

CONSTRUCTION REQUEST FOR PROPOSAL

Request for Proposals RFP No. DDA 2022-05

Catherine and Miller Bikeway Project

Ann Arbor DDA



Addendum No. 1

Due Date: Wednesday, June 1, 2022, by 3:00 p.m. (local time)

Issued By:

Ann Arbor
Downtown Development Authority (DDA)
150 South Fifth Avenue, Suite 301
Ann Arbor, MI 48104

Re-Issued on May 23, 2022 to reflect Addendum No. 1

erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

E. SELECTION CRITERIA

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised primarily of DDA staff will complete the evaluation.

If interviews are desired by the DDA, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The DDA further reserves the right to interview the key personnel assigned by the selected bidder to this project.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the proposal response shall be documented and included as part of the final contract.

F. SEALED PROPOSAL SUBMISSION

Addendum No.1

All proposals are due and must be delivered to the DDA on or before Wednesday, June 1, 2022 by 3:00 p.m. (local time). Proposals submitted late or via oral, telephonic, telegraphic, ~~electronic~~ mail or facsimile **will not** be considered or accepted.

Each respondent should submit in a sealed envelope

- **one (1) original proposal**
- **one (1) additional proposal copy**
- **one (1) digital copy of the proposal preferably on a USB/flash drive as one file in PDF format**

Proposals submitted should be clearly marked: **RFP No. DDA 2022-05 for CATHERINE and MILLER BIKEWAY PROJECT** and list the bidder's name and address.

Proposals must be addressed and delivered to:
Ann Arbor DDA
150 South Fifth Avenue, Ste #301
Ann Arbor, MI 48107

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered proposals may be dropped off at the DDA Office, Monday through Friday, 9 a.m. to 3 p.m. The DDA will not be liable to any prospective bidder for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal.

Department of Transportation Prevailing Wage Forms (sample attached hereto) or a City-approved equivalent may be required along with wage rate interviews.

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based upon the work including within this contract. **The wage determination(s) current on the date 10 days before proposals are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: www.wdol.gov.

For the purposes of this RFP the Construction Type of Highway will apply.

K. COST LIABILITY

The DDA assumes no responsibility or liability for costs incurred by the bidder prior to the execution of a Professional Services Agreement. The liability of the DDA is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, bidder agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

L. DEBARMENT

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the DDA will be notified of any changes in this status.

M. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the DDA within five (5) business days of the award action. The bidder must clearly state the reasons for the protest. The protest shall be reviewed by the DDA Capital Projects Manager or designee, whose decision shall be final.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated DDA Contacts provided herein. Attempts by the bidder to initiate contact with anyone other than the Designated DDA Contacts provided herein that the bidder believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

N. SCHEDULE

The following is the schedule for this RFP process.

Activity/Event

Written Question Deadline
Addenda Published (if needed)
Proposal Due Date

Anticipated Date

Friday May 20, 2022, at 3:00 p.m.
Week of May 23, 2022
Wednesday, June 1, 2022 **by 3:00 p.m.**

Addendum No. 1

B. Workplace Safety – 20 Points

1. Documentation of an on-going, Michigan OSHA-approved safety-training program for employees to be used on the proposed job site.
2. Evidence of the bidder's worker's compensation Experience Modification Rating ("EMR"). Preference within this criterion will be given to an EMR of 1.0 or less based on a three-year average.
3. Evidence that all craft labor that will be employed by the bidder for the project has, or will have prior to project commencement, completed at least the OSHA 10-hour training course for safety established by the U.S. Department of Labor, Occupational Safety & Health Administration.
4. The safety record of bidder and major subcontractors, including OSHA, MIOSHA, or other safety violations.

C. Workforce Development – 20 Points

1. The ratio of masters or journeypersons to apprentices proposed to be used on the construction project job site, if apprentices are to be used on the project.
2. Documentation as to bidder's pay rates, health insurance, pension or other retirement benefits, paid leave, or other fringe benefits to its employees.
3. Documentation that the bidder participates in a Registered Apprenticeship Program that is registered with the United States Department of Labor Office of Apprenticeship or by a State Apprenticeship Agency recognized by the USDOL Office of Apprenticeship.

Paragraph omitted,
Addendum No. 1

D. Social Equity and Sustainability – 20 Points

1. A statement from the bidder as to what percentage of its workforce resides in the City of Ann Arbor and in Washtenaw County, Michigan. The DDA will consider in evaluating which bids best serve its interests, the extent to which responsible and qualified bidders are able to achieve this goal.
2. Evidence of Equal Employment Opportunity Programs for minorities, women, veterans, returning citizens, and small businesses.
3. Evidence that the bidder is an equal opportunity employer and does not discriminate on the basis of race, sex, pregnancy, age, religion, national origin, marital status, sexual orientation, gender identity or expression, height, weight, or disability.

Miller Catherine Bikeway
E. Schedule of Pricing (20 points)

DDA RFP 2022-05
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Company: _____
 Date: _____

Pay Item #	Item Description	Estimated Contract Quantity	Unit	Unit Price	Total Price
130	Protective Fencing	60.00	LFT		
140	Exploratory Excavation, (0-10 ft. deep) (Trench Det 1, Modified)	4.00	EA		
210-01	Audio-Visual Recording	1.00	LSUM		
210-02	Certified Payroll Compliance And Reporting	1.00	LSUM		
210-03	General Conditions, Max \$100,000	1.00	LSUM		
210-04	Project Supervision, Max \$75,000	1.00	LSUM		
221-01	Minor Traffic Devices, Max \$75,000	1.00	LSUM		
221-02	Traf Regulator Control, Max \$35,000	1.00	LSUM		
221-03	Barricade, Type III, High Intensity, Double Sided Lighted, Furn & Oper	85.00	EA		
221-04	Plastic Drum, Fluorescent, Furn & Oper	220.00	EA		
221-08	Sign, Portable, Changeable Message, Ntfcp-Compliant, Furn & Oper	2.00	EA		
221-09	Sign Cover	6.00	EA		
221-10	Sign, Type B, Temp, Prismatic, Furn & Oper	710.00	SFT		
221-11	Sign, Type B, Temp, Prismatic, Special, Furn & Oper	404.00	SFT		
221-14	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, white, Temp	2,000.00	LFT		
221-15	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, yellow, Temp	2,000.00	LFT		
221-20	No Parking Sign	10.00	EA		
221-31	Pedestrian Path, Temp	500.00	LFT		
221-32	Pedestrian Ramp, Temp	14.00	EA		
221-33	Pedestrian Type II Barricade, Temp	40.00	EA		
221-34	Pedestrian Type II Channelizer, Temp	1,500.00	LFT		
222-01	Curb And Gutter, Any Type Or Size, Rem	655.00	LFT		
222-02	Sidewalk And Drive, Any Type Or Thickness, Rem	465.00	SYD		
222-03	Pavement, Rem	2,270.00	SYD		
222-04	Brick Pavers, Rem, Sort And Salvage	280.00	SYD		
223-01	Dr Structure, Any Size Or Depth, Rem	1	EA		
223-02	Sewer, Any Size Or Depth, Rem	47	LFT		
227-01	Erosion Control, Inlet Filter	15.00	EA		
240	Non Haz Contaminated Material Handling And Disposal, Lm	20.00	CYD		
250-03	Aggregate Base Course, 21AA, Modified	630.00	CYD		
250-04	Machine Grading, Modified (half width)	40.00	STA		
250-05	Subgrade Undercutting, Type II	80.00	CYD		
250-06	Sand Subbase Course, Class II - CIP	325.00	CYD		
251-01	Curb And Gutter, Conc, 24 Inch, Any Type	155.00	LFT		
251-02	Integral curb	35.00	LFT		
251-03	Straight Curb	515.00	LFT		
251-04	Bike Curb	45.00	LFT		
251-05	Curbed Island	1,055.00	LFT		
251-06	Planter Curb	152.00	LFT		
252-01	Concrete Pavement, 6 inch	3,230.00	SFT		
252-02	Concrete Pavement, 8 inch	3,365.00	SFT		
252-03	Driveway Opening, Conc, 8 inch, Type M	105.00	SFT		
252-04	Ramp	400.00	SFT		
252-06	Sidewalk Ramp, 8 Inch	870.00	SFT		
253-01	Detectable Warning Surface, Modified	213.00	SFT		
253-02	Detectable Directional Guideway	30.00	SFT		
254	Brick, Install Salvaged	180.00	SFT		
255-01	HMA, 3E1, 3 inches	238.00	TON		
255-02	HMA, 4E1, 2 inches	159.00	TON		
255-03	HMA, 5E1, 2 inches	159.00	TON		
255-04	Hand Patching, Modified	15.00	TON		
257	Regulatory Signs	119.25	SFT		
259-01	Pavt Mrkg, Polyurea, 4 inch, Yellow	3,500.00	LFT		
259-02	Pavt Mrkg, Polyurea, 4 inch, White	400.00	LFT		
259-03	Pavt Mrkg, Polyurea, Bike Arrow and Yield Sym.	26.00	EA		
259-04	Pavt Mrkg, Polyurea, Directional/Turn Arrow	4.00	EA		
259-05	Pavt Mrkg, Polyurea, Bike Sym.	23.00	EA		
259-06	Pavt Mrkg, Polyurea, Ramp Arrow Sym.	12.00	EA		
259-07	Pavt Mrkg, Polyurea, 12 Inch, Stop Bar Or Crosswalk	1,300.00	LFT		

