FOR SOD, WHICH ARE DISTURBED BY CONSTRUCTION, SHALL BE SEEDED WITH MNDOT SEED MIX 25.151.
3. FAILURE OF TURF DEVELOPMENT: IN THE EVENT THE CONTRACTOR FAILS TO PROVIDE AN ACCEPTABLE TURF, RE-SOD ALL APPLICABLE AREAS, AT NO ADDITIONAL COST TO THE OWNER, TO THE SATISFACTION OF THE ENGINEER OR LANDSCAPE ARCHITECT.
4. CONTRACTOR SHALL FURNISH AND INSTALL SCREENING FENCE FOR PORTABLE TOILET. SCREENING FENCE SHALL BE 10' WIDE BY 10' DEEP BY 8' TALL. CORNER POSTS SHALL BE SINGLE 6'x6' TREATED WOOD, SUITABLE FOR GROUND CONTACT, WITH AN OVERALL LENGTH TO ACCOMMODATE THE 8' HEIGHT AND MIN. BURY DEPTH WITH FOOTINGS TO PROVIDE PROPER SUPPORT. DEPTH TO BE DETERMINED BY CONTRACTOR AND SUBMITTED TO CITY FOR REVIEW AND APPROVAL. SCREENING MATERIAL SHALL BE A CORRUGATED METAL STYLE, TREATED TO BE SUITABLE FOR PLAYGROUND APPLICATION AND FREE OF ANY SHARP OR PROTRUDING EDGES. CONTRACTOR SHALL PROVIDE SAMPLE OF SCREENING MATERIAL TO CITY FOR REVIEW AND APPROVAL PRIOR TO ORDERING AND INSTALLATION.

LEGEND

- PROPOSED CONCRETE PAVEMENT
- PROPOSED MEDIUM DUTY ASPHALT PAVEMENT

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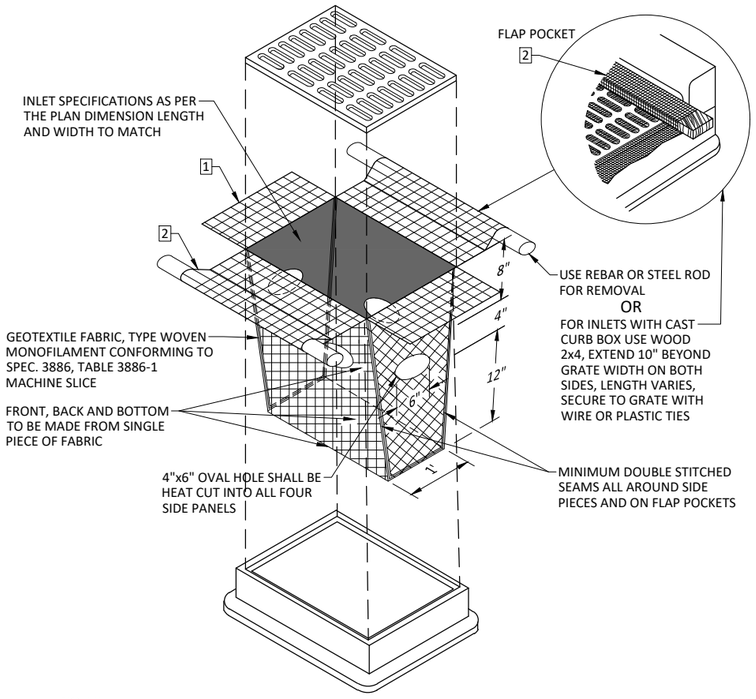
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CITY OF ARDEN HILLS, MINNESOTA
2026 PMP STREET & UTILITY IMPROVEMENTS
ALTERNATE 5: ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS
SITE PLAN

SHEET L2.03



NOTES:

1 INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER. MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENTS EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL IN THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

2 FINISHED SIZE, INCLUDING POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2x4.

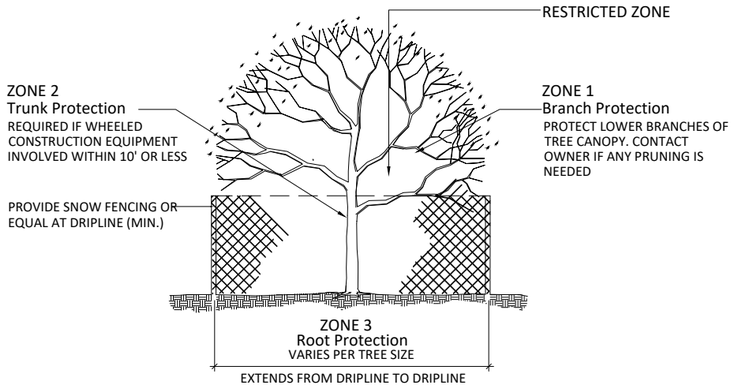
INSTALLATION NOTES:
DO NOT INSTALL PROTECTION IN INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CLINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

