ADDENDUM No. 1

RFP No. 22-25

Geddes & Huron Parkway/Tuebingen Resurfacing Project

Bids Due: May 5, 2022 at 10:00 A.M. (Local Time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any) and is appended thereto. **This Addendum includes forty-three (43) pages.**

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgment of receipt of this addendum may be considered nonconforming.

The following forms provided within the RFP Document should be included in submitted proposal:

- **Attachment D - Prevailing Wage Declaration of Compliance**
- **Attachment E - Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these completed forms listed above upon proposal opening may be rejected as non-responsive and may not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the RFP document which are outlined below are referenced to a page or Section in which they appear conspicuously. Offerors are to take note in their review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	**Change**
Pages 14-21 Section III.E	Schedule of Pricing/Cost Base Bid Forms; replace with pages Addendum-1-3 to 9. Added pay items: Fence, Rem; _Fence Ornamental Alum, 48 Inch; _Handhole Assembly, 24 Inch x 36 Inch; _Fire Hydrant Assembly, with Extensions, Complete; _Tapping Sleeve, 6_ inch x _6 inch x _6 inch, Valve and Box; Replaced pay items: _Rockery Wall to revise Pay Unit from Sft to LS. Revised estimated quantities to pay items with new line item numbers 35, 300, 380, 600, 625, and 630 due to scope of work revisions to Rockery Wall included within the project.
Page 97 Detailed Specifications	Revise Detailed Specification for Hot Mix Asphalt (HMA) Application Estimate; pages Addendum-1-10. Revise base asphalt mix; Revise Binder Performance Grade.

Pages 107-108 Detailed Specifications	Detailed Specification for Rockery Wall; replace with pages Addendum-1-11 to 13. Revised Stipulations regarding removed existing boulders, heavy equipment use, Lump Sum Pay Unit, and Pro Rata payment basis.
Detailed Specifications	Insert Detailed Specification for Electrical and Communications Handholes with pages Addendum-1-14 to 15. Specifies requirements for two sizes of handholes to be relocated in project.
Detailed Specifications	Insert Detailed Specification for Water Main and Appurtenances with pages Addendum-1-16 to 35.
Michigan Department of Transportation (MDOT) Special Provisions	Insert Michigan Department of Transportation Special Provision for Ornamental Aluminum Fence with pages Addendum-1-36 to 37. Specifies ornamental fence behind rockery wall in front of 2026 Geddes Ave.
Plans	
Sheet 8	Revised Hydrant Assembly Detail to include a tapping sleeve and valve.
Sheet 10	Added detail of Decorative Aluminum Fence to replace existing in front of 2026 Geddes Ave.
Sheets 18, 27	Added notes plus removal and construction keys to include removal and replacement of an electrical and communications handhole.
Sheets 20, 29	Added notes plus removal and construction keys regarding removal and reinstallation of existing decorative fencing in front of 2024 Geddes, and removal and replacement of decorative fencing in front of 2026 Geddes Ave.

II. QUESTIONS AND ANSWERS

Question 1:	The HMA Application in the proposal and the one on the plans have conflicting mixes and conflicting AC grades. Please clarify.
Answer 1:	The correct Base layer material mix is **3E3.** The correct AC binder performance grade is **64-28**
Question 2:	Is there a cost estimate for this project?
Answer 2:	The Engineer's estimate for the project is approximately $3.45 Million.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

E. Schedule of Pricing/Cost – 20 Points

Company: _____

Unit Price Bid

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
5	1047051	_Certified Payroll Compliance and Reporting	LS	1.00	$_____	$_____
10	1047051	_General Conditions, Max $80,000.00	LS	1.00	$_____	$_____
15	1047051	_Project Supervision, Max $30,000.00	LS	1.00	$_____	$_____
20	2020004	Tree, Rem, 6 inch to 18 inch	Ea	6.00	$_____	$_____
25	2030011	Dr Structure, Rem	Ea	41.00	$_____	$_____
30	2030015	Sewer, Rem, Less than 24 inch	Ft	568.00	$_____	$_____
35	2040025	Fence, Remove	Ft	65.00	$_____	$_____
40	2047001	_Curb, Gutter, and Curb and Gutter, Any Type, Rem	Ft	2,684.00	$_____	$_____
45	2047001	_Exploratory Excavation, Vertical	Ft	15.00	$_____	$_____
50	2047011	_Sidewalk, Sidewalk Ramp, and Driveway Approach, Any Thickness, Rem	Syd	667.00	$_____	$_____
55	2047011	_Concrete Subsurface Pavement Removal, Any Depth	Syd	4,800.00	$_____	$_____
60	2050023	Granular Material, Cl II	Cyd	362.00	$_____	$_____
65	2057011	_Grading, Driveway Approach	Syd	157.00	$_____	$_____
70	2057011	_Grading, Sidewalk	Syd	784.00	$_____	$_____
75	2057011	_Grading, Sidewalk Ramp	Syd	106.00	$_____	$_____
80	2057011	_Machine Grading, Special	Syd	22,190.00	$_____	$_____
85	2057021	_Undercutting, Type IIA	Cyd	250.00	$_____	$_____
90	2057021	_Undercutting, Type IIB	Cyd	40.00	$_____	$_____
					TOTAL THIS PAGE	$_____

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
95	2057021	_Undercutting, Type IIC	Cyd	10.00	$_____	$_____
100	2087050	_Erosion Control, Inlet Protection, Fabric Drop	Ea	54.00	$_____	$_____
105	2080036	Erosion Control, Silt Fence	Ft	935.00	$_____	$_____
110	2090001	Project Cleanup	LS	1.00	$_____	$_____
115	3010002	Subbase, CIP	Cyd	200.00	$_____	$_____
120	3027031	_Aggregate Base, Modified	Ton	6,600.00	$_____	$_____
125	3060020	Maintenance Gravel	Ton	120.00	$_____	$_____
130	4020987	Sewer, Cl IV, 12 inch, Tr Det B	Ft	698.00	$_____	$_____
135	4020989	Sewer, Cl IV, 18 inch, Tr Det B	Ft	29.00	$_____	$_____
140	4020997	Sewer, Cl IV, 48 inch, Tr Det B	Ft	271.00	$_____	$_____
145	4021260	Trench Undercut and Backfill	Cyd	50.00	$_____	$_____
150	4021451	Sewer, Reinf Conc Ellip, HE Cl IV, 19 inch by 30 inch, Tr Det B	Ft	40.00	$_____	$_____
155	4021453	Sewer, Reinf Conc Ellip, HE Cl IV, 24 inch by 38 inch, Tr Det B	Ft	490.00	$_____	$_____
160	4030200	Dr Structure, 24 inch dia	Ea	27.00	$_____	$_____
165	4030210	Dr Structure, 48 inch dia	Ea	14.00	$_____	$_____
170	4030220	Dr Structure, 60 inch dia	Ea	4.00	$_____	$_____
175	4030230	Dr Structure, 72 inch dia	Ea	2.00	$_____	$_____
180	4030306	Dr Structure, Tap, 6 inch	Ea	8.00	$_____	$_____
185	4030312	Dr Structure, Tap, 12 inch	Ea	2.00	$_____	$_____
190	4037050	_Dr Structure, 96 inch dia, Control Structure	Ea	2.00	$_____	$_____
195	4037050	_Dr Structure Cover, Type C, Modified	Ea	2.00	$_____	$_____
					TOTAL THIS PAGE	$_____

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
200	4037050	_Dr Structure Cover, Type K, Modified	Ea	28.00	$_____	$_____
205	4037050	_Dr Structure Cover, Type Q, Modified	Ea	19.00	$_____	$_____
210	4037050	_Dr Structure Cover, Type Q, Special	Ea	11.00	$_____	$_____
215	4037050	_Dr Structure, Adj, Case 1, Modified	Ea	33.00	$_____	$_____
220	4037050	_Dr Structure, Adj, Case 2, Modified	Ea	1.00	$_____	$_____
225	4037050	_Dr Structure, Cleaning, Modified	Ea	4.00	$_____	$_____
230	4037050	_Dr Structure, Point	Ea	8.00	$_____	$_____
235	4037050	_Dr Structure, Temp Lowering, Modified	Ea	8.00	$_____	$_____
240	4037050	_Structure, Reconstruct	Ea	5.00	$_____	$_____
245	4047001	_Underdrain, Subgrade, 6 inch, Special	Ft	12,774.00	$_____	$_____
250	5010001	Pavt, Cleaning	LS	1.00	$_____	$_____
255	5010002	Cold Milling HMA Surface	Syd	24,402.00	$_____	$_____
260	5010005	HMA Surface, Rem	Syd	170.00	$_____	$_____
265	5010025	Hand Patching	Ton	40.00	$_____	$_____
270	5010031	HMA, 3E3	Ton	3,138.00	$_____	$_____
275	5010051	HMA, 4E3	Ton	2,509.00	$_____	$_____
280	5010057	HMA, 5E3	Ton	1,884.00	$_____	$_____
285	6020054	Conc Pavt, Misc, Nonreinf, 8 inch	Syd	202.00	$_____	$_____
290	6027021	_Flowable Fill	Cyd	7.00	$_____	$_____
295	6030005	Cement	Ton	20.00	$_____	$_____
300	7067010	_Rockery Wall	LS	1.00	$_____	$_____
					TOTAL THIS PAGE	$_____

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
305	8017011	_Driveway, Nonreinf Conc, 6 inch, Modified	Syd	305.00	$	$
310	8027001	_Curb and Gutter, Conc, Barrier	Ft	1,910.00	$	$
315	8027001	_Curb and Gutter, Conc, Barrier or Mountable, Slip Form	Ft	958.00	$	$
320	8027001	_Curb and Gutter, Conc, Mountable	Ft	30.00	$	$
325	8027001	_Driveway Opening, Conc, Det M, Modified	Ft	438.00	$	$
330	8030020	Railing for Steps	Ft	36.00	$	$
335	8030030	Curb Ramp Opening, Conc	Ft	330.00	$	$
340	8030100	Steps, Conc	Cyd	4.00	$	$
345	8037010	_Detectable Warning Surface, Modified	Sft	260.00	$	$
350	8037010	_Sidewalk Ramp, Conc, 6 inch, Modified	Sft	1,898.00	$	$
355	8037010	_Sidewalk Retaining Wall, Integral, 6 inch to 18 inch Height	Sft	252.00	$	$
360	8037010	_Sidewalk Retaining Wall, Integral, 18 inch to 30 inch Height	Sft	104.00	$	$
365	8037010	_Sidewalk, Conc, 4 inch, Modified	Sft	7,316.00	$	$
370	8037010	_Sidewalk, Conc, 6 inch, Modified	Sft	287.00	$	$
375	8087001	_Fence, Decorative, Salvage and Reinstall	Ft	110.00	$	$
380	8087001	_Fence, Ornamental Aluminum, 48 Inch	Ft	70.00	$	$
385	8087001	_Fence, Protective, Modified	Ft	350.00	$	$
390	8110049	Pavt Mrkg, Ovly Cold Plastic, Direction Arrow Sym, Bike	Ea	15.00	$	$
395	8110058	Pavt Mrkg, Ovly Cold Plastic, Bike, Small Sym	Ea	21.00	$	$
400	8110079	Pavt Mrkg, Ovly Cold Plastic, Sharrow Symbol	Ea	6.00	$	$
405	8110092	Pavt Mrkg, Polyurea, 4 inch, Yellow	Ft	10,923.00	$	$
					TOTAL THIS PAGE	$

Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
410	8110198	Pavt Mrkg, Thermopl, 6 inch, White	Ft	10,915.00	$	$
415	8110213	Pavt Mrkg, Thermopl, 12 inch, Cross Hatching, Yellow	Ft	64.00	$	$
420	8110214	Pavt Mrkg, Thermopl, 12 inch, Crosswalk	Ft	957.00	$	$
425	8110218	Pavt Mrkg, Thermopl, 24 inch, Stop Bar	Ft	38.00	$	$
430	8117050	_Pavt Mrkg, Thermopl, Lt Turn Arrow Sym	Ea	2.00	$	$
435	8117050	_Pavt Mrkg, Thermopl, Only	Ea	1.00	$	$
440	8117050	_Pavt Mrkg, Thermopl, Thru and Rt Turn Arrow Sym	Ea	1.00	$	$
445	8120012	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	Ea	20.00	$	$
450	8120013	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	20.00	$	$
455	8120035	Channelizing Device, 42 inch, Fluorescent, Furn	Ea	30.00	$	$
460	8120036	Channelizing Device, 42 inch, Fluorescent, Oper	Ea	30.00	$	$
465	8120140	Lighted Arrow, Type C, Furn	Ea	1.00	$	$
470	8120141	Lighted Arrow, Type C, Oper	Ea	1.00	$	$
475	8120210	Pavt Mrkg, Longit, 6 inch or Less Width, Rem	Ft	400.00	$	$
480	8120252	Plastic Drum, Fluorescent, Furn	Ea	350.00	$	$
485	8120253	Plastic Drum, Fluorescent, Oper	Ea	350.00	$	$
490	8120310	Sign Cover	Ea	4.00	$	$
495	8120330	Sign, Portable, Changeable Message, Furn	Ea	3.00	$	$
500	8120331	Sign, Portable, Changeable Message, Oper	Ea	3.00	$	$
505	8120350	Sign, Type B, Temp, Prismatic, Furn	Sft	596.00	$	$
510	8120351	Sign, Type B, Temp, Prismatic, Oper	Sft	596.00	$	$
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Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
515	8120352	Sign, Type B, Temp, Prismatic, Special, Furn	Sft	161.00	$	$
520	8120353	Sign, Type B, Temp, Prismatic, Special, Oper	Sft	161.00	$	$
525	8120370	Traf Regulator Control	LS	1.00	$	$
530	8127050	_Pedestrian Type II Barricade, Temp	Ea	50.00	$	$
535	8127050	_Pedestrian Type II Channelizer, Temp	Ea	6.00	$	$
540	8127050	_Temporary No Parking Sign	Ea	12.00	$	$
545	8127051	_Minor Traffic Control, Max $30,000.00	LS	1.00	$	$
550	8157060	_Irrigation System, Protection and Maintenance	Dlr	4,000.00	$	$
555	8167011	_Slope Restoration	Syd	733.00	$	$
560	8190157	Conduit, Schedule 80 PVC, 2 inch	Ft	320.00	$	$
565	8190244	Hh, Adj	Ea	1.00	$	$
570	8190254	Hh, Rem	Ea	2.00	$	$
575	8197001	_Cable, in Conduit, 600V, 1/C#6	Ft	1,000.00	$	$
580	8197050	_Light, Rem	Ea	1.00	$	$
585	8197050	_Light Std Fdn, Modified	Ea	4.00	$	$
590	8197050	_Light Std and Luminaire	Ea	4.00	$	$
595	8197050	_Handhole Assembly, 12 Inch x 18 Inch	Ea	2.00	$	$
600	8197050	_Handhole Assembly, 24 Inch x 36 Inch	Ea	1.00	$	$
605	8217050	_Monument Box, Adj	Ea	6.00	$	$
610	8230421	Water Shutoff, Adj, Case 1	Ea	6.00	$	$
615	8230431	Gate Box, Adj, Case 1	Ea	15.00	$	$
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Line No.	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Total Price
620	8230432	Gate Box, Adj, Case 2	Ea	1.00	$_____	$_____
625	8237050	_Fire Hydrant Assembly, with Extensions, Complete	Ea	1.00	$_____	$_____
630	8237050	_Tapping Sleeve, 6 inch x 6 inch x 6 inch, Valve and Box	Ea	1.00	$_____	$_____
635	8507050	_HMA Surface, Around Structure Cover, Rem	Ea	33.00	$_____	$_____

TOTAL THIS PAGE $_____

TOTAL FROM PAGE Addendum-1-3 $_____

TOTAL FROM PAGE Addendum-1-4 $_____

TOTAL FROM PAGE Addendum-1-5 $_____

TOTAL FROM PAGE Addendum-1-6 $_____

TOTAL FROM PAGE Addendum-1-7 $_____

TOTAL FROM PAGE Addendum-1-8 $_____

TOTAL BASE BID **$_____**

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
HOT MIX ASPHALT (HMA) APPLICATION ESTIMATE

ST:CJE/GJS 1 of 1 04/25/22

a. Description. Perform this work in accordance with the requirements of section 501 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, and as herein specified.

b. Materials.