259-08	Pavt Mrkg, Polyurea, 24 Inch, Stop Bar Or Crosswalk	155.00	LFT		
259-09	Pavt Mrkg, Endurablend, Bike Lane Green	6,300.00	SFT		
259-10	Pavt Mrkg, Polyurea, 18 Inch X 18 Inch Bikeway Marks	450.00	SFT		
260-01	Recessing Pavt Mrkg, Longitudinal	3,600.00	LFT		
260-02	Recessing Pavt Mrkg, Transverse	1,755.00	LFT		
272-01	Hardened Centerline	18.00	LFT		
272-02	Bikelane Delineator Post	14.00	EA		
279-1	Line Stop, Additional Rental Day	5.00	EA		
279-8	Line Stop, Ductile/Cast Iron Pipe, 8 inch	3.00	EA		
279-14	Line Stop, Ductile/Cast Iron Pipe, 14 inch	1.00	EA		
278-14	Insertion Valve, Ductile/Cast Iron Pipe, 14 inch	1.00	EA		
280	Rain Garden Planting Soil	22.50	CYD		
282	Tree Grate, 4 ft. X 8 ft.	2.00	EA		
283	Riprap, Fieldstone	1.00	CYD		
284-17	Sacrificial Anode, 17 lb	5.00	EA		
284-32	Sacrificial Anode, 32 lb	2.00	EA		
285A-4	CL-52, D.I. Water Main, w/Poly Wrap, 4 inch, Tr Det I, Mod	40.00	LFT		
285-6	CL-50, D.I. Water Main, w/Poly Wrap, 6 inch, Tr Det I, Mod	40.00	LFT		
285-8	CL-50, D.I. Water Main, w/Poly Wrap, 8 inch, Tr Det I, Mod	40.00	LFT		
285-12	CL-50, D.I. Water Main, w/Poly Wrap, 12 inch, Tr Det I, Mod	460.00	LFT		
286-45-4	45 deg Bend, 4 Inch	4.00	EA		
286-45-6	45 deg Bend, 6 Inch	4.00	EA		
286-45-8	45 deg Bend, 8 Inch	4.00	EA		
286-45-12	45 deg Bend, 12 inch	14.00	EA		
286-90-6	90 deg Bend, 6 inch	1.00	EA		
287-8x6	Reducer, 8 inch x 6 inch	2.00	EA		
287-12x6	Reducer, 12 inch x 6 inch	1.00	EA		
287-12 x 8	Reducer, 12 inch x 8 inch	2.00	EA		
288-C-12-12	Cross, 12 inch x 12 inch	1.00	EA		
288-T-12-12-4	Tee, 12 inch x 12 inch x 4 inch	1.00	EA		
288-T-12-12-6	Tee, 12 inch x 12 inch x 6 inch	1.00	EA		
288-T-12-12-8	Tee, 12 inch x 12 inch x 8 inch	2.00	EA		
288-T-14-12-12	Tee, 14 inch x 12 inch x 12 inch	1.00	EA		
289	Fire Hydrant Assy, w/Extensions, Complete	2.00	EA		
290-4	Gate Valve-in-Box, 4 inch	1.00	EA		
290-6	Gate Valve-in-Box, 6 inch	1.00	EA		
291-12	Gate Valve-in-Well, 12 inch	4.00	EA		
293	Excavate & Backfill for Water Service Tap and Lead	40.00	LFT		
294	Water Main Pipe Abandonment	150.00	LFT		
295	Water Main, Abandon w/Flowable Fill	80.00	LFT		
296-01	Gate Valve-in-Box, Abandon	1.00	EA		
297-01	Gate Valve-in-Well, Abandon	2.00	EA		
298	Fire Hydrant, Rem	1.00	EA		
320	RCP, Sewer, C76, CL-IV, 12 inch, Tr Det I	226.00	LFT		
350	Sewer, SDR 35 PVC, 8 inch, Tr Det I	25.00	LFT		
351	Sewer, SDR 35 PVC, Service Lead, 4 inch, Tr Det I	25.00	LFT		
360	Type I Manhole (4 ft. Dia.) (0-10 ft. Deep)	1	EA		
367	Single Inlet Structure	4.00	EA		
391	Pipe Undercut & Refill	20.00	Cyd		
516	6" Wrapped Edge Drain	355.00	LFT		
563-01	Dr Structure Cover Barrier Curb Inlet	3,000.00	LBS		
563-02	Dr Structure Cover Gate Well	1,600.00	LBS		
564	Reconstruct Structure	1.00	EA		
566	Adjust Structure Cover	4.00	EA		
567	Adjust Monument Box or Gate Valve Box	5.00	EA		
580	Remove Pavement Markings	2,945.00	LFT		
811	Ginkgo Biloba 'Autumn Gold'	5.00	EA		
821	PANICUM VIRGATUM 'SHENANDOAH'	25.00	EA		
822	PENNISETUM ALOPECUROIDES 'HAMELN'	73.00	EA		
823	SCHIZACHYRIUM SCOPARIUM 'CAROUSEL'	47.00	EA		
	TS Face, Bag	4.00	EA		
	TS Face, Bag, Rem	4.00	EA		
	Traf Loop	3.00	EA		
	Wireless Vehicle Sensor Node	2.00	EA		
	Recable, TS	200.00	FT		
	3 inch Schedule 80 PVC Electrical Conduit	50.00	LFT		
	Case Sign, Rem	2.00	EA		
	TS, Pedestrian, Pedestal Mtd, Rem	1.00	EA		
	Pedestal, Rem	1.00	EA		
	Pedestal Fdn. Rem	1.00	EA		
	Conduit, Rem	10.00	FT		
	TS, Pedestrian, Two Way Pedestal Mtd (LED) Countdown	1.00	EA		

	Pedestal, Alum	1.00	EA		
	Pedestal , Fdn	1.00	EA		
	2 inch Schedule 80 PVC Electrical Conduit	5.00	LFT		
	Wireless Vehicle Sensor Node, Rem	2.00	EA		
	Wireless Vehicle Sensor Node, Salv	1.00	EA		
ALLOWANCE	Signal Modernization at Main @ Miller/Catherine	1.00	ALLOW	\$250,000.00	\$250,000.00
Bid Total					

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
Item 278: Insertion Valve-in-Well, Ductile/Cast Iron Pipe, _ inch

WT:CGT:RJM

1 of 6

05/21/22

a. Description.- The Contractor shall furnish all materials, labor and equipment to properly install and set water main insertion valves into the existing Ductile/Cast Iron Main(s) at the locations as shown on the plans and as directed by the Engineer. All work shall be performed in accordance with the requirements as detailed herein.

