

**STANDARD DETAIL SPECIFICATIONS**  
**FOR**  
**WATERMAIN SYSTEMS**

**CITY OF EDEN PRAIRIE, MINNESOTA**  
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Detail Drawings (W-1 through W-5 attached). See also "Excavation, Installation and Restoration Procedures" EIR.

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**CITY OF EDEN PRAIRIE, MINNESOTA**

1. **SCOPE OF WORK**

The work to be done under this Contract shall include the furnishing of all labor, material, tools and equipment to construct complete in place the watermain and all appurtenances as shown on the Drawings and Plans and specified herein.

The Contractor shall excavate all materials encountered, furnish or compact foundations where required, furnish and install all timbering, sheeting and bracing necessary or proper to safely support all work, remove all water, protect, repair, relocate, maintain and restore all sub-surface, surface and overhead structures directly or indirectly disturbed, injured or affected by their operations and provide all backfilling and furnish all other appurtenant items and services as necessary.

2. **FIRE HYDRANT AND WATERMAIN VALVE OPERATION**

Only authorized City personnel shall operate public fire hydrants and watermain valves. This means that a Contractor will not use a fire hydrant for construction water or for flushing water and sewer mains unless a valid permit has been issued. Contractors will not operate watermain valves in the existing water systems unless a valid permit has been issued for that purpose. A permit for operating valves will only be issued when there is no chance of interrupting or contaminating the existing water system.

A 24-hour notice must be given to the Eden Prairie Utility Division before valves will be operated or watermains flushed.

3. **WATERMAIN PIPE MATERIALS AND APPURTENANCES**

All watermain pipe, valves, fittings and all appurtenances shall be new materials and shall be of the size, strength, and quality as shown on the Plans and as specified below and/or as indicated in the Special Conditions.

All watermain pipe and appurtenances such as glands, bends, valve boxes, hydrants, and valves shall be USA made.

The Contractor may be required to secure and deliver to the Engineer a written statement from the manufacturer assuring the quality and compliance to the applicable specifications of all materials furnished and installed under this Improvement Project. This shall in no way relieve the Contractor of any responsibilities as to the quality of materials furnished and installed. The Contractor shall cut, handle and install the pipe in accordance with the manufacturer's specifications.

All watermain pipe and fittings shall be installed with a minimum cover of 7.5 feet over the pipe unless otherwise shown on the Plans.

3.1 **DUCTILE IRON PIPE (DIP)**

- (a) Ductile iron watermain pipe, shall conform to ANSI/AWWA C151/A21.51 with cement-mortar lining in accordance

with ANSI/AWWA C104/A21.4. All ductile iron pipe shall be pressure rated to 350 psi and shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be a minimum of 200 grams per square meter of pipe surface area. An asphaltic topcoat shall be applied over the zinc, and the coating system shall conform to ISO 8179-1 "Ductile iron pipes – zinc-based coating – Part 1: Metallic zinc with finishing layer; Second edition 2004-06-01."

- (b) Ductile iron fittings shall conform to ANSI/AWWA C110/A21.10 or C153/A21.53 (for compact fittings). All fittings shall be mechanical joint fittings with a pressure rating of 350 psi. Any substandard or defective fittings shall be rejected by the City Engineer/Utility Division.
- (c) All joints shall be either mechanical or push-on joints and shall conform to ANSI/AWWA C111/A21.11. All joints shall have a pressure rating of 350 psi with only ductile iron glands allowed. Cor-Blue T bolts shall be used on all mechanical fittings. Zinc anode caps conforming to ASTM B418-88 "Galvanic Zinc Anodes," with a minimum weight of 6 ounces per cap shall be installed on fitting bolts in the following manner:
  - i. In soils identified by the engineer as poorly draining blue, blue-gray, gray, or brown clay into which the pipe trench is constructed, zinc anode caps shall be installed on every bolt used to assemble the fitting.
  - ii. In soils identified by the engineer as well-draining alluvium (sand, gravel, loam, silt) into which the pipe trench is constructed, zinc anode caps shall be installed on every-other bolt used to assemble the fitting (every-other bolt can be skipped).
- (d) Joint conductivity shall be accomplished by use of external copper strap type jumpers or approved equal attached using exothermic weld kits specifically designed by the manufacturer for welding the types of material to be joined. Connections to ductile iron pipe or fittings shall use the weld metal and mold for exothermic connections to ductile iron pipe. The mold and weld metal shall be supplied by the same manufacturer. Weld metal shall be type XF manufactured by Thermoweld or approved equal.