PAY ITEM	HMA MIX	APPLICATION RATE	ESTIMATED THICKNESS	BINDER PERFORMANCE GRADE	AWI (min)
Geddes Avenue, Huron Parkway/Tuebingen					
HMA, 5E3	5E3	165 lb/syd	1.5 inches	PG 64-28	220
HMA, 4E3	4E3	220 lb/syd	2.0 inches	PG 64-28	N/A
HMA, 3E3	3E3	275 lb/syd	2.5 inches	PG 64-28	N/A
(1) Hand Patching	5E3	Varies maximum = 330 lb/syd	Varies - maximum = 3.0 inches	PG 64-28	N/A
(2) HMA Approach	5E3	Place in two courses/lifts at 220 lb/syd	Varies maximum = 2.0 inches/lift	PG 64-28	220

(1) The Contractor may use alternative top course E mixes for Hand Patching with approval by the Engineer. LVSP is approved for use only on minor (local) streets.
(2) HMA Approach mix shall match that used for mainline paving (top course) on the street for which the adjacent side street approaches are being paved unless otherwise approved or directed by the Engineer.

Use the respective mixes indicated above on Major and Local streets unless the plans note otherwise or directed otherwise by the Engineer. Submit mix designs and obtain approval from the Engineer for all HMA mixtures proposed for use. For approach and hand patching work on Major Streets, use the same HMA mixture respectively as specified for the top course unless otherwise approved by the Engineer.

Use 3.5% as target air void content of for leveling courses, top courses and shoulders paved in the same operation as the leveling and top courses. Use 3% as a target air void content of for base courses and shoulders not paved in the same operation as the leveling and top courses. Use 3% as a target air void content of for shared use paths.

The Performance Grade asphalt binder range for the HMA mixture shall be as noted above. Apply Bond Coat material accordance with the requirements of the Detailed Specification for HMA Paving.

Apply bond coat at a uniform rate between 0.05 and 0.10 gallons per square yard as directed and approved by the Engineer. Bond Coat is not a separate pay item; the HMA items of work for which it applies include payment for furnishing and placing bond coat.

c. Measurement and Payment. Measure and pay for this work as provided elsewhere in the contract documents.

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
ROCKERY WALL

a. Description. This work consists of removing an existing rockery wall and constructing a new rockery wall in accordance with the details in the Contract Drawings and as specified herein. Rockery walls covered under this specification shall not exceed 48-inches in height.

b. Material. Provide aggregate material meeting the requirements aggregate as specified in section 902 of the MDOT 2012 Standard Specifications for Construction. The ONLY permitted material shall be crushed limestone unless otherwise approved by the Engineer.

Rock for rock walls and chinking material shall be hard, sound and durable material, free from seams, cracks, and other defects tending to destroy its resistance to weather.

Rock size shall be in accordance with the drawings.

Chinking material shall be a minimum of 4 inches average dimension.

Provide geotextile fabric meeting the requirements for a non-woven geotextile separator as specified in section 910 of the MDOT 2012 Standard Specifications for Construction.

c. Construction. Construct aggregate base course in accordance with subsection 302.03 of the 2012 MDOT Standard Specifications for Construction. Deliver Class 21AA dense-graded aggregate to the job site in a thoroughly blended condition and handle in such a manner that there will be no mixing of underlying soil with the base aggregate.

If the property Owner indicates, before the start of construction, that they want to keep the existing boulders removed for the work, the Contractor shall remove and stockpile the boulders on the Owner's property in the location indicated by the owner. Otherwise, removed or excavated materials not incorporated into the work will become the property of the Contractor and be immediately removed and properly disposed of off-site. DO NOT stockpile overnight on site, or adjacent to it, any removed or excavated materials.

The Contractor shall restrict the excavation limits to the length of rock wall that can be constructed in one day's work. The Engineer may permit excavation beyond the limits that can be completed in one day's Work provided the Contractor either demonstrates that the excavation will remain stable until the rock wall is completed, or shores the excavation.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, and to defer certain work tasks, in order to protect the grade and/or adjacent areas. The Contractor shall not be entitled to any additional compensation for the use of smaller equipment, lighter equipment, or work task deferral.

Prior to rock placement, the foundation, shall be compacted as approved by the Engineer. Any foundation soils found to be unsuitable shall be removed and replaced to the satisfaction of the Engineer.

Base course rocks shall have full contact with the foundation soils. If necessary, the excavation shall be shaped to fit the rocks. Rocks may be dropped to shape the ground provided the rocks do not crack. Cracked rocks shall be replaced and the foundation regraded to fit the replacement rock.

Wall batter shall be 6:1 or flatter as specified in the Drawings.

The maximum void between adjacent main rocks shall be 6 inches as measured at the smallest dimensions of the void within the thickness of the wall. Where voids larger than 6 inches are present, chinking rock shall be keyed between the rocks to fill the void.

Rocks shall be placed so there are no continuous joint planes in either the vertical or lateral direction.

Where possible, rocks shall be placed so that the rock shall bear on at least two rocks below it. Rocks shall be oriented so that flat surface contact points between adjacent rocks are maximized. Point-to-point contact between adjacent rocks shall be minimized. Each rock in a course shall be arranged so that the natural irregularities in the rocks key the rocks together and so that the courses are keyed together

Base rocks shall be sized as “three man” (approximately 700-1500 pounds and 20-36 inch nominal diameter and top course rocks shall be sized as “two man” (approximately 200- 700 pounds and 14-22 inch nominal diameter) or greater. Rocks shall increase in size from the top of the wall to the bottom at a uniform rate.

Smaller rocks may be intermittently used for “structural chinking” which allows large rocks to rest in a stable movement free position. Void spaces between larger rocks shall be tightly filled or “aesthetically chinked” such that large gaps between rocks in the exposed face are reasonably well filled. There shall be no loose rocks or aggregate present at any point in the exposed face or top of the rockery wall.

Backfill for the rock wall shall be placed behind each course and tamped to provide a stable condition prior to placing rocks for the next successive course.

Ornamental fences shall be a minimum of 4 feet from the front face at the top of the rockery wall. Ornamental fences shall have their own foundations and not rely on the wall for structural support.

At the ends of the rockery wall, match existing walls or taper over a minimum distance of 8 feet. Adjust existing wall as necessary to create a smooth transition. All work to construct a transition within the existing wall shall be incidental.

d. Measurement and Payment. Measure and pay for the completed work, as described, at the contract unit prices using the following pay items:

Pay Item	**Pay Unit**
Rockery Wall	Lump Sum

Measure **Rockery Wall** by the unit lump sum and pay for it at contract unit price, which price includes costs for all labor, equipment and materials necessary to complete the work. The contract unit price includes payment for removal and disposal of sections of existing wall, new wall installed, including those portions of the wall frontage that are subsequently buried, and all other work necessary for a complete, finished wall. All aggregate materials and geotextile fabric required to construct the wall shall be incidental to the Rockery Wall Pay Item.

Measurement will be on a pro rata basis at the time of each progress payment, and based on the ratio of work completed during the payment period and the total contract amount. When all of the work of this Contract is complete, the measurement of this item shall be 1.0 Lump Sum, less any deductions incurred for inadequate performance as described herein. This amount will not increase for any reason, including extensions of time, extras, and/or additional work.

CITY OF ANN ARBOR

DETIALED SPECIFICATION
FOR
ELECTRICAL AND COMMUNICATION HANDHOLES

ST:GJS 1 of 2 04/25/22

a. Description. This work consists of furnishing and installing traffic signal handhole, lighting handhole, or communication handhole assemblies at the locations shown in the Plans, or as directed by the Engineer. Complete all work in accordance with the current National Electric Code (NEC), section 819 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, except as specified herein.

b. Materials. Provide materials that are new and meet the requirements of the current IEEE, NEMA, ANSI Standards as applicable, and as specified herein.

Submit product data sheets for all handholes, covers and other parts for Engineer approval prior to ordering materials. The location of manufacturer “Quazite Composolite," referenced below, is in Lenoir City, Tennessee.

Provide 12 inch x 18 inch handhole assemblies consisting of a "Quazite Composolite" #PG1118BA12 box and a #PG1118HA41 locking heavy-duty bolt-down type cover with a logo that reads “Street Lighting”, or an Engineer approved equivalent. The total depth of the handhole is 12 inches.

Provide 24 inch x 36 inch handhole assemblies consisting of a "Quazite Composolite" #PG2436BA24 box and a # PG2436HA12 locking heavy-duty bolt-down type cover with a logo that reads “Street Lighting”, or an Engineer approved equivalent. The total depth of the handhole is 24 inches.

Provide Class II granular material in accordance with section 902 of the MDOT 2012 Standard Specifications for Construction.

c. Construction. Place handholes at all junctions of traffic signal or electrical conduit, and as shown on the plans. Maximum distance between any two handholes is as shown on the Plans, and is not to exceed 500 feet.

Place foundation material consisting of four (4) inches of Granular Material, Cl II compacted to 95% of its maximum unit weight.

Set the handhole or stacked units to the proper depth and elevation.

Connect handholes to new and existing conduits, whether shown on the plans or not. Connect all conduits to the handholes in accordance with the latest revision of Article 346 of the National Electrical Code (NEC).

Backfill around the perimeter of the handhole with Granular Material, Cl II compacted to 95% of its maximum unit weight.

d. Measurement and Payment. Measure and pay for the completed work, as described, at the contract unit price using the following pay items:

Pay Item	**Pay Unit**
Handhole Assembly, 12 inch x 18 inch	Each
Handhole Assembly, 24 inch x 36 inch	Each

Measure **Handhole Assembly, ___ inch x ___ inch** individually in place by the unit each and pay for them at their respective contract unit prices, which prices include the costs for all labor, equipment and materials necessary to complete the work. Payment also includes the excavation and disposal of materials, furnishing, installing and compacting Granular Material, Cl II, and all work related to connecting handholes to new and existing conduits, whether or not shown on the plans.

a. **Description.** The Contractor shall furnish all labor, equipment, pipe, valves, fittings, restrained-joint pipe, restrained-joint gaskets, special gaskets as detailed on the plans and in the specification, polywrap, blow-off assemblies, fire hydrants, fire hydrant extensions, supplemental lighting towers, and all other materials necessary to complete the work as shown on the Plans, as detailed in this Detailed Specification, and as directed by the Engineer.

All water main installation and testing procedures shall be performed in accordance with the plans, the requirements of this Detailed Specification, and as directed by the Engineer. The Contractor shall excavate all trenches and pits to the required dimensions; sheet, brace, and properly support the adjoining ground or structures where necessary to comply with MIOSHA, Section 104.07.B of the MDOT 2012 Standard Specifications for Construction, and other relevant safety standards.

The work for all items shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; connections to new and existing water mains; the furnishing and installation of solid sleeves and push-on-joint plugs where needed; the furnishing, installation, and removal of sheeting and/or shoring where needed; all items necessary for the protection of the trench and all persons employed in the work during the work day and “after-hours” periods; polywrap; the furnishing, placement and compaction of approved bedding and backfill materials; thrust blocks; additional labor and equipment costs associated with any required nighttime water main work; cleaning, disinfecting, flushing, bacteriological and hydrostatic testing; and any other required items to complete the work as shown on the plans, as detailed in this Detailed Specification, and as directed by the Engineer.

The work of installing a gate valve-in-well shall include installation and backfill of the specified valve, furnishing and installing pre-cast concrete gate wells including the concrete base, straight pre-cast concrete sections, transition sections, and the adjustment of the structure cover. No separate payment will be made for adjusting the structure covers on new gate wells. The gate well cover shall be paid as “Dr Structure Cover.” Upon completion of the work, the Contractor shall clean the Gate Well to the approval of the Engineer.

The cost of adjusting new gate valve-in-boxes shall be included in the unit price for Gate Valve-in-Box and shall not be paid for separately.

The fire hydrant assembly work shall include the hydrant, the 6 inch gate valve-in-box, 3 feet of 6 inch pipe, the thrust block, and any required extensions to install the fire hydrant to the finish grade as shown on the plans.

b. Materials.

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:

A. Product data on all ductile iron pipe, valves, fittings, asbestos concrete pipe to ductile iron pipe fittings, and hydrants.

B. Manufacturer's certifications on all pipe, fittings, and precast concrete units indicating that all materials meet the minimum requirements of these specifications.

C. Information on equipment and methods to be used for flushing, chlorination, pressure and bacteriological testing.

2. General Specifications.

A. Cast Ductile Iron Pipe and Fittings:

Cast ductile iron pipe shall be Iron Grade 60-42-10 and meet the requirements of ANSI/AWWA C151/A21.51 in all respects; with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4; and, coated outside with an asphaltic coating in accordance with ANSI/AWWA C151/A21.51. 100% of the ferrous metals used in the manufacture of cast ductile iron pipe shall be recycled from scrap and other sources.

All pipe shall be either Pressure Class 250 or 350 (Table 50.5 ANSI/AWWA C150/A21.50) as detailed on the plans, or Thickness Class 50 (Table 50.15, ANSI/AWWA C150/A21.50). Ductile iron pipe crossing under a railroad shall be thickness Class 56.

Cast ductile iron river crossing pipe shall be Clow Corp. "F-141 River Crossing Pipe", U.S. Pipe "USIFLEX Boltless Flexible Joint Pipe" or equal approved by the Engineer, and shall be thickness Class 56 minimum. The pipe shall have a boltless flexible joint of the ball and socket type, and be designed for, and rated at, a minimum interior working water pressure of 250 psi.

Restrained joint pipe, where called for on the Plans, shall be boltless, factory-manufactured, by the installation of retainer weldment and ductile iron locking segments or rings. Restrained joint pipe shall be Ductile Iron manufactured in accordance with the requirements of ANSI/ AWWA C151/A21.51. Joints for restrained joint pipe shall be in accordance with ANSI/AWWA C111/A21.11. Restrained joint fittings and the restraining components shall be Ductile Iron in accordance with applicable requirements of ANSI/AWWA C110/A21.10 and/or C153/A21.53 with the exception of the manufacturer's proprietary design dimensions. Push-on joints for such fittings shall be in accordance with ANSI/AWWA C111/A21.11.