Insertion valves shall be used where the existing mains, upstream and downstream of the proposed connections cannot be shut down or taken out of service. To ensure that the entire operation shall be accomplished without interruption of service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to insertion valves of the required size(s).

The work shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; the furnishing, installation, and removal of sheeting and/or shoring where needed; the furnishing, placement and compaction of approved bedding and backfill materials; furnishing and placing suitable, clean, gravel to create a stable working surface at the bottom of the excavation; de-watering; pipe cleaning, measuring, and performing all advance work necessary to prepare for the performance of the insertion valve; nighttime lighting as required; the furnishing and installation of insertion valve and valve well; the removal of all materials and equipment associated with the work when no longer needed; and backfill, restoration and compaction of subgrade.

This work shall also include all traffic maintenance and control items in accordance with the Michigan Manual of Uniform Traffic Control Devices.

b. Materials.- Bedding and backfill for areas contained within a segment of water main designated as Trench Detail I (under roadbed), Modified, shall be Granular Material, Class II, meeting the requirements of Section 902 of the 2020 MDOT Standard Specifications for Construction. For work within a segment of water main designated as Trench Detail V (outside of the 1:1 influence line of roadbed or curb and gutter), Modified, Granular Material, Class II and Engineer approved native material, placed in accordance with the trench details, shall be used.

The Contractor shall submit to the Engineer two (2) sets of drawings, furnished by manufacturers, fully and distinctly illustrated and describing the Insertion Valve fittings proposed to be furnished. Work shall not commence until such time as the drawings have been reviewed and accepted by the Engineer.

Insertion valves shall be an all stainless steel body Resilient Wedge Gate and designed for permanent use in potable water, raw water, reclaimed water, irrigation and backflow control systems. The design will allow the valve to be installed into an existing pressurized pipeline

while maintaining constant pressure and service without system shutdown. No restraining devices, restraining fasteners, or transition gaskets shall be required for the installation or operation of the valve.

Valve Body and Bonnet: Valves shall have a stainless steel body, carbon steel epoxy coated bonnet and a reinforced composite polymer valve cartridge to provide superior corrosion resistance, strength and a pressure rating that meets or exceeds the requirements of resilient seated gate valves. The insertion valve shall be stainless steel construction for corrosion resistance, maximum toughness and strength.

Valves must be capable of working on Cast/Grey Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel and AC pipe diameters without changing either top or bottom portion of split valve body or using a transition gasket.

Valves must provide a solid support of the host pipe through the entire laying length of the valve body. No gaps or space between the valve body and host pipe shall be accepted.

Valves shall be rated for 250 psig maximum working pressure. The pressure rating must be permanently marked into the body.

Valves must be hydrostatically pressure tested to 1.25 times of the system operating pressure (minimum) or 1.5 times of the Insertion Valves 250 psig maximum pressure rating. The test shall be sustained for a minimum of 15 minutes. Once the pressure test is affectively achieved the insertion valve body must not be moved in accordance with AWWA Standards. If the insertion valve body is moved the pressure test must be completed again. Any movement, repositioning, loosening and/or re-tightening must be retested before the pipe is tapped.

Resilient Wedge Gate Assembly: All insertion valves shall be resilient seated meeting the requirements of AWWA C509. Valves shall have an EPDM molded resilient wedge seal. The resilient wedge seal will be affixed into a reinforced nylon composite polymer valve cartridge. The entire assembly shall be inert and impervious to corrosion.

Nylon composite polymer valve cartridge shall be engineered to come into contact with the interior of the host pipe and an engineered sealing surface in the valve body to create a seal. The resilient wedge shall be reinforced to resist abrasion thus extending the life and quality of the shutdown where the wedge contacts the host pipe.

Pressure equalization on the down or upstream side of the closed wedge shall not be necessary to open the valve.

Wedge shall be symmetrical and seal equally well with flow in either direction.

Resilient wedge must ride inside a minimum of four body channels to maintain wedge alignment throughout its travel and to achieve maximum fluid control regardless of high or low flow pressure or velocity.

Valves shall have a full size, full port flow way that is unobstructed, and free of depressions to provide optimum flow and sealing and not trap tuberculation or debris.

Fusion-Bonded Epoxy / E Coating: Valves shall have all stainless steel bodies, fasteners and epoxy coated carbon steel valve bonnet. The use of epoxy coatings for protection against corrosion is deemed insufficient for any component other than the valve bonnet.

Gaskets and Stem Seals: Insertion valves shall utilize four O-Ring's to seal between valve body to valve bonnet and valve stem. These O-rings shall be located in such a fashion as to ensure the 250 psig pressure worthiness and prevent ground water and/or foreign materials from entering the valve.

Valve Stem: Valves shall be NRS (non-rising stem) and operate with standard turns 3 turns per diameter inch to open and close. NRS stem must have an integral stem collar manufactured of no lead bronze. Two-piece stem collars are not acceptable. The stem shall be affixed into the valve cartridge to maintain stem alignment, low torque and continuous operation of the valve.

Valves shall be operated by a 2" square wrench nut –open right.

Valve stem shall be made of stainless steel and shall be able to withstand torque of 700 ft. lbs. of torque without compromising operation.

Hardware: Bonnet and valve body fastener hardware shall be stainless steel. Valve cartridge locking pins shall be made of grade 8 zinc coated carbon steel to prevent galling with stainless steel pin plugs coated to prevent galling.

Split Restraint Devices & Fasteners: Valves that require the use of external or integral split restraint devices and or restraint fasteners are prohibited.

Insertion Valve Wells: All insertion valves shall be installed in 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.

General: Manufacturer will exercise extreme care to ensure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the cast iron main during installation, pressure tapping, or Line stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.

d. Method of Construction.- Installation of proposed insertion valves 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 MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

If necessary, The City will reduce the pressure to 100 psig or less for the duration of the installations. The entire operation of installing the insertion valve shall be accomplished without reduction of water pressure in the main(s) below 100 psig. It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation.

Preliminary Field Inspection of Water Main:

Dimensional, specification, and other data regarding the existing mains have been taken from existing records. This information may be inaccurate, out of date, and/or inadequate. The data have not been verified by field inspections. Further, the water main consists of cast iron pipe which may contain dimensional and structural flaws. In addition, the Contractor shall anticipate that exterior main conditions, bells, service connections, or presence of adjoining utilities may require relocation of proposed valve. Prior to proceeding with the installation of any valve, it is necessary to know the exact main outside diameter of the water main, if it has any ovality, and the internal diameter of the pipe before valve can be manufactured and/or ordered.

Prior to ordering material, Contractor shall excavate at each proposed location and carefully measure the outside diameter of the water main with calipers along at least four (4) locations to determine ovality and the critical outside diameter of the water main. The Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be taken to determine extent of internal deposits, tuberculation, etc.

If the Engineer determines that Contractor's data are not adequate, the Engineer may direct Contractor to make one or more pressure taps on main to obtain test pipe coupons for the Engineer's evaluation. The minimum size of the test coupon shall be 5" diameter, drilled through a nominal 6" valve. Pressure tapping saddles and other materials used for inspection taps shall conform to the requirements of this Special Provision. The Contractor shall anticipate that heavy interior corrosion and/or tuberculation exists within the water main.

If, in Engineer's opinion, the proposed location is unsatisfactory based on measurements of the existing pipe at the locations of the proposed insertion valve, the Engineer will direct excavation at another site. Excavating, de-watering, inspections, backfill, and restoration will be paid for separately in accordance with the applicable contract unit prices or Section 109.05.C and 109.05.D of the 2020 MDOT Standard Specifications for Construction whichever the Engineer deems most appropriate.