All exposed straps and welds shall be protected with an adhesive rubber thermite weld cap or approved equal.
- (e) Pipe coating damage. Any chips or scratches to the pipe coating system during transit or installation resulting in exposure of the zinc coating or the metal of the pipe wall shall be repaired using TE Mastic manufactured by Tapecoat Company or approved equal.

### 3.2 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS

Polyvinyl chloride (PVC) pressure pipe shall be manufactured with compounds conforming to ASTM D1784 and shall conform to the requirements of AWWA C-900, C-905, Fusible C-900, and Fusible C905, for the size, grade, and pressure class indicated on the Plans, Specifications, and special conditions. Fittings shall be the same pressure class as the pipe and shall conform to AWWA C907 and C908. PVC pressure pipe and fittings shall have a pressure rating of one hundred sixty (160) psi or greater, unless otherwise provided in the special conditions. The grade used shall be resistant to aggressive soils or corrosive substances in accordance with the requirements of ASTM D-543. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to

ductile iron or cast iron pipe equivalent outside diameters.

### 3.3 HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE AND FITTINGS

Polyethylene pressure pipe and fittings shall be manufactured with compounds conforming to ASTM D3350 and shall conform to ASTM D3035 and AWWA C-901 (for 0.5" to 3" diameters) and ASTM F714 and AWWA C906 (for 4" to 65" diameters) for the size, grade and pressure class indicated on the plans, specifications and special conditions. Color shall be black. Polyethylene pipe and fittings shall be PE 3608 or PE 4710 for potable water transmission and pressure rating of one hundred sixty (160) psi or greater, unless otherwise provided in the special conditions. The pipe and fittings shall be manufactured from the same resin type, grade, and cell classification. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to Ductile Iron pipe equivalent outside diameters for pipe diameters greater than three inches (3"). Minimum DR 11. The method of joining material shall be by the Thermal Butt-Fusion Method in accordance with ASTM 3261. The minimum "quick-burst" strength of the fittings shall not be less than that of the pipe with which the fitting is to be used.

### 3.4 TRACER WIRE

Tracer wire for use with all thermoplastic pipe types shall be Underwriters Laboratories (UL) listed for use in direct burial applications, color coated per APWA uniform color code for the specific utility being marked. Tracer wire shall be copper clad steel rated to 30 volts, insulation shall be High Molecular Weight Polyethylene (HMWPE) meeting ASTM D1248, with designation identified on the outside of the wire casing.

Tracer wire shall meet the following additional criteria for the construction method specified:

- Open Trench - Tracer wire shall be High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- Directional Drilling/Boring and Pipe Bursting/Slip Lining - Tracer wire shall be 7 x 7 Stranded hard drawn, high carbon steel with Copper Cladding and minimum 4,700 lb. break load, with minimum 50 mil HDPE insulation thickness.

Connectors for tracer wire shall meet the following:

- All direct bury wire connectors shall be DryConn direct bury dielectric silicon filled lugs or approved equal.
- All service line trace wires must be interconnected to mainline trace wires using a single 3-way lockable connector at tees or a single 4-way lockable connector at crosses. Substitutions of 3-wire connectors at crosses are not permitted.
- No exposure of uninsulated (bare) wire outside of the dielectric silicon seal is permitted.
- Splicing of the main line is not permitted on directional drilling or pipe bursting projects.

## Trace Wire Termination/Access

All trace wire termination points must utilize an approved trace wire access box (above ground or grade level/in-ground as applicable), specifically manufactured for this purpose. A minimum of 2 ft. of excess wire is required in all grade level trace wire access boxes after setting at final grade.