Restrained joint pipe shall be TR-Flex restrained joint pipe manufactured by U.S. Pipe; Lok-Ring pipe for pipe diameters 54" through 64" or Flex-ring pipe for pipe diameters less than 54" manufactured by American Ductile Iron Pipe; or, equal as approved by the Engineer. Bolts and nuts for "field-cut" retainer assemblies shall be stainless steel.

Cast ductile iron fittings shall be push-on joint (with the exception of solid sleeves and fire hydrants which shall be mechanical joint), meeting the requirements of ANSI/AWWA C110/A21.10 for short body cast iron fittings. Fittings shall have a cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4 and ANSI/AWWA C110/A21.10. The outside of all fittings shall have an asphaltic coating in accordance with ANSI/AWWA C110/A21.10.

Solid sleeves shall be long-pattern sleeves.

B. Gate Valves and Gate Valve Boxes:

All gate valves shall be resilient seated meeting the requirements of AWWA C509. All valves shall be of the push-on joint type, unless used on tapping sleeve assemblies, or noted otherwise on the plans. The valves supplied shall be:

a. Metroseal 250 Resilient Seated Gate Valve as manufactured by U.S. Pipe & Foundry Company
b. U. S. Pipe and Foundry Tyton Joint, Resilient Wedge Seated Gate Valve, meeting the requirements of AWWA C 509, AWWA C550, and ASTM D 2794
c. American Flow Control, Series 2500, Single Resilient Wedge
d. East Jordan Iron Works FlowMaster Resilient Wedge Valve
e. Mueller Series, 4" through 12", A-2360-38, Resilient Wedge – SL x SL
f. Tyler Series DRS 250-22 Double Resilient Wedge

All valves shall come equipped with a two-inch square operating nut, opening right.

Valve Boxes shall be Tyler 6860 Buffalo type, Size D, screw-type, 3 piece, 5-1/4 inch shaft and a No. 6 Base for a valve 8 inches or less and a No. 8 base for 10 and 12 inch valves.

C. Gate Valve Wells:

Pre-cast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat-slab tops shall conform to the requirements of ASTM C-478. Joints on precast gate wells shall meet the requirements of ASTM C-443, rubber O-ring gasket.

Flat-slab top, pre-cast, gate wells shall be designed to accommodate HL-93 Modified Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed. For the purposes of design, a HL-93 Modified Live Load shall consist of 1.2 times the design truck or 1.2 times a single 60 kip load, whichever produces the greater stresses.

D. Fire Hydrants:

Fire hydrants shall be East Jordan Iron Works Model 5-BR Water Master BR 250 with traffic flange; American Flow Control 5-¼" Pacer, WB 67-250; or, Waterous Model TCV-5 with traffic flange. All fire hydrants shall have the following features: a 6 inch mechanical joint pipe connection, ANSI/AWWA C111/A21.11; two 2-1/2 inch National Standard hose connections; one 4 inch Stortz pumper connection; 1-3/8 inch pentagon operating and cap nuts (1-3/8 in. point-to-flat at top; 1-7/16 in. point-to-flat at base); open left; breakable flange construction; no barrel drain; and a painted red finish. Depth of bury (bottom of pipe to ground surface) is generally 6 feet but may vary depending on specific site conditions. The Stortz pumper connection must be 21 in. ± 3 in. above finished grade, and the breakable traffic flange must be between finished grade and 8 in. above finished grade.

Fire hydrant extensions shall be fully compatible with the manufacturer of the fire hydrant assembly provided and be approved by the Engineer. East Jordan Iron Works hydrants shall be provided with a model 5-BR extension kit; and, Waterous Fire Hydrants shall be provided with a F1-K562-6 extension kit.

All fire hydrants must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system.

E. Tapping Sleeves and Valves:

Tapping sleeves and valves shall be manufactured of cast iron or stainless steel and designed for water service with a minimum working pressure of 150 psi. The sleeve shall be a full-bodied split sleeve design manufactured by one of the following manufacturers:

a) Clow No. F-5205;
b) Mueller Co. No. H-615;
c) Waterous Series 800;
d) East Jordan Iron Works MJ Tapping Sleeve with East Jordan FlowMaster RW Valve;
e) Tyler/Union D.I. MJ Tapping Sleeve;
f) Ford Meter Box Company Style FTSS;
g) Power Seal Model No. 3490 AS;
h) Smith Blair Model No. 622;
i) JCM 432 All Stainless Steel Tapping Sleeve; and
j) Price Brothers Company Tapping Sleeve for Prestressed Concrete Steel Cylinder Pipe (only to be used on concrete water mains.)

Tapping Sleeves for Pre-stressed Concrete Steel Cylinder Pipe shall be in accordance with AWWA M-9. The sleeves shall have a separate gland which permits installation of the sleeve prior to cutting of the prestress wires. The gland shall have a fusion epoxy coated (per AWWA C-213) waterway, and a broad gasket set in a retaining groove of a pressure plate gusseted to eliminate flexing. The gland shall be equipped with load bearing set screws to protect the cylinder. Grout under saddle is needed whether saddle is epoxy coated or not. Sleeves shall be furnished with grouting seals and grout horns to facilitate filling the space between the sleeve and the pipe. Tapping sleeves shall be a Price Brothers Company Tapping Sleeve for Prestressed Concrete Steel Cylinder Pipe or approved equal.

Tapping valves shall be double-disk type of the same manufacture as the sleeve, NRS with two-inch square operating nut-opening right, with a mechanical joint outlet.
All tapping sleeves and valves must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system.

F. Asbestos Concrete Pipe to Ductile Iron Pipe Coupling:

The asbestos concrete pipe to ductile iron pipe coupling shall be the “Smith-Blair 415 (23.15”—21.60”) Gaskets, Alloy bolts and Epoxy” coupling or equivalent.

G. Joints:

Push-on joints shall be single gasket joint meeting the requirements of ANSI/AWWA C111/A21.11.

Mechanical joints for fire hydrants and solid sleeves shall be in accordance with ANSI/AWWA C111/A21.11 and shall be the Mega Lug Series 1100 joint restraint system manufactured by EBAA Iron Sales, Inc. or the Ford Meter Box Co. Uni-flange Retainer (UFR

1400-D-x style.)

Bolts for mechanical joints shall be high strength, low alloy steel bolts, only, meeting the requirements of ANSI/AWWA C111/A21.11. All bolts, nuts, and washers if required, shall be coated with a factory-applied flouropolymer coating meeting the following requirements:

Use Temperature: -100°F to 500°F
Salt Spray – ASTM B117 up to 4000 hours (nuts must not become frozen)
Pencil Hardness – 5H to 6H – ASTM D3363-92A
Kinetic Coefficient of Friction – 0.06 to 0.08
Thickness – nominal 0.001" (1 mil)
Impact – 160 in-lbs as measured by ASTM D2794-93
Adhesion – 5B – ASTM D3359-95
Di-electric Strength – 500V per mil
Elongation – 35% to 50%
Tensile Strength – 4,000 psi
Operating Pressure – up to 100,000 psi
Kesternich Test – Nuts not frozen up to 30+ cycles (DIN 50018)

Corrosion Resistance: as measured by;

ASTM D 1308	Muriatic Acid 31% HCL - 24 hours - No Effect
	Sulfuric Acid 93% H_2SO_4 - 24 hours - No Effect
	Caustic Soda 100% NaOH - 24 hours - No Effect
	Methy Ethyl Keytone MEK - 24 hours - No Effect
ASTM B117	Salt Fog - 1,000 hours - No Effect

The flouropolymer coating shall strongly adhere to surface being coated and shall not flake off or be easily removed by rubbing or brushing.

Cast ductile iron river crossing pipe joints shall be a push-on type ball and socket joint utilizing a first grade rubber gasket. The joint shall be capable of 15-degree full turning deflection without separation, leakage, or restriction of the pipe waterway. Joint restraint shall be provided by a boltless means which is locked against accidental disengagement of the restraining component. Pipe shall be furnished with the necessary gaskets, lubricant, and retainer locking accessories.

Restrained, push-on joint, pipe shall be American Pipe's "Fast-Grip" gasket system; U.S. Pipe's "Field-Lok 350" gasket system; or, Griffin Pipe "Field-Lok 350" gasket system.

The use of retainer glands and set screws shall not be acceptable.

Lubricants used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

H. Pipe Wrapping:

All Cast Ductile Iron Pipe, Fittings, and Valves (except river, railroad and highway crossing pipe) shall be fully wrapped with polyethylene per ANSI/AWWA C105/A21.5 and the details as contained on the plans.

I. Casing Pipe:

Steel casing pipe used for construction at railroad or State highway crossings shall comply with the following minimum requirements unless more stringent requirements are established by the railroad or State. Casing pipes at other locations shall comply with the following minimum requirements unless otherwise indicated on the Plans or in the Specifications.

Nominal Diameter of Casing Pipe (Inches)	Minimum Wall Thickness (Inches)
Under 14	0.250
14, 16, and 18	0.312
20 and 22	0.375
24, 26, 28, and 30	0.500
32 and 34	0.563
36, 38, 40, 42, and 48	0.625

Steel pipe shall be non-spiral pipe and have a minimum yield strength of 35,000 psi. All joints shall be made leakproof using full penetration, continuous welds. Welds shall be ground smooth outside and inside (except inside 22 in. diameter and less) to prevent conflict with the soil or pipe placement. Steel pipe shall meet the requirements of ASTM A 53, Type E or S, Grade B.

Pipe Marking:

The following information shall be clearly marked on each length of pipe:

a) The pipe designation and class (e.g. A 53, Type S, Grade B.)
b) The name or trademark of the manufacturer.
c) Identification of the manufacturing plant.

Inspection:

All casing pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe that, independent of physical tests specified under the standard specifications designated herein, fails to conform to the requirements of these Specifications.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

J. Water Main Pipe Marking:

The following information shall be clearly marked and/or cast on each length of pipe:

a) The pipe designation and class (e.g., D.I., Class 50).
b) The name or trademark of the manufacturer.
c) Country where cast.
d) The year in which the pipe was produced.

The following shall be distinctly cast on each fitting:

a) The pressure rating of the fitting.
b) Nominal diameters of openings.
c) The name or trademark of the manufacturer.
d) Country where cast.
e) The number of degrees or fraction of the circle on all bends.
f) Ductile iron fittings shall have the letters "DI" or "Ductile" cast on them.

K. Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

All materials that will potentially be in contact with the City of Ann Arbor water supply must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system. These materials shall include pipe coatings, pipe metals, cement linings, and joint lubricants and gaskets.

L. Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection. The Contractor shall also notify the Engineer when the material has arrived at the site.

All ductile iron water main pipe shall be stacked on pallets off of the existing grade, with each end plugged or bagged so as to keep the pipe interior clean until final installation.

Cast ductile iron pipe and fittings shall be subject to rejection on account of any of the following:

a) Variation in any dimension exceeding the permissible variations given in the material specifications.
b) Any crack or defect in the cement mortar lining which, in the opinion of the Engineer, is non-repairable, including, but not limited to, loose or "hollow" lining.
c) Any signs of physical damage or poor manufacturing which might render the material unsuitable for its intended use.
d) Variation of more than 1/16 inch per lineal foot in alignment of pipe intended to be straight.
e) Damaged ends, where in the judgment of the Engineer such damage would prevent making a satisfactory joint.
f) Improper handling during delivery, unloading, or installation.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

M. Water Main Bedding and Backfill Materials:

Bedding and backfill material for Trench Detail I (under roadbed), Modified, shall be Granular Material, Class II, meeting the requirements of Section 902. Bedding and backfill for Trench Detail V (outside of the 1:1 influence line of roadbed or curb and gutter), Modified, shall be Granular Material, Class II and Engineer approved native material, placed in accordance with the trench details.

c. Construction. Water main installation, bacteriologic and hydrostatic testing, and acceptance requirements are described as follows.

Installation of proposed water mains will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to all relevant MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

Coordinate with the City of Ann Arbor Public Works Unit for the installation of 1-inch corporations in the gate wells to be used for water main testing and/or filling of new main.

The Contractor must have all materials, fittings, pumps and other miscellaneous equipment, and personnel on-site before the City of Ann Arbor Public Services personnel will prepare and shutdown an existing main.

The bedding and backfill for Trench Detail I (under roadbed), Modified, shall be MDOT Granular Material, Class II compacted to 95% of its maximum dry density in maximum lifts of 12 inches. The bedding and backfill for Trench Detail V (within 1:1 influence of the roadbed or curb and gutter), Modified, to a point 12 inches above the top of pipe, shall be MDOT Class II sand compacted to 95% of its maximum dry density. The material above this point shall be Engineer-approved native material compacted to 90% of its maximum dry density.

The Contractor shall dig-up and expose all utility crossings prior to laying any water main pipe. This will allow the Engineer to adjust the grade of the water main, if possible, to avoid the existing utilities. The costs of the ‘dig-ups”, and all related costs, shall be included in the respective items of work in this Detailed Specification. Some “dig-ups” may need to occur out of Phase.

Should the water main, or other pay items in this Detailed Specification, conflict with abandoned sewers or water mains, the conflicting section of the abandoned sewer or water main shall be removed and the remaining sections shall be (re)abandoned in accordance the Detailed Specification for “Water Main and Appurtenances, Abandon” and the Detailed Specification for “Sewer, Any Size or Depth, Abandon,” except that flow filling the sewer will not be required. All the work shall be included in the cost of the water main, or other pay items in this Detailed Specification.

A. Dry Tap:

When a connection to an existing water main is to be made in the dry, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing

valves, and the water from the existing main shall then be pumped out or removed by other means so that the connection may be made in the dry. All pipe materials and appurtenances which will come into contact with potable City water after the restoration of water service following the connections shall be disinfected with a strong chlorine solution prior to installation.

The Contractor may not operate City water main valves. For valve operation, contact City of Ann Arbor Public Services Area personnel; the City of Ann Arbor personnel will direct the operation of all valves by Contractor personnel. It is recommended that the Contractor request that the existing valves, which will need to be operated in order to perform the water main work, are checked in advance of the work to ensure that they operate properly. If the Contractor elects not to request the operation of the valves in advance of any required water main operation, then a request for extension of contract time will not be allowed.

It is possible that the valves which need to be operated to facilitate a shutdown will not close entirely, thereby allowing water to leak past the valve into the area of the shut down. The Contractor shall provide the necessary labor, material, and equipment to enable work to be completed with a poor shut down. Under no circumstances shall the Contractor be compensated for “downtime” associated with water main valve or appurtenance failure or its inability to properly operate or close fully. An extension of contract time may be allowed, if the Contractor has requested that the water main valves have been exercised in advance of the intended water main shutdown.

Due to the size and length of pipe being shut down, and the quality of shut-down attained, large amounts of water may need to be removed from the excavation. Where possible, the water shall be run directly into nearby storm sewer inlets via pumps and hose.

The Contractor shall have all pipe, fittings and appurtenances required to complete the water main connection prior to the excavation for the connection, or the work will not be allowed to commence.

The Contractor shall complete the water main work in a manner which minimizes the disruption of water service to the greatest extent possible.

The City must notify all businesses 48 hours in advance of a water main shut-down; residences must be notified 24 hours in advance. To give the City an opportunity to provide such notification, the Contractor shall schedule the water main shut-downs at least 72 hours in advance, and preferably a full four or five days in advance, of the water main shut-down.