1 / L2.04 INLET PROTECTION GEOTEXTILE BAG

NOT TO SCALE

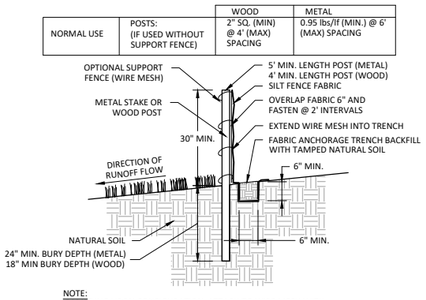


2 / L2.04 TYPICAL SECTION: EXISTING TREE PROTECTION

NOT TO SCALE

TREE PROTECTION NOTES

1. ALL TREES TO BE PROTECTED AND PRESERVED SHALL BE PER DETAIL. GROUPING OF MORE THAN ONE TREE MAY OCCUR.
2. TREES TO BE PROTECTED AND PRESERVED SHALL BE IDENTIFIED ON THE TRUNK WITH WHITE SURVEY TAPE.
3. TO PREVENT TREE ROOT SMOTHERING, SOIL STOCKPILES, SUPPLIES, EQUIPMENT OR ANY OTHER MATERIAL SHALL NOT BE PLACED OR STORED WITHIN A TREE DRIP LINE OR WITHIN 15 FEET OF A TREE TRUNK, WHICHEVER IS GREATER.
4. TREE ROOTS SHALL NOT BE CUT UNLESS CUTTING IS UNAVOIDABLE.
5. TRENCHES SHALL BE HAND DUG WITHIN THE DRIP LINE IN AREAS WHERE ROOTS TWO INCHES IN DIAMETER AND GREATER ARE PRESENT, OR WHEN IN CLOSE PROXIMITY TO LOW BRANCHING TREES. WHENEVER POSSIBLE, ROOTS TWO INCHES OR GREATER IN DIAMETER SHALL BE TUNNELED OR BORED UNDER AND SHALL BE COVERED TO PREVENT DEHYDRATION.
6. WHEN ROOT CUTTING IS UNAVOIDABLE, A CLEAN SHARP CUT SHALL BE MADE TO AVOID SHREDDING OR SMASHING. ROOT CUTS SHOULD BE MADE BACK TO A LATERAL ROOT. WHENEVER POSSIBLE, TREE ROOTS SHOULD BE CUT BETWEEN LATE FALL AND BUD OPENING, WHEN ROOT ENERGY SUPPLIES ARE HIGH AND CONDITIONS ARE LEAST FAVORABLE FOR DISEASE CAUSING AGENTS. EXPOSED ROOTS SHALL BE COVERED IMMEDIATELY TO PREVENT DEHYDRATION. ROOTS SHALL BE COVERED WITH SOIL OR BURLAP AND KEPT MOIST.
7. WATERING OF PROTECTED TREES IN WHICH ROOTS WERE CUT SHALL BE PROVIDED BY THE CONTRACTOR.
8. AUGER TUNNELING RATHER THAN TRENCHING SHOULD BE USED FOR UTILITY PLACEMENT WITHIN DRIP LINE OF TREE.
9. FENCING MATERIAL SHALL ENCIRCLE ANY TREE WHOSE OUTER DRIP LINE EDGE IS WITHIN 20 FEET OF ANY CONSTRUCTION ACTIVITIES.
10. FENCING MATERIAL SHALL BE BRIGHT, CONTRASTING COLOR, DURABLE, AND A MINIMUM OF FOUR FEET IN HEIGHT.
11. FENCING MATERIAL SHALL BE SET AT THE DRIP LINE OR 15 FEET FROM TREE TRUNK, WHICHEVER IS GREATER, AND MAINTAINED IN AN UPRIGHT POSITION THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITIES.
12. ANY GRADE CHANGES (SUCH AS THE REMOVAL OF TOPSOIL OR ADDITION OF FILL MATERIAL) WITHIN THE DRIP LINE SHOULD BE AVOIDED FOR EXISTING TREES TO REMAIN. RETAINING WALLS AND TREE WELLS ARE ACCEPTABLE ONLY WHEN CONSTRUCTED PRIOR TO GRADE CHANGE.

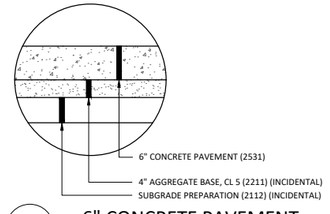


NORMAL USE	POSTS: (IF USED WITHOUT SUPPORT FENCE)	WOOD	METAL
		2" SQ. (MIN) @ 4' (MAX) SPACING	0.95 lbs/lf (MIN.) @ 6' (MAX) SPACING

NOTE:
DEPENDING UPON CONFIGURATION, ATTACH TO WIRE MESH WITH HOG RINGS, STEEL POSTS WITH TIE WIRES, OR WOOD POSTS WITH STAPLES