Contractor shall power wire brush and grind the exterior of the water main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each insertion valve fitting against each main. Any structural defects in the water main, service connections, appurtenances, adjacent utilities, etc., that could interfere with the insertion valve installation shall be immediately reported to Engineer.

All insertion valve fittings and appurtenances shall be cleaned and disinfected in accordance with the current City of Ann Arbor Public Services Area Standard Specifications prior to bolting any of the line stop fittings in place or commencing any pipe cutting.

Contractor shall fit upper and lower saddle plate assemblies to main, thoroughly checking for proper fit to main. Under no circumstances shall Contractor attempt to force, reshape, or bend saddle plates by excessive tightening of saddle studs while the insertion valve fitting is assembled around the main. Any required retrofitting shall be accomplished with the fitting removed from the main. Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.

Upper and Lower saddle halves shall be drawn together by bolt assemblies and the Saddle plates shall be bolted together in the horizontal position.

All insertion valve work shall be performed in accordance with the equipment manufacturers approved work procedures and installation guidelines.

The Contractor shall place polyethylene encasement meeting the requirements of the City of Ann Arbor Standard Specifications for Construction around the upper and lower saddle halves, the blind flange, and to a point at least 1 foot on either side of the saddle halves. All polyethylene encasement shall be securely taped to the water main such that water entry is minimized to the greatest extent possible.

Lighting Requirements for Nighttime Water Main Work:

Night work shall be lighted to an average intensity of 108 lux 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. Nighttime water main 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, including pipe, fitting, and valve installations, disinfection of the pipe, pipe cleaning, and all other night work.

Lighting systems may be fixed, portable, or equipment mounted. A power source shall be supplied with sufficient capacity to operate the lighting system. The lighting system(s) shall be arranged such that they do not interfere with the vision of motorists or unnecessarily illuminate surrounding properties or residences.

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

Contract Item (Pay Item)**Pay Unit**

Item 278: Insertion Valve-in-Well, Ductile/Cast Iron Pipe, __ inch.....Each

All work shall be paid in full at the contract unit prices which shall include all the labor, materials, and equipment required to perform the work as detailed herein. This shall also include all required costs associated with night time work, supplemental lighting, and all other required elements of the work, including all traffic maintenance and control.

Pavement removal, aggregate base course, bituminous pavement, and traffic control items as necessary to construct the line stop (as determined by the Engineer), shall be paid for separately as specified elsewhere; all other items shall be included in the pay item for the insertion valve.

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR

Item 350:Sewer, SDR 35 PVC, _ inch, Tr Det I
Item 351: Sewer, SDR 35 PVC, Service Lead, _ inch, Tr Det I

AA:DAD
WT:CGT

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05/16/22

a. Description. This work includes installing sanitary sewer, manholes and related items. The Contractor shall furnish all materials, equipment, tools, and labor necessary to perform the work required by this special provision and shall unload, haul, distribute, store, and install all pipe, fittings, castings, manholes, and accessories.

The Contractor shall excavate all trenches and pits to the required dimensions; excavate the bell holes; sheet, brace, and properly support the adjoining ground or structures where necessary to comply with MIOSHA and other relevant safety standards; properly handle and remove all drainage or ground water so that the work can be completed in accordance with the specifications; install and test the pipe, fittings, castings, manholes, and accessories; backfill and compact all fill materials within trenches and pits; and remove and properly dispose of surplus or unsuitable excavated material off-site.

b. Materials. Materials shall conform to the following sections of Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction.

Concrete, Grade 3500	Section 1004
Mortar, Type R-1	Section 1005
Granular Material, Class II	Section 902
Coarse Aggregate, 6A	Section 902
Steel Reinforcement	Section 905
Castings	Section 908
Miscellaneous Metal Products	Section 908
Geosynthetics.....	Section 910
Masonry Units	Section 913

Coarse Aggregate, 6A shall be crushed limestone. Concrete, Grade X shall consist of Portland cement, coarse and fine aggregates, and water, proportioned with 282 lbs. cement (3 sacks) per cubic yard to produce a minimum 28 day compressive strength of 1000 psi.

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:
 - A. Product data on all pipe, fittings, and manhole structures.
 - B. Manufacturer's certifications on all pipe, fittings, and manhole structures indicating that all materials meet the minimum requirements of these specifications.
 - C. Information on equipment and methods to be used for mandrel, air, infiltration, and exfiltration testing, and television inspection.

2. General Specifications.

A. Vitrified Clay Pipe and Fittings:

Vitrified clay sewer pipe shall be the bell and spigot type, glazed or non-glazed, and shall be of full internal diameter from 4 through 18 inches inclusive. Clay pipe shall conform to the material and testing requirements of ASTM C 700, extra strength.

Joints:

Joints for vitrified clay sewer pipe shall be compression type joints conforming to the material and testing requirements of ASTM C 425. Lubricant 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.

(1) Pipe Marking:

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

- (a) The pipe designation and class (e.g., C 700, ES).
- (b) The name or trademark of the manufacturer.
- (c) Identification of the manufacturing plant.
- (d) Testing lot number or testing lab stamp.

(2) 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.

(3) 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.

Vitrified clay pipe 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. Pipe in all cases shall be full diameter.
- (b) Fractures or cracks passing through the barrel or socket.
- (c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.

(d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.

(e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

(f) Insecure attachment of branches or spurs.

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.

B. Polyvinyl Chloride Pipe and Fittings:

Polyvinyl chloride (PVC) pipe shall have an integral wall bell and spigot. PVC pipe shall conform to the material and testing requirements of ASTM D 3034-83. Minimum wall thickness shall be SDR 35.

(1) Joints:

Joints for PVC pipe shall be elastomeric gasketed push-on joints conforming to the requirements of ASTM D 3212-81. Lubricant 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.

(2) Pipe Marking:

The following information shall be clearly marked on each length of pipe at intervals of five feet or less:

- (a) Manufacturer's name or trademark and code.
- (b) Nominal pipe size.
- (c) The PVC cell classification (e.g. "12454-B").
- (d) The legend "Type PSM SDR-35 PVC Sewer Pipe".
- (e) The designation "Specification D 3034".

The following information shall be clearly marked on each fitting:

- (a) Manufacturer's name or trademark and code.
- (b) Manufacturer's name or trademark.
- (c) Nominal size.
- (d) The material designation "PVC".
- (e) "PSM"
- (f) The designation "Specification D 3034".

(3) 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.

(4) 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.

Pipe 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. Pipe in all cases shall be full diameter.
- (b) Fractures or cracks passing through the barrel or socket.
- (c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.
- (d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.
- (e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

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.

C. Sewer Service Leads, Risers and Fittings:

Allowable pipe materials are; SDR 26 polyvinyl chloride (PVC) plastic conforming to the material and testing requirements of ASTM D 3034; and vitrified clay pipe conforming to the material and testing requirements of ASTM C 700.

Whenever adapters are required to properly connect the pipe with pipe of other material or manufacturer, the nominal I.D. of adapters shall be manufactured for that specific purpose and shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer. The adaptor at this tapped connection shall be made using either a gasketed sewer saddle, a flexible neoprene rubber boot, or approved equal. Gasketed sewer saddles shall meet the following requirements:

- (a) The castings shall be ductile iron per ASTM 536, Grade 65-45-12, protected with a yellow shopcoat.

(b) The adjustable strap shall be 3.5" wide, stainless steel per ASTM A 240, type 304.

(c) The bolts shall be 0.5" UNC rolled thread, lubricant coated, stainless steel per ASTM A 1943, type 304.

(d) The nuts shall be per ASTM A 194, type 304.

(e) The washers shall be stainless steel per ASTM A 240, type 304 and plastic lubricating washers.

(f) The gaskets shall be SBR per ASTM D 2000 MBA 710, compounded for water and sewer service.

(1) Joints:

Joints for SDR 35 PVC pipe shall be bell and spigot rubber o-ring gasket joints conforming to the requirements of ASTM D-3212. Lubricant supplied by the pipe manufacturer shall be used, and the joints shall be coupled in accordance with the manufacturer's requirements.