No water main shutdown shall take place after 12:00 p.m. (noon), unless written permission has been granted by the Engineer and that the Contractor has sufficient lighting equipment to provide a safe and efficient work area for working after dark. No water main will be shut down until the main has been exposed, cleaned, and is ready to be cut.

There shall be no gap larger than 1/4 inch left in the existing water main as a result of the tie-in. If needed, a closure piece ("thrust ring") of such size so as to meet this requirement shall be installed.

B. Wet Tap:

Prior to the installation of a tapping sleeve, the section of pipe to be tapped shall be cleaned

of all foreign material and wire brushed to a smooth surface. The two halves of the sleeve shall be placed around the pipe with the gaskets installed per the manufacturer's instructions. The bolts shall be tightened evenly from the center toward the ends. The bolts shall be tightened to the manufacturer's specified torque.

When performing a wet tap in a prestressed concrete steel cylinder water main, grout is to be placed under the tapping saddle whether or not the saddle is epoxy coated.

All pipe materials and appurtenances which may come into contact with potable City water shall be disinfected with a strong chlorine solution prior to installation. This includes the pipe section to be tapped, the two halves of the sleeve, gaskets and the gate valve.

Prior to installation of the end gaskets, the sleeve shall be blocked with cement bricks such that the outlet is in proper position. The end gaskets shall be installed with an overlap as specified by the manufacturer.
The glands shall be assembled on the pipe. The bolts around the gland shall be tightened evenly, causing the gaskets to uniformly compress.

The valve shall be installed on the sleeve following the manufacturer's instructions.

Prior to tapping, the assembly shall be tested using the test plug tap in the sleeve with the valve closed, or by placing a tapped plug on the outlet of the valve with the valve open. The assembly shall be pressurized to l50 psi and hold the pressure fifteen minutes. After the pressure test is complete, the pipe shall be tapped.

C. Oversized Water Mains:

Portions of the proposed water mains or fittings may connect with existing water mains or fittings. The possibility exists that some of the existing water mains may have been constructed using oversized, cast iron, pipe. Where tie-ins or interconnections are specified and the existing main is found to be oversized, the Contractor shall furnish and install Clow 3501B Sleeves, Tyler Dual Sleeve 5-146L, or Rockwell 441 Sleeves. These sleeves are to be present on the jobsite prior to the excavation for the water main connection, or the work will not be allowed to commence.

D. Permissible Deflection at Joints:

Wherever it is necessary to deflect ductile iron pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions, to plumb valve stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint and shall be approved by the Engineer. The deflection shall not exceed the following amounts:

Size of Pipe (inches)	Joint Angle (degrees)	Deflection in 18 ft. (inches)	Approx. Radius of Curve Produced by Succession of 18 ft. Lengths (feet)
4	5	19	205
6	5	19	205
8	5	19	205
10	5	19	205
12	5	19	205

16	3	11	340
20	3	11	340
24	3	11	340
30	3	11	340

The above joint deflection angles apply to fittings as well as pipe joints.

E. Trench Opening:

The Contractor shall fully comply with all laws and regulations governing construction methods and the furnishing and use of all safeguards, safety devices, protective equipment, and pollution controls. Where required to support the surfaces of adjacent roadways, structures, or excavations, or to protect the construction work, adjacent work, or workmen, the Contractor shall design and install sheeting, bracing, and shoring. The Engineer will not review the Contractor's design(s) or be responsible for the adequacy of the elements supporting the trench. The placing of such supports shall not release the Contractor of the responsibility for the sufficiency and integrity of the trench, trench opening, and the safety of all persons involved in the work.

Sheeting, bracing, and shoring shall not be left in place after completion of the work except as required by the Engineer. In the removing of sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to adjacent property. Where the Engineer requires the sheeting, bracing, or shoring to be left in place it shall be cut off below the established surface grade as required by the Engineer.

All excavation shall be performed in such a manner as to provide adequate room for the construction and installation of the work to the lines, grades and dimensions shown on the Plans. The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified. For each size of pipe, the minimum trench width shall provide clearance of four inches on each side of the bell of the pipe or fitting or six inches on each side of the pipe barrel, whichever is greater. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports, sheeting and bracing, and handling of special fittings. The Work shall be performed such that the existing utilities, asphalt curb and gutter, and existing pavement shall be protected at all times.

In excavating for water mains, the excavation shall at all times be finished to the required grade in advance of the pipe line, but unless otherwise permitted in writing by the Engineer, not more than 50 feet of trench shall be open at one time in advance of the pipe. At no time shall more than 200 feet of trench be opened and incompletely backfilled. At the end of each day, no more than 10 feet of trench may be left open, and access to all drives shall be restored. This opening shall be surrounded by fencing and barricades, or plated. The remainder of the trenching operation shall be available for safe vehicular and pedestrian traffic at all times.

It is essential that the discharge of the trench de-watering pumps be conducted to natural drainage channels, drains, or storm sewers. Engineer-approved soil erosion and sedimentation controls shall be installed and maintained at the point of discharge.

The length of street which may be occupied by the construction work at any one time shall be subject to the approval of the Engineer and will be based on the requirements of use of the street by the public.

F. Boring Pits

The means and methods of boring pit excavation and support, in whatever conditions encountered or created, shall be determined by the Contractor, subject to approval by the Engineer. All costs shall be included in the Contract Price per lineal foot of bored water main. Perform all excavations required for construction of pits, shafts, and other structures. Excavations shall include any and all materials encountered in the Work, euch 3e topsoil, cl3y, sand, gravel, cinders, rocks, boulders, fill, old timber, buried trees and roots, abandoned utilities, abandoned foundations and structures, buried debris, or any combination of these, in whatever condition found.

Provide and maintain all sheeting, shoring, and bracing required in shafts and pits, and open cut excavations to insure protection and safety of personnel and to protect adjacent structures, property and work in place. The Contractor shall be responsible for the complete design of all sheeting, shoring, and bracing work. The design shall be appropriate for the soil conditions, shall be of such strength, quality, dimension and spacing as to prevent caving or loss of ground or squeezing within the neat lines of the excavation, and shall effectively restrain movement of the adjacent soil. Prior to installing the sheeting, shoring or bracing, the Contractor shall submit plans for this work to the Engineer for informational purposes only. Sheeting, shoring, and bracing shall conform to the current federal or state regulations for safety.

Excavate as required to perform all boring work to the grades, lines and levels indicated on the Plans and as specified herein. Construct approach trenches, pits and shafts of sufficient length and width to accommodate the equipment being used, the pipe units to be placed and the manpower working. Locate the approach tunnel or working shaft or pit so that it will not unduly interfere with traffic or with the use of adjacent property.

Where required, control the infiltration of groundwater into the excavation. Use dewatering systems to lower the groundwater to below the bottom of the shaft or use other approved methods at no additional cost to the Owner.

Any relocations or removal and replacement of utilities, including gas mains, water mains, services, sewers, irrigation systems, signs, and other miscellaneous items required to construct shafts shall be incidental to the project unless otherwise specified.

Excavation under railroads shall conform to the requirements of the American Railroad Engineering Association (AREA) and the railroad corporation having jurisdiction.

G. Laying Pipe:

Each pipe shall be inspected for defects prior to being lowered into the trench. Inside of pipe and outside of spigot shall be cleaned of any earth or foreign matter.

Proper 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. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by

means of an excavator using chains, slings, or other suitable tools or equipment as recommended by the manufacturer, in such a manner as to prevent damage to them and their protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

New water main construction shall not be connected into the existing system until it has been tested and accepted by the Engineer. The Contractor shall excavate for all bell holes and shall place the bell of the pipe in the excavated bell hole. Pipe shall be laid on the prepared trench bottom with the bell ends facing the direction of laying, unless otherwise directed by the Engineer.

The Contractor shall take every precaution to prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply during the noon hours as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Pipe shall be jointed as specified elsewhere herein. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space.

All pipe shall be laid at the correct line and grade as indicated by the grade stakes and offset line. Each pipe, as laid, shall be checked by the Contractor to ensure that this result is obtained. The staking shall be provided by the Engineer. No pipe shall be laid until a cut sheet for that pipe has been approved by the Engineer. The grade as shown on the Plans is that of the top-of-pipe for water main; and, the work must conform to this profile. For water main construction, a variation from the profile grade of two inches with ductile iron pipe, and three inches with reinforced concrete pipe, will be deemed sufficient reason to cause the work to be rejected and re-laid. Water main pipe alignment shall be maintained so as not to vary more than three inches from the correct line. Any pipe found out of line shall be re-laid properly by the Contractor.

Due to conditions in the field, changes to the proposed vertical and horizontal alignment of the proposed water main may become necessary. The Contractor shall, where directed by the Engineer, excavate up to 60 feet in advance of the pipe laying operation to expose existing underground facilities thereby enabling the Engineer to make alignment decisions. The Contractor is required to realign (re-lay) the water main up to 2 feet vertically and/or horizontally as directed by the Engineer at no extra cost to the project. The excavation in advance of the pipe laying is intended to help eliminate the need for re-laying pipe.

H. Crossing Existing Structures and Facilities:

During the construction it may be necessary to cross under or over certain sewers, drains, culverts, water lines, gas lines, electric lines, fiber optic communication, telecommunication, and other types of underground structures or facilities, known or unknown. The Contractor shall make every effort to prevent damage to such underground structures and facilities. The Contractor shall not intentionally damage or break existing structures or facilities and repair them in order to expedite the water main installation process. Wherever such

structures or facilities may inadvertently be disturbed or broken, they shall be restored to a condition that is equal to, or better than, that was encountered prior to the damage. All damaged structures and/or facilities shall be made fully acceptable to the owner and the City, at the Contractor's expense. All crossings shall be made with a minimum of twelve inches of vertical clearance between or alongside existing structures or facilities.

I. Cutting Pipe:

Cutting cast iron or ductile iron pipe for inserting valves, fittings, or closure pieces shall be performed in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the longitudinal axis. Where the type of pipe joint in use is such that it employs push-on assembly to affect the joint seal, the outside of the cut end shall be tapered back 1/8 inch with a coarse file or a portable grinder at an angle of about 30 degrees. The tapering must remove all sharp and/or rough edges which might injure the gasket.

The flame cutting of pipe will not be allowed. Reinforced concrete water main pipe shall not be cut.

J. Setting Water Main Fittings and Accessories:

Valves, fittings, plugs, hydrants, etc. shall be set and joined to pipe in the manner specified in the Section entitled “Making Joints.”

Hydrants shall be located as shown on the Plans or as directed by the Engineer in such a manner as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.

Hydrants shall be set to stand plumb with their nozzles parallel to the street and the pumper nozzle facing the street. Hydrants shall be set with pumper nozzles between 18 and 24 inches above finished grade, or as directed in writing by the Engineer.

K. Making Joints:

Mechanical means shall be used for pulling home all rubber-gasket pipes regardless of trench condition where manual means will not result in pushing and holding the pipe home. When a trench box or liner is used, a cable shall be used to pull the joints home and hold them in position.

Where work is performed in wet trenches or trenches with running sand, the Contractor shall provide and use mechanical means for pulling the pipe home in making up the joint and for holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside or outside of the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

Where not required by these Specifications, manual means will be acceptable only if the joints can be pushed home and held.

L. Anchorage for Water Main Fittings and Accessories:

All plugs, caps, tees, hydrants, and bends shall be provided with MDOT Grade S2 concrete

meeting the requirements of Section 701 of the 2012 MDOT Standard Specifications for Construction reaction backing (thrust block) as shown on the Plans or specified herein. Valves shall be restrained from movement at adjacent sleeves by the use of a closure piece, or thrust ring (full size pipe section cut to fill the gap inside the sleeve to within 1/4") as specified herein.

Reaction backing shall be placed between unexcavated solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall be that shown on the details or directed by the Engineer. The reaction backing shall, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repairs. This shall include adequate protection of any bolts from direct contact with the concrete.

Metal harnesses of tie rods or clamps may not be used instead of concrete reaction backing. Mega-Lug joint restraint systems and restrained, push-on joint, pipe shall be used where connections to existing lines require immediate pressurization, as specified herein.

In the event that the Engineer determines a change in the anchorage or design is required due to unsuitable earth conditions, changes may be ordered by the Engineer.

The use of friction clamps or set-screw type retainer glands for thrust restraint will not be allowed.

M. Casing Pipe Installation:

Casing pipe 1.0. shall be a minimum of 6-inches larger than the largest O.D. of the water main pipe. Larger diameter casing pipes shall be required where so noted on the plans. Place pipe to the lines and grades indicated on the Plans. Use care to not damage pipe, joints or joint material.

Perform boring or auguring excavation by excavating an opening larger than the outside diameter of the pipe to be installed. The diameter of the excavation shall not exceed the outside diameter of the casing pipe by more than 1-inch. Employ grouting or other methods approved by the Engineer to fill voids within 48 hours of completing the bore.

N. Abandonment or Removal of Water Main:

The Contractor shall abandon or remove water main(s) where shown on the Plans. All work shall be performed in accordance with the Detailed Specification entitled “Water Main and Appurtenances, Remove or Abandon.”

O. Water Main Testing:

The water main shall be disinfected and tested by the Contractor in the presence of the Engineer in accordance with the requirements below. The Contractor shall furnish all piping, pumps, hoses, gauges, and other materials and equipment required to carry out the tests using water from the City's water mains. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course. Any hoses which are needed to direct water from blow-offs and/or hydrants during water main testing and flushing shall be supplied by the Contractor. The City shall furnish and install one inch corporation stops at all necessary locations, at the

expense of the Contractor. The tapping of water mains, the installation of all corporation stops, and the operation of valves and hydrants is reserved for City personnel. The Contractor is required to assist in valve and hydrant operation, however. The Contractor shall give the City forty-eight hours prior written notice of intent and desire to test water mains.

a) Bacteriological Testing Sequences:

In the case of all water mains connected to existing facilities, flushing, chlorination and bacteriological testing must precede pressure testing. Where mains can be totally isolated from existing facilities with air gaps or double valves, pressure testing may precede chlorination and bacteriological testing. The normal sequence and time requirements for testing are:

Isolated (Gapped) Water Main	Connected Water Main
1. Fill Main	1. Flush and Swab*
2. Pressure Test	2. Chlorinate
3. Connect One End of Main	3. Wait; 24 hours
4. Flush and Swab*	4. Flush**
5. Chlorinate	5. Wait; 24 hours
6. Wait; 24 hours	6. Bacteriological Samples
7. Flush**	7. Wait; 24 hours
8. Wait; 24 hours	8. Bacteriological Samples
9. Bacteriological Samples	9. Wait; 48 hours
10. Wait; 24 hours	10. Pressure Test (If both sets of Bacteriological samples pass)
11. Bacteriological Samples	11. Flush
12. Wait; 48 hours	12. Wait; 24 hours
13. Make Final Connection(s) – Place in Service (If both sets of bacteriological samples pass)	13. Bacteriological Samples
	14. Wait; 24 hours
	15. Bacteriological Samples
	16. Wait; 48 hours
	17. Place in Service (If both sets of bacteriological samples pass)

*Collect flush water in operable storm water retention/detention facility.
**Discharge flush water into approved sanitary sewer.