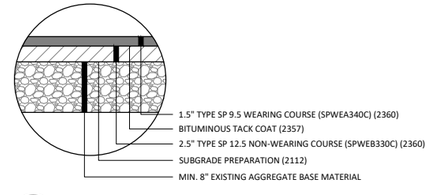
3 / L2.04 SILT FENCE

NOT TO SCALE



4 / L2.04 6" CONCRETE PAVEMENT

NOT TO SCALE



5 / L2.04 BITUMINOUS STREET PATCH

NOT TO SCALE

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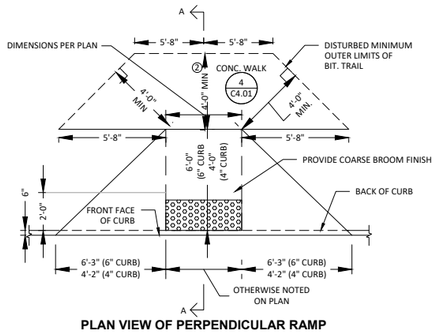
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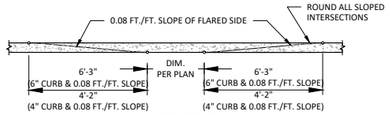
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2026 PMP STREET & UTILITY IMPROVEMENTS
ALTERNATE 5: ARDEN OAKS PARK ADA TRAIL IMPROVEMENTS
SITE DETAILS

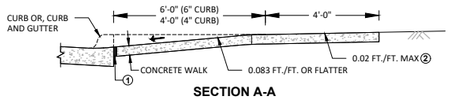
SHEET L2.04



PLAN VIEW OF PERPENDICULAR RAMP



ELEVATION OF RAMP



SECTION A-A

NOTES:

① 1/2 INCH PREFORMED JOINT FILLER MATERIAL, AASHTO M 213.

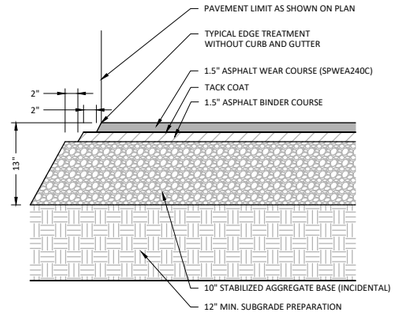
② PROVIDE A PATH OF TRAVEL 4' 0" WIDE BEHIND THE PEDESTRIAN RAMP. A RELATIVELY FLAT 4' X 4' LANDING WILL ALLOW WHEELCHAIRS TO NAVIGATE AROUND THE PEDESTRIAN RAMP.

③ INSTALL TRUNCATED DOMES PER SPECIFICATIONS

④ PEDESTRIAN RAMP AT ARDEN OAKS PARK (SHEET XX) IS PART OF BID ALTERNATE 1.

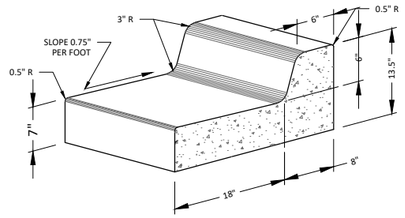
5 / L2.05 CONCRETE PEDESTRIAN RAMP

NOT TO SCALE



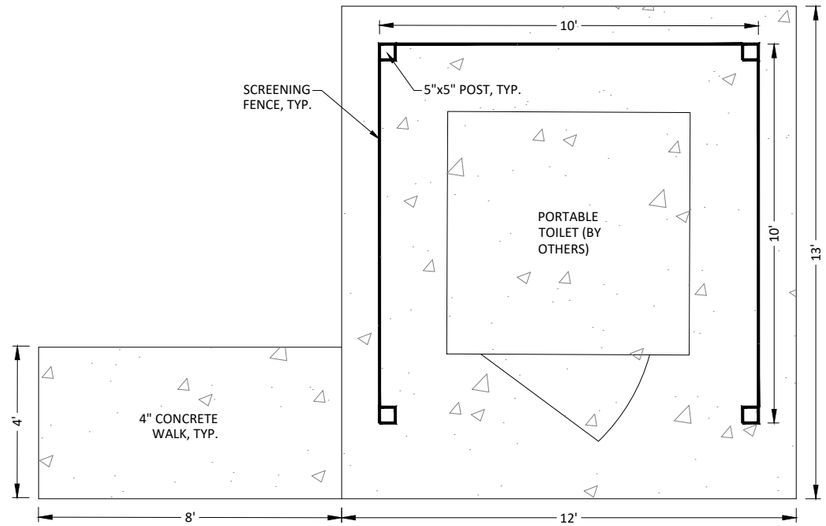
6 / L2.05 MEDIUM DUTY ASPHALT PAVEMENT (EDGE CONDITION)

NOT TO SCALE



7 / L2.05 B-618 CURB AND GUTTER

NOT TO SCALE



8 / L2.05 PLAN: PORTABLE TOILET ENCLOSURE

NOT TO SCALE

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