Joints for vitrified clay pipe shall be compression type joints conforming to the material and testing requirements of ASTM C 425. Lubricant 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.

Joints for cast iron pipe shall be mechanical compression joints conforming to the material and testing requirements of ASTM C 564.

(2) Pipe Marking:

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

(a) The pipe designation and class (e.g., SDR 35, ASTM D 3034).

(b) The name or trademark of the manufacturer.

(c) Identification of the manufacturing plant.

(d) Testing lot number.

(3) 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.

(4) 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.

Pipe for sewer service leads and risers 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. Pipe in all cases shall be full diameter.
- (b) Fractures or cracks passing through the barrel or socket.
- (c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.
- (d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.
- (e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

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.

D. Manholes:

All sanitary sewer manholes shall be constructed of precast reinforced concrete sections. Precast drainage structures 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.

Precast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat top slabs shall conform to the requirements of ASTM C 478. Joints on precast manholes used on all sanitary sewers shall meet ASTM C 443, rubber O-ring gasket.

Concrete brick shall conform to the requirements for concrete building brick, ASTM C 55, Grade N-1.

Cast iron frames and covers for manholes shall conform to the requirements for grey iron castings, ASTM A 48, Class No. 30. Specific, approved castings are listed in the Special Provision for "Dr Structure Covers."

Plastic coated manhole steps shall be injection molded of copolymer, polypropylene, encapsulating a 1/2 inch grade 60 steel reinforcing bar. Plastic-coated manhole steps shall meet the performance test described in ASTM C-478, Paragraph II, and shall have an impact resistance of 300 ft.-lbs., with only minor deflection and no cracking or breaking.

The steps shall resist pull out forces of 1500 lbs.

E. Manhole Connections:

Sewer pipe to precast manhole connections shall be through: 1) a flexible neoprene rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacture and shall be accurately located within 1/2-inch of proposed sewer centerline; or, 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient, flexible, and infiltration-proof joint; or, 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole as approved in writing by the Engineer.

Neoprene rubber for manhole boots shall meet the requirements of ASTM C 443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.

c. Construction.

1. Material Handling:

Pipe, fittings and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such material be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

In distributing the material at the site of the work, each piece shall be stored off of the ground surface by means of skids or bunks, and stacked neatly. Pipe may be "strung-out" for only the length which, in the opinion of the Engineer, will be installed within 24 hours, if maintained such that the pipe interior will remain free of dirt, mud, and debris.

2. Excavation:

The Contractor shall dig-up and expose all utility crossings prior to laying any sanitary sewer pipe or lead. This will allow the Engineer to adjust the grade of the sanitary sewer or lead, if possible, to avoid the existing utilities. The costs of the dig-ups, and related costs, shall be included in the unit price of the sanitary sewer or lead. The Engineer may require that some dig-ups be performed out-of the staging area where the sewer work is taking place in order to aid in alignment decisions.

Excavation shall include the removal and disposal of all materials of every kind, including rock, boulders, or buried obstructions necessary to be removed in the construction work.

The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and the Contractor shall be held responsible for the repair of such structures when broken or otherwise damaged.

Excavation normally shall be by open cut from the surface, except as otherwise specified, or in special cases where crossing under trees, pavements, or structures. The Contractor may use tunnel methods if permitted in writing by the Engineer, provided his method of backfill is such, in the judgment of the Engineer, as to avoid any present or future injury to the tree, pavement, or structure. 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 trench shall be excavated to a minimum of four inches below the final location of the pipe. This cut shall be filled to the level of the bottom quadrant of the pipe with Coarse Aggregate, 6A as specified herein, shaped and compacted to the pipe barrel.

Bell holes shall be provided in the trench bottom at each joint to permit the joints to be made properly.

Whenever, in the opinion of the Engineer, it is necessary to explore and excavate to determine the location of existing underground structures, the Contractor shall make explorations and excavations for such purposes. These excavations will not be paid for separately, but shall be included in the cost of the item of work being performed. Any backfilling that may be required to be performed as a result of an exploratory excavation that is not part of the backfill associated with the work being undertaken, shall be included in the item of work being performed, with the exception of final trench restoration, which shall be paid for separately using appropriate items of work contained within the contract documents.

All excavated material approved by the Engineer as backfill material and imported backfill material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways or clear vision areas along roadways, driveways, or parking areas. All excavated material which is unsuitable for backfill shall be immediately removed from the site by the Contractor. Hydrants under pressure, manholes of any kind, valve boxes, curb stop boxes, fire and police call boxes, and other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear, or other satisfactory provisions made, for proper drainage. Natural and man-made water courses shall not be obstructed. Disposal of excavated material, if required, shall be the Contractor's responsibility.

Hand methods for excavation shall be employed in locations shown on the Plans. In other locations the Contractor may use trench-digging machinery or employ hand methods.

3. Pipe Undercut:

In locations where in the opinion of the Engineer, the soil at the bottom of the trench is unstable, the Contractor shall excavate below the trench bottom to such depth as directed by the Engineer and refill with compacted Aggregate, 6A (limestone), or compacted Granular Material, Class II, as directed by the Engineer, to the level of the bottom quadrant of the pipe. If refill with compacted Aggregate, 6A (limestone) is required during sewer construction, it shall be placed for the entire sewer run, from manhole to manhole.

4. Trench Opening:

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. 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. 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. The maximum trench width shall be in keeping with good construction practice, such that existing structures are not undermined.

In excavating for pipe lines, 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 25 feet of trench may be left open, and access to all drives shall be restored. This opening shall be surrounded by fencing and lighted barricades, or plated. The remainder of the trenching operation shall be available for safe vehicular and pedestrian traffic at all times.

The trench shall be so braced and drained that the workers may work therein safely and efficiently. It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains, or storm sewers. If trench water is pumped to natural drainage channels or drains, approved soil erosion and sedimentation controls shall be installed and maintained at the point of discharge. If trench water is pumped into storm sewers, filters shall be provided to prevent the flow of rocks, mud and other debris into the storm sewer line.

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.

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. Particular care shall be taken to conform to all applicable rules of the Michigan Department of Labor, Construction Safety Standards Commission, "Safety Standards". Part 9 of the above document should be particularly noted.

Where required to support the surfaces of adjacent thoroughfares, structures, or excavations, or to protect the construction work, adjacent work, or workmen; sheeting, bracing, and shoring shall be provided. The placing of such supports shall not release the Contractor of the responsibility for the sufficiency and integrity of the trench opening. 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.

Sheeting, bracing, and shoring shall not be left in place after completion of the work except as required by the Engineer. 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.

5. Disposal of Water and Sewage:

The Contractor shall remove by well points, pumping, bailing, or other acceptable method any water which may accumulate or be found in the trenches or other excavations to be made. The Contractor shall take all necessary precautions to keep the trenches and other excavations entirely clear of water and sewage during construction of pipe lines and structures. Newly placed concrete shall be adequately protected from injury resulting from ground water or sewage. No drainage ditches shall be placed within the area to be occupied by any structure except as permitted in writing by the Engineer.

The Contractor shall at all times have upon the work sufficient pumping equipment ready for immediate use to carry out the intent of this section.

Where existing sewers, drains, or ditches are encountered in this work, adequate provisions shall be made for diverting their flow, so that the excavation will be kept dry. Upon completion of the construction work, the existing sewers, drains, or ditches shall be restored as directed by the Engineer.

6. Crossing Existing Structures & Facilities:

During the construction it may be necessary to cross under or over certain sewers, service leads, drains, culverts, water lines, gas lines, electric lines, and other 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 "dig through" existing facilities with the intention of replacing or repairing them after the proposed work is completed. Wherever such structures or facilities are disturbed or broken, they shall be restored to a condition equal to, or better than, the condition that existed prior the work being performed. All repairs shall be acceptable to the owner and the City and shall be at the Contractor's sole expense. These crossings shall be made with a minimum of twelve inches of vertical clearance between facilities.