The Contractor shall not connect any end of a newly constructed water main to an existing, in-service, water main, until the newly constructed water main passes the hydrostatic test, unless approved in writing by the Engineer.

b) Hydrostatic (Pressure Test):

Insofar as is practical, mains shall be pressure tested between valves. The maximum length of water main to be tested in any one test shall be 1500 feet. The section of main to be tested shall be slowly filled with potable water and the entrained air within the pipe removed or absorbed and pumped up to a pressure of 150 psi (or other pressure if

specified) and the test period shall start immediately thereafter. The lines shall then be maintained under a test pressure of 145-155 psi for a continuous period of three hours by pumping chlorinated (25 ppm) water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the line under test during the interval. Visible leaks shall be repaired regardless of test results. The leakage under the conditions of the test shall not exceed the values shown in the table below. If one side of a double disc gate valve is under test pressure, that seat shall count as four joints.

Maximum Allowable Leakage per 100 Joints at 150 psi Avg. Test Pressure

Pipe Diameter (Inches)	4	6	8	10	12	16	20	24	30	36
Leakage (gallons/hr)	0.66	0.99	1.32	1.66	1.99	2.65	3.30	3.97	4.97	5.96

In the event that the leakage exceeds the maximum allowable leakage as specified above, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or fittings found to be leaking shall be removed and replaced with new pieces by the Contractor. After this work has been performed, all tests shall be repeated.

c) Flushing and Swabbing:

The Contractor shall flush the water main after making a connection to the existing City water main where a valve separates the new water main from the existing main. As a result, flushing will be accomplished using flow through the full size of the new water main. If a storm water retention/detention facility is to be constructed as part of the project, this facility is to be completed, stabilized, operable, and utilized for the collection of the flushing water. All pipe, materials, and appurtenances which will come into contact with potable City water after the restoration of water service following the connection shall be disinfected with a strong chlorine solution prior to installation.

Water main shall be cleaned using a high density poly-pig, Girard Aqua Swab (2 lbs/ft3 density) swab, or Engineer approved equal and flushed. The diameter of the blow-off pipes shall be at least 50% of the diameter of the pipe being flushed. Hydrants, with internal components removed, may serve as blow-offs for mains 12 inches and less. The Contractor shall provide details, for the review and approval of the Engineer, for the various required blow-offs. Blow-off pipes, discharge hoses, where needed, and associated costs shall be included in the cost of the permanent water main being installed and will not be paid for separately. If there are no branch connections to be swabbed, the poly-pig shall be inserted in the new water main at the time of connection described above. The poly-pig shall be located on the "downstream" or new side of the separation valve. The poly-pig shall then be forced through the new water main during the first flush and discharged through a construction blow-off of sufficient size to allow passage of the poly-pig. For water mains with branch connections, a launching tee or wye shall be installed as shown in the details, for launching multiple poly-pigs. The main line and each branch main shall be flushed and swabbed individually. Following the successful final bacteriological testing of the water main, the launching tee/wye shall

be permanently capped at its branch.

During the flushing and swabbing of a water main, the discharge point for the main shall be left open, with all other discharge points closed, to direct the poly-pig completely through the main being swabbed to its point of termination. Following the initial swabbing of water main, the separation valve shall be closed, and then the discharge point closed. If a branch water main is to be swabbed, the poly-pig is then to be placed in the launcher; the discharge point for the branch water main is to be opened; the poly-pig is to be inserted into the water main; the separation valve partially opened and the branch water main flushed and swabbed.

Following the swabbing of the water main(s), the water main(s) are to be flushed as required. If approved or directed by the Engineer, the water main(s) may be flushed overnight, provided that proper controls (i.e. hoses directed into storm structures, etc.) are installed to direct and control the flushing water.

d) Chlorination:

After the water mains to be tested have been acceptably flushed, they shall be disinfected in accordance with AWWA C651 "Disinfecting Water Mains" and these Specifications. All new mains and fittings, and any existing mains contaminated by the Contractor, shall be chlorinated to a minimum residual of fifty (50) parts per million (ppm) with commercial liquid chlorine solution (sodium hypochlorite - pool type). Other forms of chlorination and disinfection methods of water mains may be presented by the Contractor and shall receive prior approval in writing by the Engineer before being used. The minimum recommended dosage of sodium hypochlorite is as follows (based on 10% available chlorine):

Recommended Minimum Chlorine Dosage to Disinfect 100 L.F. of Pipe	
Pipe Diameter (inches)	10% Chlorine Solution (gallon)
6	0.153
8	0.272
10	0.426
12	0.613
16	1.090
20	1.703
24	2.452

The chlorinated water shall remain in the mains for a minimum of 24 hours, at the end of which period the chlorinated water at all parts of the main must show free available chlorine residual of at least twenty-five (25) ppm. If less than 25 ppm residual is shown at the end of the first 24 hour period, additional chlorine shall be added until a residual of not less than 25 ppm at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and disposed of into an existing, approved City sanitary sewer main, or other location approved in writing by the Engineer. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course. The mains shall then be left full of water ready for bacteriological testing.

e) Bacteriological Testing:

The City will obtain bacteriological samples of the water in the mains for analysis from testing blow-offs, corporations, or other sampling points as determined acceptable by the City. Samples will be taken after the mains have been satisfactorily chlorinated in accordance with these Specifications, the chlorinated water flushed out and removed, and the mains filled with potable water. The water samples will only be bacteriologically tested at the City's Water Treatment Plant Laboratory; the use of other laboratories or testing locations shall not be allowed or deemed to provide satisfactory test results by the City of Ann Arbor under any circumstance. No samples will be deemed acceptable until they meet all city requirements. If the newly constructed water main is connected at one end to an in-service section of the City water main, and the chlorination precedes pressure testing, the City will also take samples after satisfactory pressure testing. In each case, two sets of samples shall be taken; a period of 24 hours must elapse between flushing of the main and drawing of the first samples, with the second samples being drawn 24 hours after the first samples were drawn. For each sample, a minimum of 48 hours is required to obtain test results. All samples must pass the bacteriological test.

The Contractor shall plan for these testing sequences and durations in his construction schedule. Contract time will continue during all water main testing phases, regardless of duration.

P. Lighting Requirements for Nighttime Water Main Work.

Night work shall be lighted to an average intensity of 10 foot-candles minimum. Sufficient light sources shall be provided to achieve this illumination requirement. The lighting scheme shall be submitted to the Engineer for review and approval a minimum of 72 hours prior to the anticipated commencement of the nighttime work. Nighttime work will not be allowed to begin until such time as the lighting scheme has been approved by the Engineer.

The lighting shall allow the inspector to clearly see and inspect all work operations. Light sources shall be adjusted as directed by the Engineer, as many times as needed, in order to meet the requirement.
Lighting systems may be fixed, portable, or equipment mounted. A power source shall be supplied with sufficient capacity to operate the lighting system. The power source shall not violate any local noise ordinance requirements. The lighting system(s) shall be arranged such that they do not interfere with the vision of motorists, glare or shine in the eyes of oncoming drivers, or unnecessarily illuminate surrounding properties or residences. After initial set-up, drive through and observe the lighted area from each direction on the roadway. Adjust lighting units as many times as needed in order to comply with these requirements.

Q. Sequence of Construction.

All water main construction shall be completed in accordance with the Detailed Specification entitled "Maintaining Traffic and Construction Sequencing" and as detailed herein. The Contractor shall schedule and coordinate all water main shutdowns with the Engineer. The Contractor shall submit for the Engineer's review and approval the sequence of all water main "shut downs" and tie-ins such that disruption in service to existing properties is minimized to the greatest extent possible. Should the Engineer not accept the Contractor's

proposed construction sequence, it shall not be a basis of claim for extension of contract time or additional compensation.

All water main and appurtenances shall be pressure tested, cleaned, disinfected and bacteriological tested in accordance with the specifications outlined within this Detailed Specification.

After acceptance of each section of new main the Contractor shall begin coordination with the City of Ann Arbor Public Services Area for the installation of water services, curb stops and boxes in accordance with the Detailed Specification entitled "Excavate and Backfill for Water Service Tap and Lead."

d. Measurement and Payment. The completed work will be paid for at the contract unit prices for the following pay items:

Pay Item	**Pay Unit**
__ deg Bend, ___ inch	Each
D.I., Cl-56, Water Main, w/ Poly Wrap, _ inch, Bored in Steel Casing	Foot
Fire Hydrant Assembly, with Extensions, Complete	Each
Gate Valve-in-Box, ___ inch	Each
Gate Valve-in-Well, ___ inch	Each
PC 350, D.I. Water Main, w/ Polyethylene Wrap, ___ inch, Tr Det _, Mod	Foot
Reducer, ___ inch x ___ inch	Each
Tapping Sleeve, _ inch x _ inch x _ inch, Valve and Box	Each
Tee, ___ inch x ___ inch x ___ inch	Each
Water Service Connection to __ inch HDPE Water Main	Each

All work shall be paid in full at the contract unit prices which shall include all labor, materials and equipment required including all required costs associated with night time work, supplemental lighting, and all other required elements of the work.

D.I., Cl-56, Water Main, w/ Poly Wrap, _ inch, Bored in Steel Casing includes all excavation, boring pits, sheeting, shoring, bracing, backfilling, casing pipe to install water main in casing pipe.

Fittings other than those specifically listed as separate contract items, blow-off assemblies, hoses, and restrained joint pipe and gaskets, special gaskets, and the like, shall not be paid for separately, but shall be considered included in the payment for **PC 350, D.I. Water Main, w/ Polyethylene Wrap, ___ inch, Tr Det _, Mod**.

Tees, Bends, and Reducers and other fittings specifically listed as separate pay items, shall be paid for at the contract unit price for each unit installed.

Gate Valve-in-Box includes the Valve Box.

Valve Box Extensions will only be paid for if they are required by the plans and they are not required due to the Contractor's operations.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
ORNAMENTAL ALUMINUM FENCE

BRG:MGB 1 of 2 APPR:NAP:DMG:10-25-21

a. Description. This work consists of furnishing, manufacturing, and installing an ornamental aluminum fence at the locations shown on the plans. Complete all work in accordance with the standard specifications, except as modified herein.

Furnish fence from one of the following manufacturers or approved equal:

Ultra Aluminum Mfg., Inc.	Ameristar Fence Products
2124 Grand Commerce Drive	1555 North Mingo Road
Howell, MI 48855	Tulsa, OK 74116
(800) 656-4420	(800) 321-8724
www.ultrafence.com	www.ameristarfence.com

Ensure the furnished fence and all components are from one manufacturer.

b. Materials. Ensure aluminum material for fence framework (i.e., tubular pickets, rails, and posts) is in accordance with *ASTM B221*. Ensure the aluminum extrusions for posts and rails (outer channels) are Alloy and Temper Designation 6005-T5. Ensure the aluminum extrusions for pickets and rail inner slide channels are Alloy and Temper Designation 6063-T5.

Ensure aluminum material for fence base plates is in accordance with *ASTM B209/B209M*. Ensure the aluminum plate for base plates are Alloy and Temper Designation 5052-H32.

Elastomeric sheet. Use elastomeric bound fabric pad in accordance with subsection 914.12 of the Standard Specifications for Construction.

Anchor bolts. Use stainless steel anchor bolts and washers in accordance with *ASTM A320/A320M*, *Grade L7*. Ensure nuts are self-locking nylon insert type in accordance with *ASTM A194/A194M*, *Grade 7*.

Hardware. Furnish stainless steel bolts, washers, nuts, and screws for assembly and installation of the fence panels in accordance with the manufacturer's recommendations.

Ensure the furnished fence and all components are from one manufacturer and are designed to carry 0.015 kips per square foot (ksf) wind load acting normal to the entire surface of the fence. This wind load need not be applied simultaneously with live load.

The various fence components must meet the following dimensions listed below:

Components	Dimension or Feature
Aluminum Base Plates	as shown on the plans

Spacing Between Pickets	4 inches maximum
Post Spacing	72 inches on center
Height of Fencing	48, 60, 72 inches, or as shown on the plans
Color (Federal Standard 595, color # 17038)	Gloss Black
Finish	Powder Coated

c. Construction. Construct the ornamental aluminum fence in accordance with subsection 808.03 of the Standard Specifications for Construction, as specified herein and as shown on the plans.

Field verify the location of all fence components and dimensions prior to fabrication to ensure proper fit up.

Assemble and install fence components in accordance with the manufacturer's recommendations.

Install the fence at locations shown on the plans. Ensure fence posts, both end and line, are shop welded to the base plates. Install adhesive anchor bolts in accordance with section 712 of the Standard Specifications for Construction. Ensure the adhesive anchor bolts for fencing base plates will not interfere with existing reinforcement and are accurately positioned in accordance with the plans and firmly held by means of a template. Paint the bolt heads to match the finish of the fence. Install expansion sleeves at the locations shown on the plans.

Shop weld aluminum in accordance with *AWS D1.2* and as specified in the contract. Field welding is prohibited.

Repair any painted surface that has been damaged during shipping or assembly in accordance with the manufacturer's recommendations.

Submit working drawings to the Engineer for review and approval, not less than 14 calendar days prior to fabrication.

Provide manufacturer's limited lifetime warranty that the ornamental railing system is free from defects in material and workmanship including cracking, peeling and chipping.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Fence, Ornamental Alum, __ inch	Foot

Fence, Ornamental Alum, __ inch will be measured along the centerline of the fence. The price includes all appurtenances for furnishing, fabricating, and installing the **Fence, Ornamental Alum, __ inch** complete and in place including aluminum base plates, adhesive anchored bolts, expansion sleeves, bolts, nuts, washers, elastomeric pads and all hardware required for erection.

MINIMUM STANDARDS

THE MDOT GRADE P1 OR P-NC CONCRETE AT THE FITTING FACE SHALL EXTEND TO WITHIN 2 INCHES OF THE BELL AND SHALL EXTEND FROM THE FITTING FACE A MINIMUM OF 2 FEET TO THE UNDISTURBED SOLID GROUND.

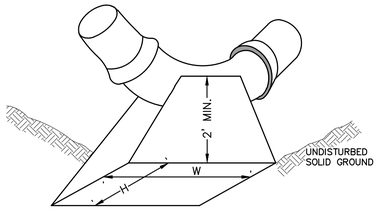
THE DIMENSIONS OF THE THRUST BLOCK AT THE FACE OF THE UNDISTURBED SOLID GROUND SHALL BE AS SHOWN IN THE TABLE BELOW.

IF THERE ISN'T SUFFICIENT SPACE FOR THE INSTALLATION OF THE THRUST BLOCK WITHOUT INTERFERENCE WITH OTHER SERVICES, ANOTHER ARRANGEMENT SATISFACTORY TO THE ENGINEER SHALL BE USED.

FITTINGS I.D.	PLUG TEE CROSS		BENDS								HYDRANT	
			90°		45°		22½°		11¼°			
INCHES	W	H	W	H	W	H	W	H	W	H	W	H
4	1.0	1.0	1.0	1.0	1.0	1.0						
6	2.0	1.5	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	1.5
8	2.5	2.0	3.5	2.0	2.0	2.0	2.0	1.0	1.0	1.0	2.5	2.0
12	3.5	3.0	5.5	3.0	3.5	2.5	2.0	2.0	2.0	1.0		
16	6.0	3.5	6.0	4.0	5.0	3.0	3.5	2.5	2.0	2.0		

FOR FITTING SIZES LARGER THAN 16", THRUST BLOCK DIMENSIONS SHALL BE AS SPECIFIED BY ENGINEER.