7. Laying Pipe:

Each pipe shall be inspected for defects prior to being lowered into the trench. The inside of each pipe and outside of each 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 and fittings shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, 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 sewer construction shall be plugged at the outlet, so as to not be connected into the existing system until it has been tested and accepted. Construction of sewers shall begin

at the outlet end and proceed upgrade, unless otherwise directed by the plans or the Engineer. Pipe shall be laid on the prepared subgrade 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 break period 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. The correct line and grade shall be maintained by the use of a laser alignment system. 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. Each pipe, as laid, shall be checked by the Contractor to insure that this result is obtained. The grade as shown on the Plans is that of the pipe invert for sewers; the work must conform to this profile. A variation of 1/4 inch from this profile grade will be deemed sufficient reason to cause the work to be rejected and re-laid. Sewer pipe alignment shall be maintained so as to not vary more than one-half inch from the correct line on pipes up to 36 inches in diameter nor more than one inch on pipes 42 inches in diameter and larger. 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 sanitary sewer 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 sanitary sewer 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.

8. Making Joints

A. General:

Mechanical means shall be used for pulling home all rubber-gasket pipe 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.

Sewer pipe may not be cut when the cut end will be used in making a pipe joint. Cut ends may only occur in situations such as a manhole or headwall. Cut ends shall be carefully and neatly made with a saw, pipe cutter, or other approved means.

B. Vitrified Clay Pipe:

Compression-type joints shall be made in accordance with manufacturer's standards and ASTM C 425. The jointing surfaces of the pipe shall be wiped clean, and lubricated using lubricants supplied by the pipe manufacturer. The socket and spigot shall be lined up and joined together with a steady, uniformly applied force.

C. Polyvinyl Chloride (PVC) Pipe:

Elastomeric gasket, push-on joints, shall be made in accordance with manufacturer's standards, and ASTM D2321 and D3212. The jointing surfaces of the pipe shall be wiped clean, and lubricated using lubricant supplied by the pipe manufacturer. The spigot end is to be inserted into the bell so that it is in contact with the gasket. The bell is to be braced while the spigot end is pushed in under the gasket, so that previously completed joints will not be altered. The spigot shall be pushed into the bell until the reference mark on the pipe barrel is flush with the end of the bell.

9. Backfilling

A. General:

Backfilling shall not be performed in freezing weather except by written permission of the Engineer, and it shall not be composed of frozen material. No fill shall be placed where the material already in the trench is frozen.

B. Vitrified Clay Pipe:

All pipe shall be bed on a four inch or thicker layer of compacted Granular Material Class II or compacted Aggregate, 6A (limestone) as specified herein.

From the bedding to the pipe centerline backfill shall be carefully placed Granular Material Class II placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods, to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. Each lift shall extend the full width of the space between the pipe and trench, and the fill shall be brought up evenly on both sides of the pipe. The backfill under the haunches of the pipe shall be consolidated by the use of a tee-bar.

When the pipe is greater than 48 inch diameter, or when permitted in writing by the Engineer, the Granular Material Class II from the bedding to the centerline may be replaced by Aggregate, 6A (limestone) as specified. A suitable granular filter, designed by the Contractor and approved by the Engineer, shall be provided above the coarse aggregate to prevent intrusion of succeeding backfill materials.

From the pipe centerline to the top of the pipe, backfill shall be Granular Material, Class II placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods, to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557 Method C, or AASHTO T-180.

From the top of the pipe to two feet above the top of the pipe backfill shall be Granular Material, Class II uniformly spread and machine tamped. Machine tamping shall include manually operated vibrating plate compactors. The backfill material shall be compacted in lifts of twelve inches, loose measure.

From two feet above the top of the pipe to the grade shown on the Plans and Details, or to the subgrade of roadway materials, or to the subgrade of surface structures, backfill shall be Granular Material, Class II uniformly spread and machine tamped. If machine tamping includes manually operated vibrating plate compactors or self propelled vibrating rollers the backfill material shall be compacted in lifts not exceeding twelve inches, loose measure. If a backhoe mounted compactor is employed, the backfill material shall be compacted in lifts of thirty-six inches, loose measure. Approval to use a particular machine tamping method will be withdrawn by the Engineer if the method causes injury to the pipe or adjacent structures or movement of the pipe. Each lift shall be thoroughly compacted to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. The Engineer may give consideration to giving written permission to increase the thickness of the lifts specified in this paragraph if satisfactory compaction is achieved and no undesirable side effects occur.

C. PVC Pipe:

All pipe shall be bed on a four inch or thicker layer of compacted Coarse Aggregate, 6A (limestone) as specified herein.

From the bedding to the pipe centerline backfill shall be carefully placed Coarse Aggregate, 6A (limestone), placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods. Each lift shall extend the full width of the space between the pipe and trench, and the fill shall be brought up evenly on both sides of the pipe. The backfill under the haunches of the pipe shall be consolidated by the use of a tee-bar.

From the pipe centerline to the top of the pipe, backfill shall be Aggregate, 6A (limestone) placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other

approved methods. A layer of geotextile separator, meeting the requirements of Section 910, extending the full width of the trench, shall be provided above the coarse aggregate to prevent intrusion of succeeding backfill materials.

From the top of the pipe to two feet above the top of the pipe, unless otherwise specified, backfill shall be Granular Material Class II placed in a maximum lift thickness of twelve inches, loose measure. These lifts shall be thoroughly compacted by manually operated vibrating plate compactors, to at least 95% of the material's maximum dry density at optimum moisture content, as determined by ASTM D 1557, Method C, or AASHTO T-180.

From two feet above the top of PVC pipe to the grade shown on the Plans and Details, or to the subgrade of roadway materials, or to the subgrade of surface structures, backfill shall be Class II granular material uniformly spread and machine tamped. If machine tamping includes manually operated vibrating plate compactors or self propelled vibrating rollers the backfill material shall be compacted in lifts not exceeding twelve inches, loose measure. If a backhoe mounted compactor is employed, the backfill material shall be compacted in lifts of thirty-six inches, loose measure. Approval to use a particular machine tamping method will be withdrawn by the Engineer if the method causes injury to the pipe or adjacent structures or movement of the pipe. Each lift shall be thoroughly compacted to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. The Engineer may give consideration to giving written permission to increase the thickness of the lifts specified in this paragraph if satisfactory compaction is achieved and no undesirable side effects occur.

11. Concrete Cradle and Encasement for Sewers:

Where shown on the Plans, pipe shall be installed with a concrete cradle or encasement of Concrete, Grade X as shown on the Standard Details or plan sheets. Cradle or encasement shall be for the full run of the sewer, from manhole to manhole. Each pipe shall rest on a bed of Concrete, Grade X, shaped to fit the bottom of the pipe. After setting the pipe, the space between the outside of the pipe and the undisturbed trench bank shall be completely filled with Concrete, Grade X. Concrete, Grade X used for this purpose shall have a slump not exceeding two inches.

12. Riser Pipe for Service Leads:

Where shown on the Plans or directed by the Engineer, the Contractor shall furnish and place risers extending from the branch opening of the sewer up to within eight to ten feet of the proposed finished grade. These pipes shall be laid with joints as specified above. These risers shall be laid up and held in place as required by the Standard Details. The connection fitting when a riser is to be used shall be a tee fitting. Openings in the top of the riser pipe shall be closed, marked, and staked as specified above.

13. Service Lead Connections and Fittings:

Service lead connections shall be provided at such points as shown on the Plans or as directed by the Engineer. These shall be of the size and character indicated on the Plans. House service leads shall be a minimum of four inches in diameter. Service lead connections shall be formed by the use of standard wye or tee fittings of the same material called for use on the main sewer being constructed. Wye fittings are not to be used for connections with riser pipes. All wye and tee fittings shall be encased in Concrete, Grade X. All leads which will not have pipe connected to them immediately shall be closed by the use of a watertight plug manufactured specifically for that purpose and approved by the Engineer.

Branch connections to existing sewers shall be made by the City of Ann Arbor – Field Operations Personnel. Scheduling of these taps shall be made with Field Operations by the Contractor. All applicable tap fees must be paid in full prior to this scheduling.

Connections for sewer service leads connecting to existing sewer mains or sewer mains of a different pipe material shall be at a core-drilled tap into the sewer pipe. The joint at this tapped connection shall be made using either a gasketed sewer saddle, a flexible neoprene rubber boot securely clamped into the core-drilled tap, or approved equal. The end of the sewer service lead pipe shall be flush with the inside wall of the sewer main. Gasketed sewer saddles shall meet the following requirements:

- (a) The castings shall be ductile iron per ASTM 536, Grade 65-45-12, protected with a yellow shopcoat.
- (b) The adjustable strap shall be 3.5" wide, stainless steel per ASTM A 240, type 304.
- (c) The bolts shall be 0.5" UNC rolled thread, lubricant coated, stainless steel per ASTM A 1943, type 304.
- (d) The nuts shall be per ASTM A 194, type 304.
- (e) The washers shall be stainless steel per ASTM A 240, type 304 and plastic lubricating washers.
- (f) The gaskets shall be SBR per ASTM D 2000 MBA 710, compounded for water and sewer service.

In order to properly mark the location of every branch connection, the Contractor shall take accurate measurement of all branches before the sewer trench is backfilled. The measurements shall indicate the distance from each branch to the center of the nearest

downstream and upstream manhole. When leads are run to the property line, they shall be perpendicular to the main sewer. The Contractor shall also report the location of the point where the lead ends, relative to the nearest property corners. The Contractor shall furnish the Engineer with a copy of these measurements immediately upon the completion of each section of sewer.

In addition to measurements, the Contractor shall furnish and place a minimum two inch by two inch cedar or treated lumber marking stick at the end of each lateral extension or service lead connection of such length that it will reach from the end of the pipe vertically up to a minimum of two inches above the proposed finished grade. Each marker shall be set in a vertical position. Markers will not be required on the main run of sewer at fittings. The visible end of each marker stake must be plainly painted red if sanitary or white if storm.

The service lead pipes shall also be marked for identification in order to prevent cross connection of the leads: sanitary leads - red, storm leads - white. The last two lengths of pipe shall be marked by wrapping the appropriate colored tape twice around the barrel. This wrapping shall take place at any point in the lead whenever the lead is terminated. This taping (wrapping) must be performed under the inspection of the Inspector.

14. Manholes:

Excavation shall be carried to the depth and width required to permit the construction of the required base. The excavation width shall be greater than the base. The bottom of the excavation shall be trimmed to a uniform horizontal bed and be completely dewatered before any concrete is placed therein. Concrete shall be Grade S2. Precast manhole bases and precast bottom sections are allowed.

Precast concrete manholes shall be constructed of Concrete, Grade S2.

Circular precast manhole sections shall be constructed in accordance with the Standard Detail Drawings. Manhole stack units shall be constructed on level poured-in-place bases, precast concrete bases, or precast concrete bottom sections.

Precast cone sections shall be constructed in accordance with the Standard Details. These units shall be eccentric for all manholes. All structures shall be topped with a minimum of one and a maximum of three brick or precast adjustment ring courses.

Manholes shall be constructed within 2-1/2 inches of plumb.

Frames and cover castings shall be set in full mortar beds and pointed on the structure interior to a smooth, brushed finish. The covers shall be set flush with sidewalk, roadway pavement, or ground surfaces. City of Ann Arbor Project Management Personnel shall be notified prior to the final paving of all private roads and parking lots so as to allow inspection of the final casting adjustments for all City utility structures. In gravel streets, covers shall be set six to eight inches below finished gravel surface.

Sewer pipes shall extend into structures a minimum of 1/2 inch and a maximum of 3 inches.

Flow channels for sewer structures shall be finished in accordance with the Standard Details. All flow channels shall be screeded and floated to a smooth, uniform surface and troweled to a hard surface finish. In vitrified clay sewers, the manhole may be constructed around the pipe, then the top half of the pipe broken out with concrete fillets provided to fill in between the pipe and manhole.

Stubs for future sewer connections shall be furnished and placed by the Contractor as shown on the Plans and as directed by the Engineer. Connections shall be properly supported and braced when not resting on original ground so that any settlement will not disturb the connection. Stubs shall consist of one length of sewer pipe, of the size indicated on the Plans, with a watertight plug.

See Sewer Testing section for the requirement of the installation of a pipe nipple through the sewer manhole wall.

15. Drop Connections:

Where shown on the Plans or directed by the Engineer where a branch sanitary sewer is brought into a manhole more than 24 inches above the invert elevation in the manhole, a drop connection shall be provided in accordance with the Standard Detail Drawings.

16. Backfilling Around Manholes:

As soon as practicable after a precast structure has been set, forms and debris have been removed from the structure, and the structure has been inspected and approved, the excavated area around the structure shall be backfilled up to the specified grade with Granular Material, Class II. No boulders, rocks, stones, masonry, lumber, or debris shall be allowed within the backfill.

17. Sewer Testing:

All sanitary sewers, including leads, 36 inches and smaller shall be air tested by the Contractor. All sanitary sewers greater than 36 inches shall be infiltration or exfiltration tested by the Contractor. The Engineer will decide whether infiltration or exfiltration testing is performed based upon ground water conditions. All sewers, except 4-inch and 6-inch leads, shall be television inspected by the Contractor. All PVC sanitary sewer mains shall be mandrel tested. All sewer must meet each test, in order (mandrel testing, air or infiltration/exfiltration, television inspection), before the next test is performed. The Contractor shall furnish all labor, equipment and materials necessary for testing. Only after all tests have been successfully completed, and acknowledged by the Engineer in writing, may the sewer be placed in service.

A. Mandrel Testing:

All PVC sanitary sewer mains shall be mandrel tested for deflection by the Contractor.

The mandrel shall be a commercially produced, nine-fin mandrel, with the pipe diameter, percent deflection and applicable ASTM or AASHTO standard stamped on the fins. The testing is to take place after the sewers have been in place for a minimum of 30 days. The mandrel shall be pulled from structure to structure. Any portion of the pipe through which the mandrel passes freely shall be deemed to have passed the mandrel test. Sections of pipe through which the mandrel does not pass freely shall be exposed and examined. Based on this examination the pipe zone bedding and backfill shall be improved, or the pipe replaced. The pipe shall then be re-tested before approval is granted.

The Contractor shall not be granted an extension of contract time for the period in which a portion(s) of PVC sanitary sewer is awaiting mandrel and other acceptance tests. This waiting period is understood to be an integral element of the construction of the utility and cannot be eliminated. Further, if a sewer is installed and requires remedial action in order to comply with the requirements of the project specifications, the waiting period associated with the remedial repairs shall also not be considered as a basis for an extension of contract time. The Contractor shall take these requirements into account when preparing their Critical Path Schedule, and any required updates, and shall account for them during the performance of the project.

The mandrel is to be constructed in accordance with the following table:

SDR 26 PVC, Pipe I.D.	Mandrel O.D.
8"	7.28"
10"	9.08"
12"	10.79"
15"	13.20"
18"	N/A
24"	N/A

B. Air Test:

The air test can be dangerous. Lack of understanding, carelessness, or an improperly prepared line must be avoided. It is extremely important that the plugs be installed in such a way as to prevent blowouts. Sudden expulsion of a poorly installed or partially deflated plug can cause serious injury or damage. As a safety precaution, pressurizing equipment must include a relief valve set at not more than 10 psig. No one will be allowed in the manholes during testing.