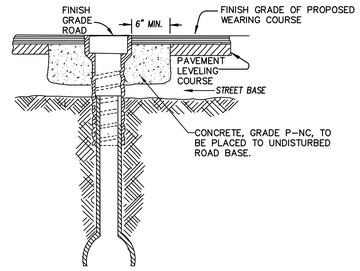
W = WIDTH IN FEET
H = HEIGHT IN FEET



NOTE:

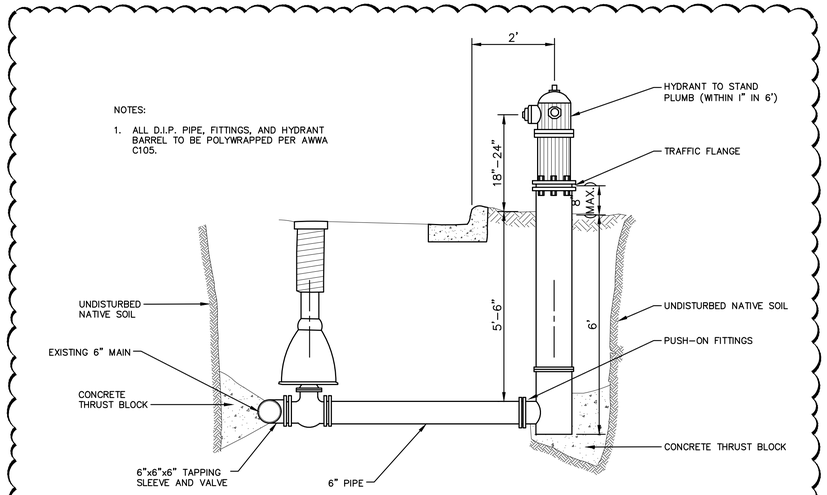
THESE ARE MINIMUM STANDARDS. WHERE SOIL CONDITIONS DICTATE, ADJUSTMENTS IN SIZE SHALL BE MADE AS DIRECTED BY THE PUBLIC SERVICES AREA ADMINISTRATOR.

THRUST BLOCK SD-W-2



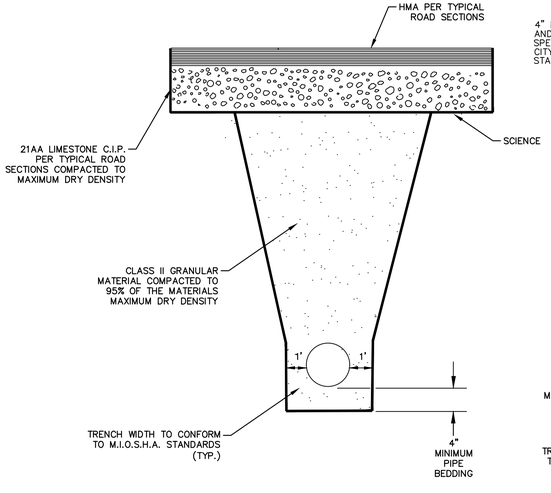
NOTE: RAISE CASTING TO PROPOSED FINISH STREET GRADE AFTER PLACEMENT OF LEVELING COURSE(S) AND PRIOR TO PLACING FINAL SURFACE COURSE

WATER VALVE BOX ADJUSTMENT

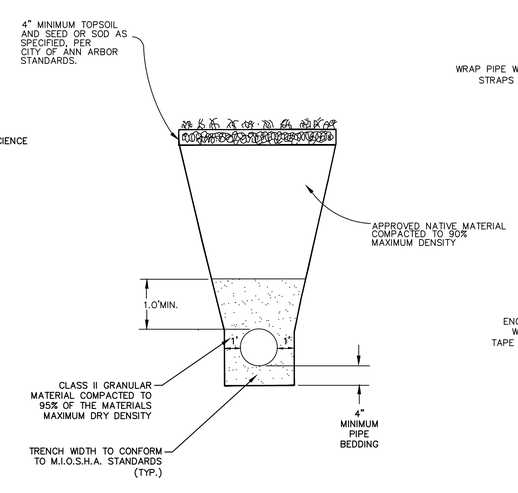


FIRE HYDRANT WITH TAPPING SLEEVE AND VALVE

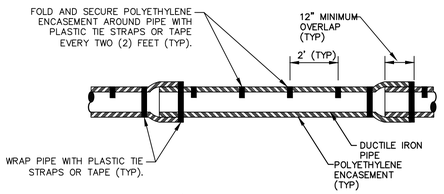
1



UTILITY TRENCH - TYPE I



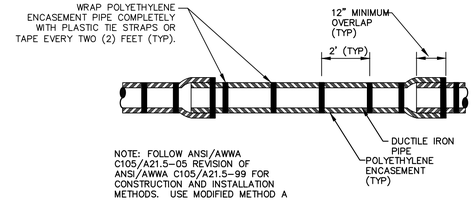
UTILITY TRENCH - TYPE V



NOTE: FOLLOW ANSI/AWWA C105/A21.5-05 REVISION OF ANSI/AWWA C105/A21.5-99 FOR CONSTRUCTION AND INSTALLATION METHODS. USE MODIFIED METHOD A

APPLIES TO: POLYETHYLENE WRAPPED D.I. WATERMAIN SEE PLANS FOR LOCATIONS

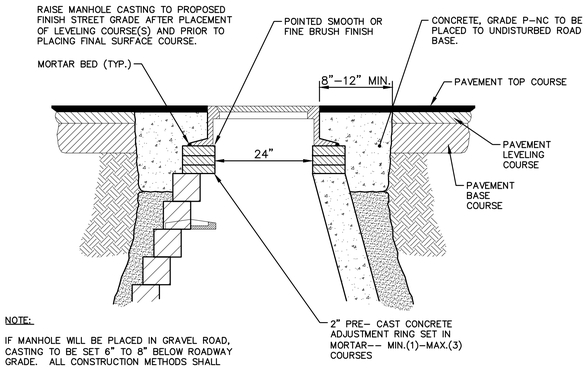
POLYETHYLENE ENCASEMENT (DRY INSTALLATION)



NOTE: FOLLOW ANSI/AWWA C105/A21.5-05 REVISION OF ANSI/AWWA C105/A21.5-99 FOR CONSTRUCTION AND INSTALLATION METHODS. USE MODIFIED METHOD A

APPLIES TO: POLYETHYLENE WRAPPED D.I. WATERMAIN SEE PLANS FOR LOCATIONS

POLYETHYLENE ENCASEMENT (WET INSTALLATION)



NOTE:

IF MANHOLE WILL BE PLACED IN GRAVEL ROAD, CASTING TO BE SET 6" TO 8" BELOW ROADWAY GRADE. ALL CONSTRUCTION METHODS SHALL REMAIN AS SHOWN ABOVE.

ADDITIONAL REPAIRS NECESSARY BEYOND 15" BELOW GRADE TO BE PAID FOR AS, "ADDITIONAL DEPTH STRUCTURE ADJUST/REPAIR"

MANHOLE CASTING ADJUSTMENT SD-GU-6

Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	C.E
2	70% DESIGN PLAN	03/16/2022	BWA	C.E
1	30% PRELIMINARY PLAN	02/07/2022	BWA	C.E

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CITY OF ANN ARBOR - PUBLIC SERVICES - ENGINEERING

GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

CONSTRUCTION DETAILS

WATER MAIN DETAILS

SCALE : NTS

DRAWING No. 2022-009-8

SHEET No. 8 OF 53

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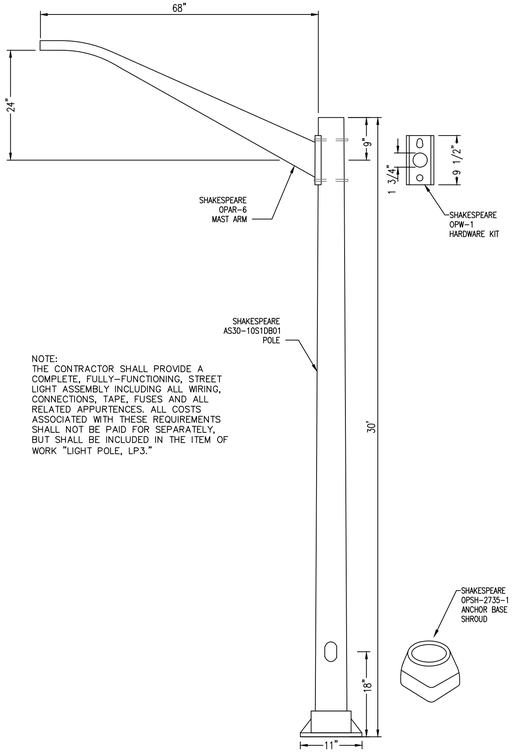
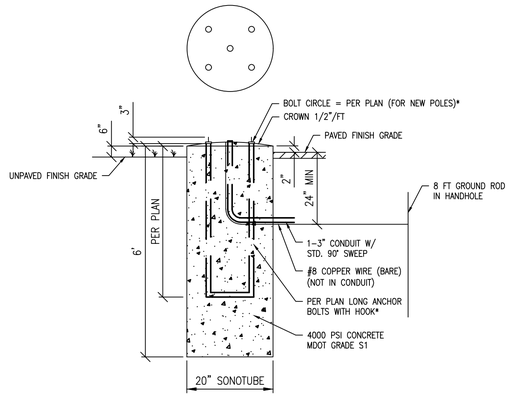


NOTE:
THE CONTRACTOR SHALL PROVIDE A COMPLETE, FULLY-FUNCTIONING, STREET LIGHT ASSEMBLY INCLUDING ALL WIRING, CONNECTIONS, TAPE, FUSES AND ALL RELATED APPURTENCES. ALL COSTS ASSOCIATED WITH THESE REQUIREMENTS SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE ITEM OF WORK "LIGHT POLE, LP3."

POLE TYPE LP3 DETAIL

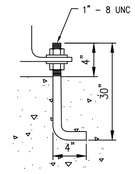
LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG #	LAMPS	REMARKS
SL3	COBRA HEAD STREET LIGHT	LUMECON	LWS-LSL-60-GR-1-T2-WW-R	LED	FIXTURE TO BE MOUNTED ON POLE TYPE LP3.
		–	–		
		–	–		



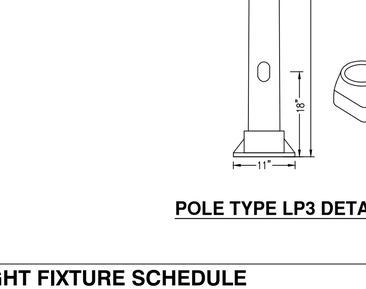
TYPICAL LIGHT POLE FOUNDATION DETAIL

NOTES:
1. HOLE TO BE AUGERED. MINIMIZE DISTURBANCE OF IN-SITU SOILS DURING AUGERING.
2. CONTRACTOR TO PROVIDE PREFABRICATED ANCHOR BOLT BUILD-UP.
3. THE CITY WILL INSPECT THE AUGERED HOLE AND THE ANCHOR BOLT BUILD-UP AND PROVIDE WRITTEN APPROVAL PRIOR TO THE PLACEMENT OF CONCRETE.
4. NO WATER IS TO BE IN HOLE AT THE TIME OF CONCRETE PLACEMENT.
5. CONCRETE SHALL BE VIBRATED DURING PLACEMENT.
6. CONTRACTOR WILL PROVIDE NECESSARY CONDUIT FOR ENTRY. PAID FOR AT THE CONTRACT UNIT PRICE FOR 2" CONDUIT.
7. COPPER CLAD GROUND ROD (1 REQUIRED) TO BE 5/8" DIA. x 8'-0". LOCATE IN HANDHOLE.
8. CONDUIT TO EXTEND 1-2" ABOVE BASE. CABLES TO EXTEND 6" OUTSIDE OF HANDHOLE.
9. SHIMS TO BE 1/2" MIN., PER D.E. SPEC.
10. GROUND CABLE SHALL BE #6 SOFT BARE COPPER WIRE WELDED TO GROUND ROD WITH 24" SLACK ABOVE FOUNDATION TOP. THE NEUTRAL AT THE POLE IS TO BE CONNECTED TO THIS GROUND CABLE.
11. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT ANCHOR BOLT PATTERN WITH FIXTURE/POLE MANUFACTURER PRIOR TO POURING CONCRETE BASE. ARRANGE ANCHOR BOLTS AS REQUIRED FOR PROPER ORIENTATION OF RECEPTACLE AND BANNER ARMS.
12. PAID FOR AS "FOUNDATION, LIGHT POLE"
13. REFERENCE, ANN ARBOR CITY DETAIL "SD-SL-1".



ALSO PROVIDE SHAKESPEARE OPAB-2035 ANCHOR BOLT KIT FOR EACH LIGHT POLE. ANCHOR BOLTS TO BE HOT-DIPPED GALVANIZED, 30" LONG, WITH 4" HOOK, AND A 4" PROJECTION ABOVE FOUNDATION.

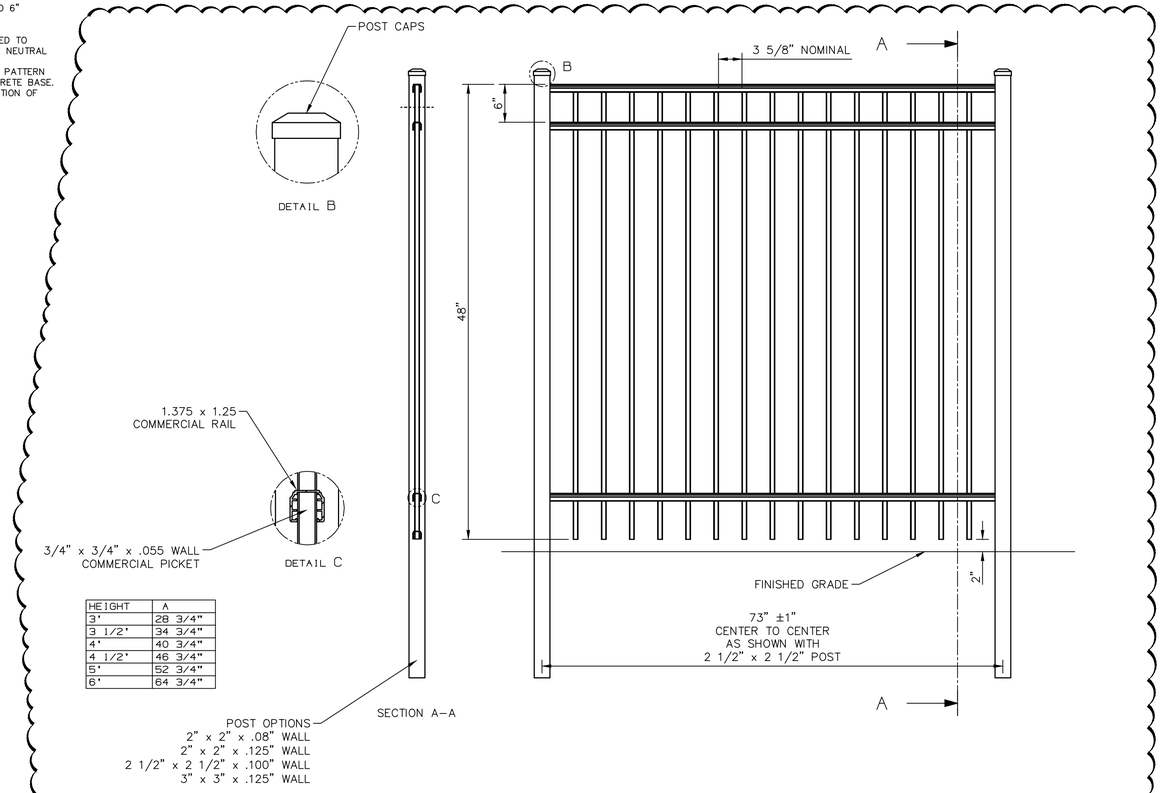
ANCHOR BOLT PROJECTION DETAIL



HANDHOLE DETAIL

GENERAL NOTES

1. PROVIDE QUAZITE MODEL PC1118BA12 WITH COVER PC1118HA00 OR APPROVED EQUIVALENT.
2. BOX AND COVER SHALL BE POLYMER CONCRETE.
3. COVERS SHALL BE SECURED WITH 3/8" BOLTS, NUTS, AND WASHERS. WHICH SHALL BE BRASS, STAINLESS STEEL OR OTHER CORROSION RESISTANT MATERIAL. STAINLESS STEEL SHALL HAVE A CHROMIUM CONTENT OF NOT LESS THAN 18% AND A NICKEL CONTENT OF NOT LESS THAN 8%. NUTS SHALL BE RECESSED BELOW TOP SURFACE OF COVER.
4. COVER LETTERING SHALL BE 1/2" MINIMUM LETTERS CAST IN STANDARD MARKINGS: (STREET LIGHTING).
5. CONDUIT ENTERING THE BOX SHALL HAVE 90° LONG RADIUS BEND (INSIDE THE BOX). THE CONDUITS OPENING, INSIDE THE BOX, SHALL BE AT LEAST 4" BELOW THE LID, OPENING SHALL HAVE SMOOTH EDGE. IF THE CONDUIT IS P.V.C. A SLIP COUPLING MUST BE USED. IF THE CONDUIT IS RIGID PIPE, A PROTECTIVE BUSHING SHALL BE USED.
6. CONDUCTORS SHALL HAVE A MINIMUM OF 24" SLACK FROM CONDUIT BELL END.
7. BACKFILL WITH CLASS II GRANULAR MATERIAL AND THOROUGHLY COMPACT.
8. WHERE HANDHOLES ARE INSTALLED IN CONCRETE AREAS, 1/2" PREMOLDED EXPANSION JOINT SHALL BE INSTALLED AROUND THE BOX.
9. BOXES IN NON-VEHICLE TRAFFIC AREAS TO BE TIER 8 AND IN VEHICLE TRAFFIC AREAS TO BE TIER 22 UNLESS OTHERWISE NOTED.



HEIGHT	A
3'	28 3/4"
3 1/2'	34 3/4"
4'	40 3/4"
4 1/2'	46 3/4"
5'	52 3/4"
6'	64 3/4"

ULTRA ALUMINUM MANUFACTURING UAF-200 FLAT TOP COMMERCIAL DECORATIVE FENCE DETAIL

(OR APPROVED EQUAL)

1

Know what's below. Call before you dig. 811

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	CJE
2	70% DESIGN PLAN	03/16/2022	BWA	CJE
1	30% PRELIMINARY PLAN	02/07/2022	BWA	CJE

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CITY OF ANN ARBOR - PUBLIC SERVICES - ENGINEERING

GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

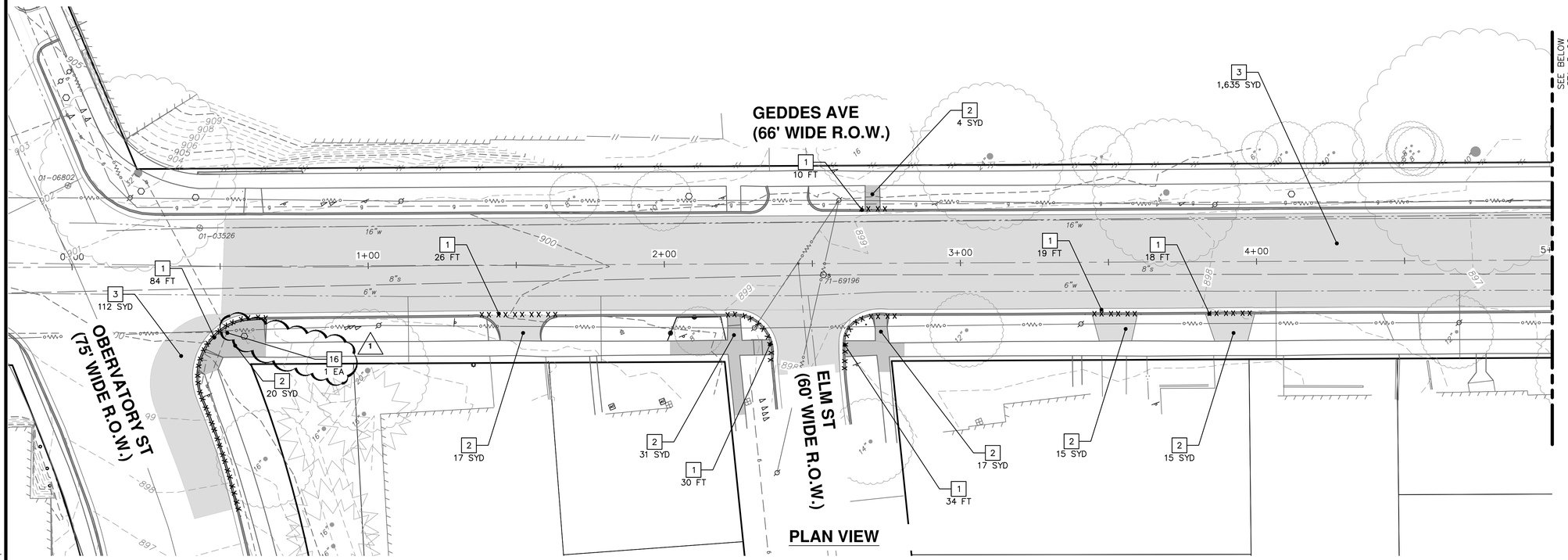
CONSTRUCTION DETAILS

MISCELLANEOUS DETAILS II

SCALE: NTS

DRAWING No. 2022-09-10

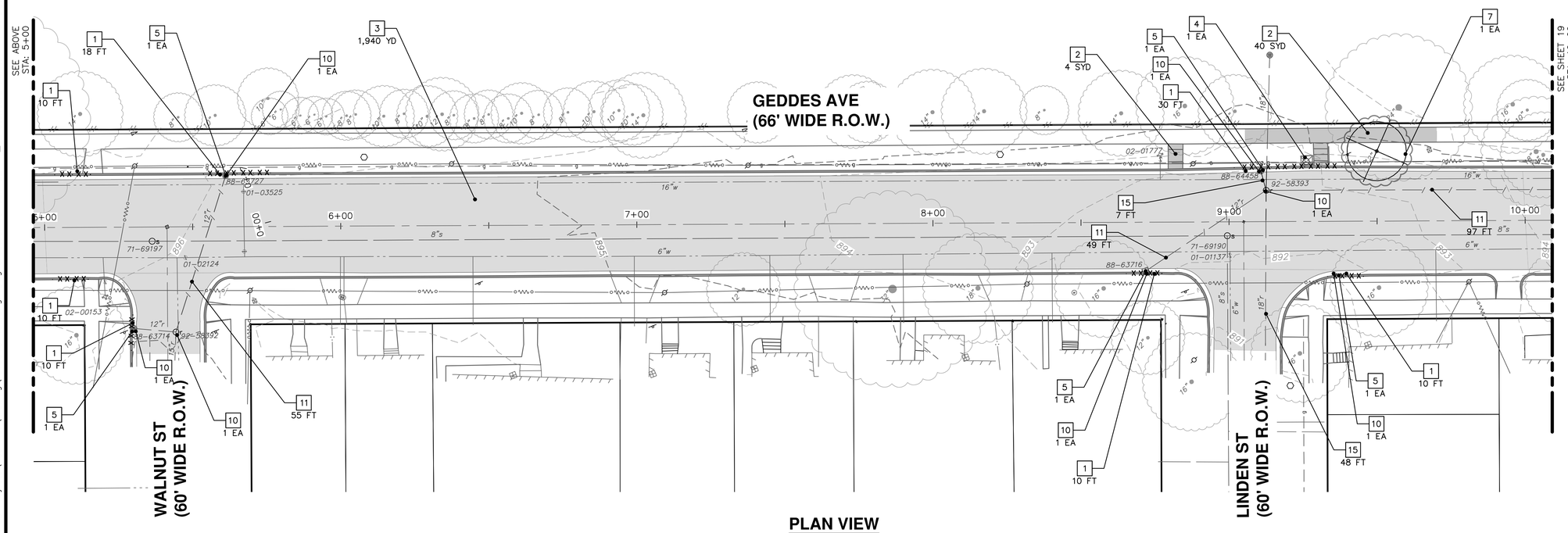
SHEET No. 10 OF 53



REMOVAL KEY	
KEY	DESCRIPTION
1	REMOVE CONCRETE CURB OR CURB & GUTTER, ANY TYPE
2	REMOVE CONCRETE SIDEWALK AND PAVEMENT – ANY THICKNESS
3	HMA SURFACE REMOVE*
4	REMOVE CONCRETE PEDESTAL AND STREET LIGHT
5	INLET FILTER
7	TREE, REM, 6" TO 24"
10	DR STRUCTURE, REMOVE
11	SEWER, ANY SIZE OR DEPTH, ABANDON W/ FLOWABLE FILL
15	SEWER, ANY SIZE OR DEPTH, REMOVE
16	HANDHOLE, REMOVE

*SAWCUT FULL DEPTH AT REMOVAL LIMITS

1



EXISTING STORM SEWER STRUCTURE REMOVAL TABLE		
STRUCTURE	DEPTH (Feet)	REMOVE
88-63727	7.45	2' Inlet (Cover K)
92-58392	7.80	4' Storm MH (Cover B)
88-63714	2.50	2' Inlet (Cover K)
88-64458	3.60	2' Inlet (Cover K)
92-58393	3.70	4' Storm MH (Cover B)
88-63716	2.20	2' Inlet (Cover K)

Know what's **below.** **Call before you dig.**

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	CJE
2	70% DESIGN PLAN	03/16/2022	BWA	CJE
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CITY OF ANN ARBOR - PUBLIC SERVICES - ENGINEERING

GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

GEDDES AVENUE

EXISTING CONDITIONS, REMOVALS STA 0+00 TO 10+00

SCALE PLAN: 1" = 20' PROFILE: 1" = 2'

DRAWING No. 2022-009-18

SHEET No. 18 OF 53

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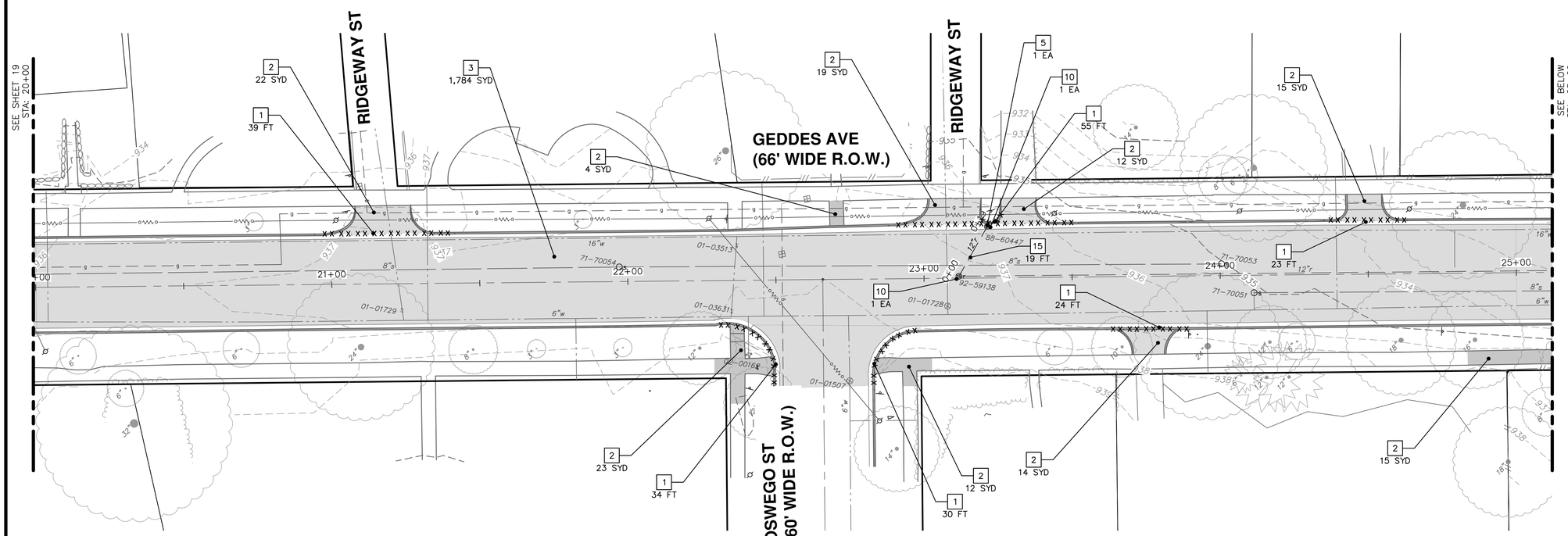
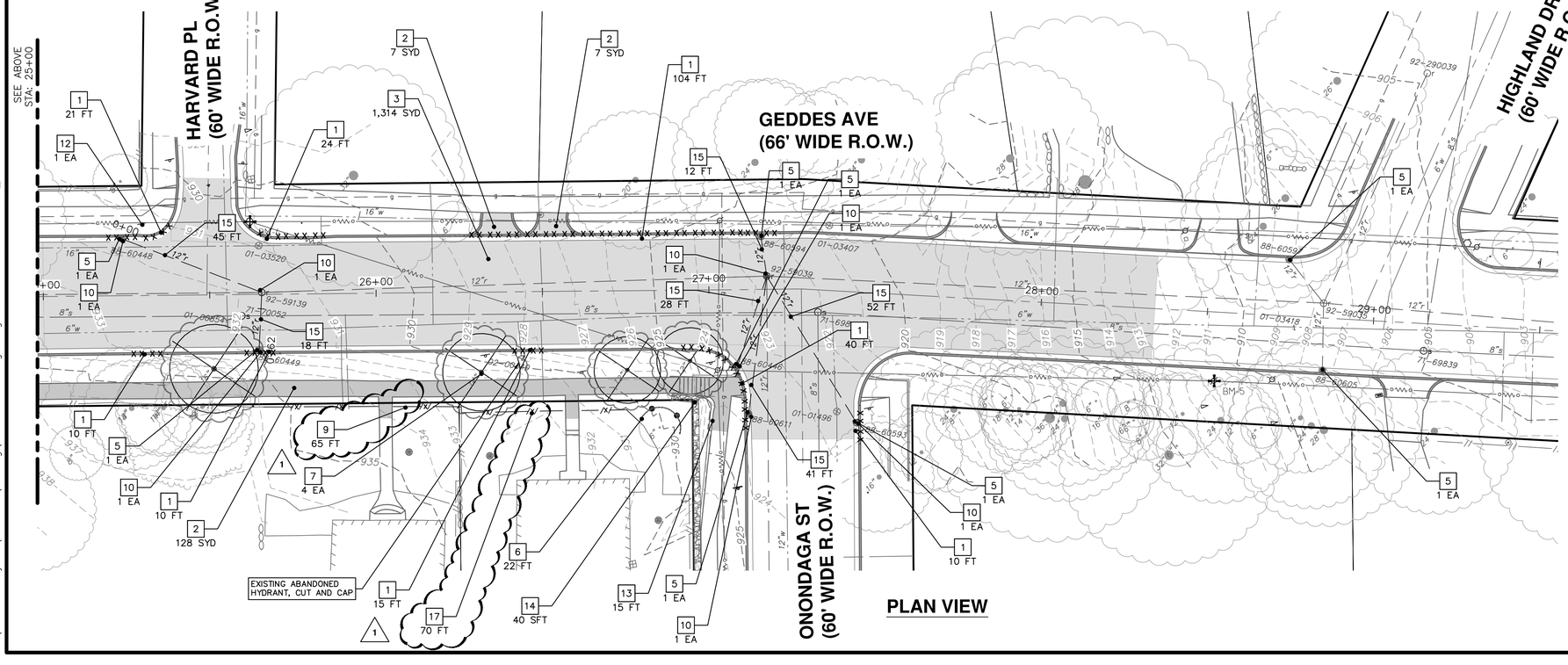