In areas where ground water is known to exist and the sewer is to be air tested, the Contractor shall install a 1/2-inch diameter by approximately 10 inch long pipe nipple, through the manhole wall above one of the sewer lines entering the manhole. The pipe nipple shall be capped on the inside of the manhole at the time the sewer line is installed. Immediately prior to the performance of the air test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The tube shall be held vertically and a measurement of the height in feet of water above

pipe centerline shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.31 to establish the pressure (in psig) that will be considered to be the average ground water back pressure.

The normal sequence and time requirements for air testing are:

(1) After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing. There shall be three hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

(2) Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the pressurization hose shall be disconnected to prevent air from entering or escaping from the line.

There shall be a pressure gauge for reading the internal pressure of the line being tested. The gauge shall be capable of showing pressure as low as 0 psig up to no greater than 20 psig. In the 0-10 psig range the gauge shall be both calibrated and accurate to one-tenth of one pound and the gauge dial shall cover at least one-half of the complete dial range. This gauge shall have a tee fitting to allow simultaneous pressure reading by a City gauge.

(3) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

<u>Pipe Size</u>	VCP SEWERS	PVC SEWERS	
	<u>Minimum Holding Time Seconds/100 ft. Pipe</u>	<u>Holding Time (Seconds)</u>	<u>Minimum Holding Time (Min:Sec)</u>
4-inch	18	0.380 x Length	3:46
6-inch	42	0.854 x L	5:40
8-inch	72	1.520 x L	7:34
10-inch	90	2.374 x L	9:26
12-inch	108	3.418 x L	11:20
15-inch	126	5.342 x L	14:10
18-inch	144	7.692 x L	17:00

21-inch	180	10.470 x L	19:50
24-inch	216	13.674 x L	22:40
30-inch	288	21.366 x L	28:20
36-inch	360	30.768 x L	34:00

C. Infiltration Test:

The Contractor shall place temporary weirs for testing purposes in such manholes as necessary to measure the amount of infiltration. Test sections shall be no longer than 1,200 feet.

The allowable amount of infiltration shall not be more than 200 gallons per inch of pipe diameter per mile of sewer per 24 hours, including manholes. The Contractor shall repair all visible leaks regardless of the results of the infiltration test.

If the allowable limit of infiltration is exceeded on any test section, the Contractor shall reconstruct or repair the defective portion of the sewer, and re-test.

D. Exfiltration Test:

The standpipe method will be used from manhole to manhole for the length of pipe to be tested. A hydrostatic head of 10 ft. to the sewer's average centerline elevation will be required, with adjustments for external submergence due to water in the trench. The Engineer will establish time durations and procedures for each test. The maximum allowable exfiltration rate will be 200 gallons per inch of pipe diameter per mile of sewer per 24 hours including manholes. Upon completion of this test on a sanitary sewer, the Contractor shall pump all water out of the downstream manhole to a storm sewer.

18. Television Inspection:

A video inspection must be approved prior to the acceptance of the sewers, and prior to any building connections being made. The Engineer shall be given 24 hours notice so that an Inspector may witness the video inspection. All sewer lines are to be thoroughly cleaned prior to video inspection, by jetting of the lines or other approved methods. Video inspection shall consist of wetting the invert of the section by pouring clean water in the upstream manhole until it appears in the downstream manhole, and then, after the water has stopped flowing, passing a video camera through the section. The camera shall be connected to a monitor and the results recorded in DVD format. The inspection record (DVD) shall indicate the date, the section tested, and the actual distance from the beginning manhole to each tee or wye, and each visible defect. The DVD shall be furnished to the Engineer for further review and final approval.

The video inspection will be deemed satisfactory if there are no visible defects, including, but not limited to: dips or low spots, high spots, deviations in horizontal or vertical alignment, joint offsets, leaks or cracks and there is no debris or other foreign material in the sewer system.

19. Sewer Repairs:

If a sewer repair is required as a result of damage during construction operations, air test failure, or video inspection failure, the Contractor shall expose the sewer pipe and perform the required correction(s), as specified herein and as directed by the Engineer. The Contractor shall be fully responsible to provide a written plan of all proposed activities associated with any repair(s) for the review and approval of the Engineer. All repairs proposed shall be effective. The Engineer's acceptance of a proposed repair plan shall not be construed as acceptance of any associated result. The Contractor is, and shall remain responsible, for all work until such time as it is formally accepted in writing by the Engineer.

If the repair is required due to the pipe being out of alignment or off grade, the pipe shall be adjusted so as to be placed in proper alignment and grade. Aggregate, 6A (limestone) shall be carefully placed under the haunches of the realigned pipe and compacted by the use of a tee-bar. From the haunches of the pipe, backfilling shall be performed as specified elsewhere herein.

If the pipe cannot be satisfactorily realigned or an open joint reset; or if the pipe is cracked, broken, or permanently deflected, the affected pipe shall be removed and replaced with the same pipe material. The pipe to be removed is to be sawed on each side of the damaged section in a neat and workmanlike manner without damage to the adjacent pipe. The replacement pipe section shall fit flush to the remaining pipe at each end. These sawed joints shall be coupled using a flexible pipe coupling and stainless steel shear ring. These joints shall be encased to the pipe centerline with Concrete, Grade X one foot on either side of the flexible coupling. The remaining pipe backfill shall be performed as specified elsewhere herein.

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

<u>Pay Item</u>	<u>Pay Unit</u>
Item 350: Sewer, SDR 35 PVC, ____ inch, Tr Det ____	Foot
Item 351: Sewer, SDR 35 PVC, Service Lead, ____ inch, Tr Det ____	Foot

Sewer pipe as specified shall be measured in place by length in feet from center of manhole to center of manhole.

Payment will include, but not be limited to; excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; connections into existing structures; bulkheading existing connections that are no longer needed in existing manholes; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling per the trench details and the requirements specified herein; cleaning; video inspection; and testing.

Service tees or wyes shall be paid for based on each tee installed. The payment for the service tee will include the material, equipment and labor costs for the connection of the riser or lead to the

tee. Also, the payment for the service tee will include the material, equipment and labor costs for the excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling per the trench details and the requirements specified herein; cleaning; testing; placing the plug or cap placed on the tee, riser or lead; and, the required wooden stake to locate the riser or lead in the future.

Service risers shall be paid for based on the installed height measured in feet from invert of the sewer main to invert of the bend at the top of the riser.

Service leads shall be paid for based on installed length measured feet from the center of the main to the capped end of the lead. If a service riser is installed, this measurement shall be from the center of the bend at the top of the riser to the capped end of the lead. The payment for service leads will include, but not be limited to; excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; connections into existing structures; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling and compacting per the trench details and the requirements specified herein; cleaning; video inspection; testing; and, the necessary fittings, labor and equipment to connect the lead to a riser.

Manholes of the detail and depth specified will be paid for at the Contract unit price for each unit installed. Payment includes, but shall not be limited to; furnishing the labor, equipment and materials for all necessary excavation; any needed sheeting, shoring and bracing; properly disposing of surplus or unsuitable excavated material; backfilling and compaction; and, constructing the structure complete, including pipe connections and structure cleaning, up to 10 feet of drainage structure depth.

Payment for additional depth for drainage structures includes, but shall not be limited to; furnishing the labor, equipment, and materials for all necessary excavation; any needed sheeting, shoring and bracing; disposing of surplus excavated material; backfilling and compaction; and constructing the structure complete, including pipe connections and structure cleaning, for the portion of the structure which is deeper than 10 feet.

Payment for adjusting of manhole frames and covers shall be included in payment for the manhole. The manhole frames and covers will be paid for separately.

Payment for drop connections shall be based on the installed vertical height measured in feet from the bottom invert of the drop connection to the top invert of the drop connection. Payment includes, but shall not be limited to; furnishing all labor, equipment and materials for all necessary excavation; any needed sheeting, shoring and bracing; proper removal and disposal off-site of surplus and unsuitable excavated material; pipe, fittings, and concrete; backfilling and compaction; and, connections to complete this item of work.