PLAN VIEW



PLAN VIEW

REMOVAL KEY	
KEY	DESCRIPTION
1	REMOVE CONCRETE CURB OR CURB & GUTTER, ANY TYPE
2	REMOVE CONCRETE SIDEWALK AND PAVEMENT – ANY THICKNESS
3	HMA SURFACE REMOVE*
5	INLET FILTER
6	PROTECTIVE FENCING
7	TREE, REM, 6" TO 24"
9	REMOVE AND SALVAGE FENCE
10	DR STRUCTURE, REMOVE
12	REMOVE SIGN
13	REMOVE CONCRETE WALL
14	REMOVE BOULDER WALL
15	SEWER, ANY SIZE OR DEPTH, REMOVE
17	REMOVE DECORATIVE FENCE

*SAWCUT FULL DEPTH AT REMOVAL LIMITS

EXISTING STORM SEWER STRUCTURE REMOVAL TABLE		
STRUCTURE	DEPTH (Feet)	REMOVE
88-60447	4.40	2' Inlet (Cover K)
92-59138	10.55	4' Storm MH (Cover B)
88-60448	4.40	2' Inlet (Cover K)
92-59139	8.95	4' Storm MH (Cover B)
88-60449	3.85	2' Inlet (Cover K)
88-60594	4.60	2' Inlet (Cover K)
92-59039	9.00	4' Storm MH (Cover B)
88-60446	3.10	2' Inlet (Cover K)
88-60611	3.85	2' Inlet (Cover K)
88-60593	2.40	2' Inlet (Cover K)

Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	CJE
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CITY OF ANN ARBOR - PUBLIC SERVICES - ENGINEERING

GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

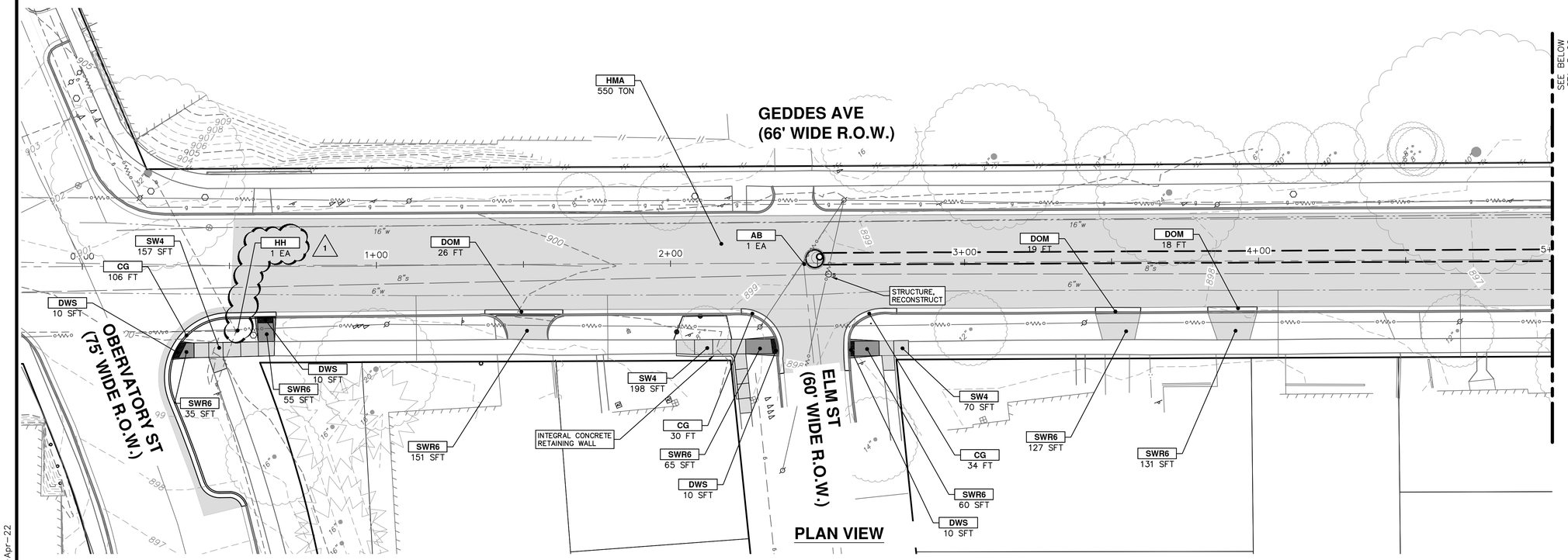
GEDDES AVENUE

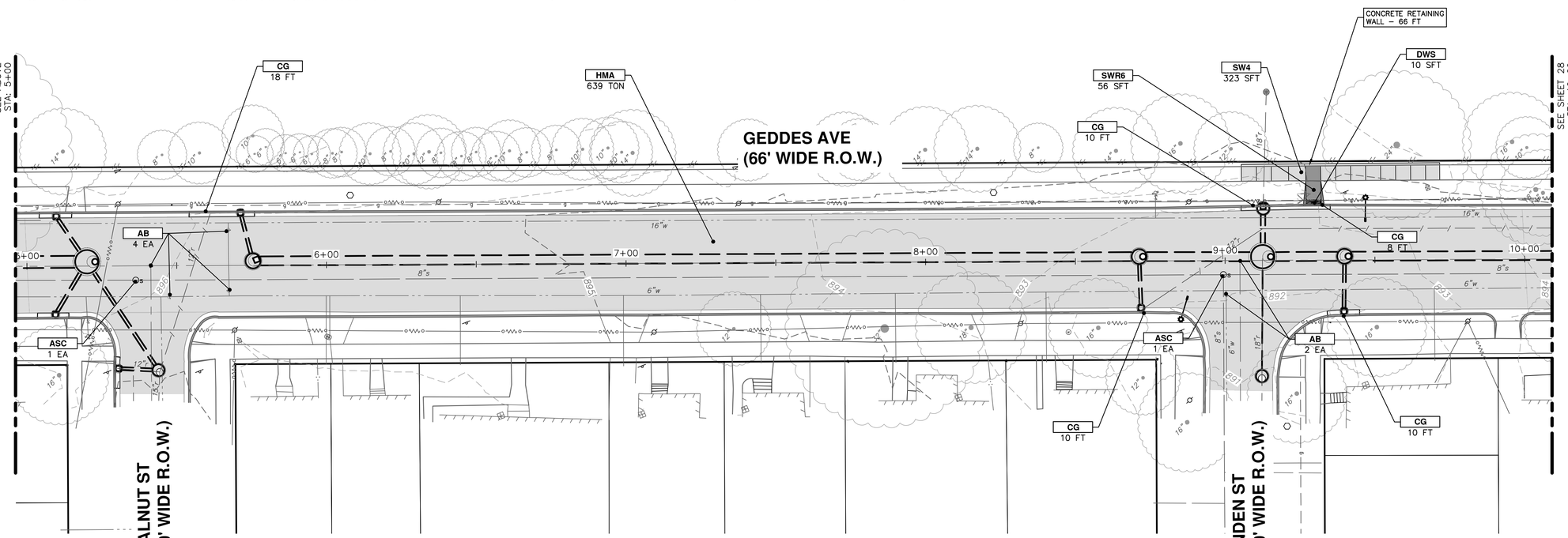
EXISTING CONDITIONS, REMOVALS STA 20+00 TO 30+00

SCALE PLAN: 1" = 20' PROFILE: 1" = 2'

DRAWING No. 2022-09-20

SHEET No. 20 OF 53





CONSTRUCTION KEY	
KEY	DESCRIPTION
HMA	SURFACE AREA FOR HMA
CG	CONCRETE CURB OR CURB & GUTTER, ALL TYPES
SW4	4 INCH CONCRETE SIDEWALK
SWR6	6 INCH CONCRETE RAMP, DRIVE APPROACH
DWS	DETECTABLE WARNING, CAST IN PLACE
DOM	CONCRETE TYPE M DRIVE OPENING
ASC	ADJUST STRUCTURE COVER
AB	ADJUST MONUMENT BOX OR CAPE VANE BOX
HH	24 INCH X 36 INCH HANDHOLE

Know what's below. Call before you dig.

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	CJE
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GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

GEDDES AVENUE

PAVING PLAN STA 0+00 TO 10+00

SCALE PLAN: 1" = 20' PROFILE 1" = 2'

DRAWING No. 2022-009-27

SHEET No. 27 OF 53

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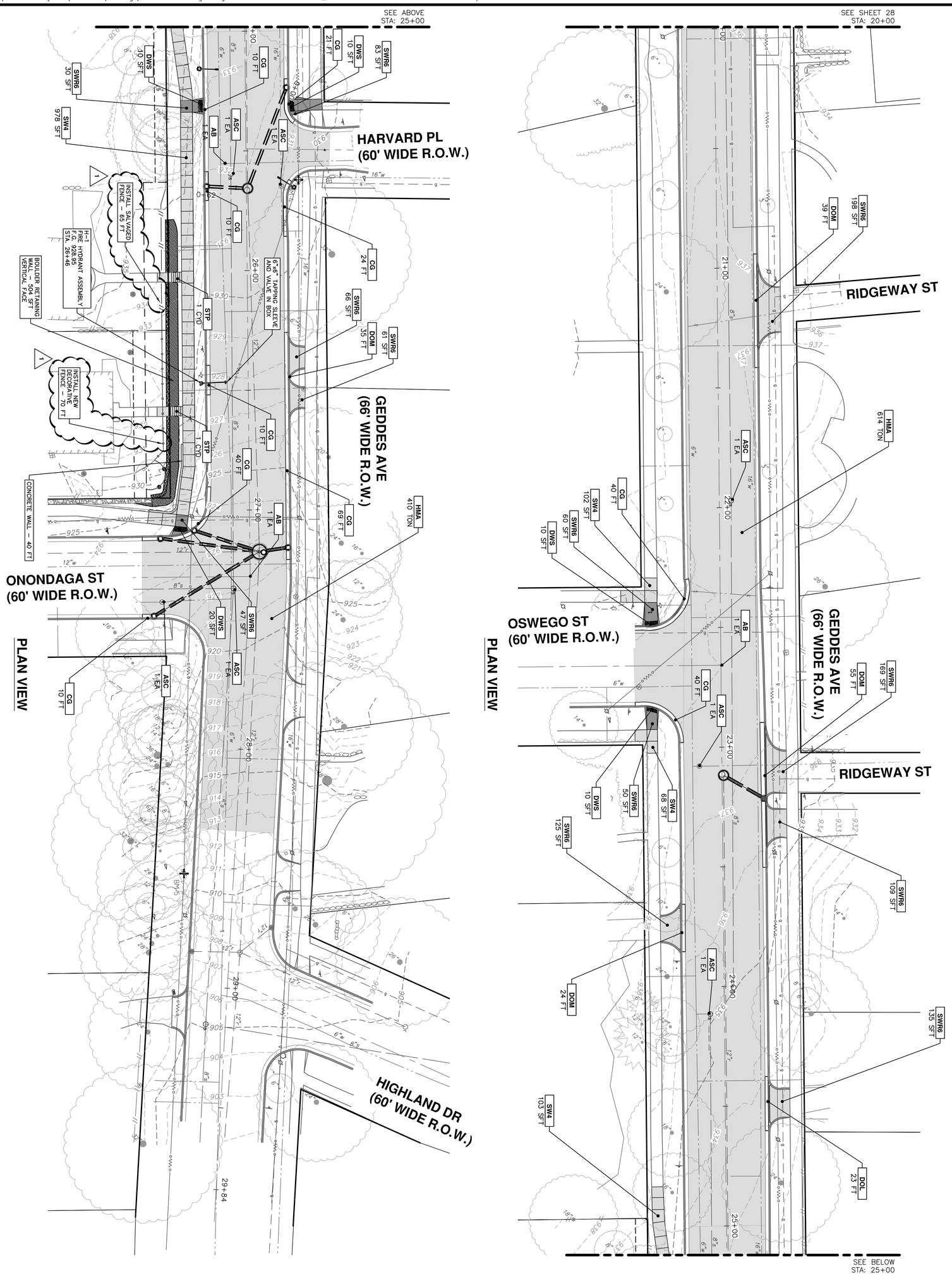

KEY	DESCRIPTION
HMA	SURFACE AREA FOR HMA
CG	CONCRETE, CURB OR CURB & GUTTER, ALL TYPES
SW4	4 INCH CONCRETE SIDEWALK
SWR6	6 INCH CONCRETE RAMP, DRIVE APPROACH
DWS	DETECTABLE WARNING SURFACE, CAST IN PLACE
DOM	CONCRETE TYPE M DRIVE OPENING
ASC	ADJUST STRUCTURE COVER
AB	ADJUST MONUMENT BOX OR GATE VALVE BOX
STP	STEPS, CONCRETE

CONSTRUCTION KEY

REV.	DESCRIPTION	DATE	DRAWN	CHECKED
4	ADDENDUM #1	04/27/2022	BWA	RBS
3	BID SET	04/08/2022	BWA	CJE
2	70% DESIGN PLAN	03/16/2022	BWA	CJE
1	30% PRELIMINARY PLAN	02/07/2022	BWA	CJE

SHEET No. 29 OF 53

CITY OF ANN ARBOR - PUBLIC SERVICES - ENGINEERING

SCALE PLAN: 1" = 20' PROFILE: 1" = 2'

DRAWING No. 2022-009-29

GEDDES & HURON PARKWAY/TUEBINGEN RESURFACING PROJECT

GEDDES AVENUE

PAVING PLAN STA 20+00 TO 30+00

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