- Service Laterals on public property - Trace wire must terminate at an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.
- Service Laterals on private property - Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the building exterior, directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above grade or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- Hydrants – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange (the approved method of installation is prescribed below in the trace wire installation section for water systems).
- On long-runs, in excess of 500 linear feet without service laterals or hydrants, trace wire access must be provided utilizing an approved in-ground trace wire access box located at the edge of the road right-of-way, and out of the roadway. The in-ground trace wire access box shall be delineated using a polyethylene marker post, color coded per APWA standard for the specific utility being marked (blue for water, green for sewer).

### Installation General:

- Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
- Trace wire system must be installed as a continuous single wire. No looping or coiling of wire is allowed.
- Any damage occurring during installation of the trace wire must be immediately repaired in an approved waterproof method. Taping and/or spray coating shall not be allowed.
- Trace wire on all service laterals/stubs must terminate at an approved trace wire access box directly above the utility, using color coded access boxes, located at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)
- All mainline dead-ends shall go to ground using an approved waterproof connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. The anode will be buried on the opposite side of the utility at the furthest most point. The anode wire will be connected in the trace wire access box to the trace wire utilizing the connection point in the access box.
- Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode, buried at the same depth as the trace wire.

- All service lateral trace wires shall be connected to the mainline with a single wire, (no looping will be allowed) using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
- In occurrences where existing trace wire is encountered on an existing utility that is being extended or tied into, the new and existing trace wire shall be connected using approved splice connectors, shall be properly grounded at the splice location as specified and be completely waterproof to prohibit corrosion and loss of conductivity.

#### Trace wire installation - Sanitary Sewer System

- Lay mainline trace wire continuously, by-passing around the outside of manholes/structure on the North or East side.
- Trace wire on all sanitary laterals must terminate at an approved trace wire access box color coded green and located directly above the service lateral at the road right of way. Follow grounding specification and connections.

#### Trace wire installation - Water System

- Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side. Trace wire shall be installed immediately adjacent to the pipe below the springline but not at the bottom of the trench where the weight of the pipe could rest on the wire.
- Non-Roadway access box applications: Trace wire access boxes for grade level installation shall be Copperhead adjustable lite duty D14\*TP-ADJ 36” or approved equal.
- Concrete / Driveway access box applications: Trace wire access boxes for grade level installation shall be Copperhead CD14\*TP 14” or approved equal.
- Fire hydrant trace wire access box applications: An above ground three terminal access box with 1” conduit fitting and hydrant flange bracket shall be used for all hydrant lead tracer wire installations. The box and flange shall be Copperhead Cobra Hydrant Flange Package T3-Red-FLPKG or approved equal. 1-inch schedule-80 plastic conduit shall be installed to protect the tracer wire to a depth of 24-inches below final grade. Ground wire shall be connected to the bottom terminal in all cases.
- Tracer wire access boxes will be installed on all fire hydrants included in the project.
- Access box will be securely connected to the fire hydrant using the approved fastening system. Straps or tape will not be allowed.
- Plastic or copper service lines will require a tracer wire. Installation procedures will include taping or tying at 5 ft. intervals.

#### Trace wire installation - Storm Sewer System

- If the storm sewer system includes service laterals for connection of private drains and tile lines, it shall be specified the same as a sanitary sewer application.
- Lay mainline trace wire continuously, by-passing around the outside of manholes/structure on the North or East side.

Trace wire testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project. Continuity testing in lieu of actual line tracing shall not be accepted.

### 3.5 POLYETHYLENE ENCASEMENT

Ductile Iron Pipe and the polyethylene encasement used to protect it shall be installed in accordance with AWWA C600 and ANSI/AWWA C105/A21.5, and also in accordance with all recommendations and practices of AWWA M41 Manual of Water Supply Practices – Ductile Iron Pipe Fittings.

All DIP watermain shall be encased with V-Bio enhanced polyethylene encasement or equivalent polyethylene film in the "tube" form following the procedures outlined in installation method A. Specifically, the wrap shall be overlapped one foot in each direction at joints and secured in place around the pipe by using two (2) inch wide polyethylene adhesive tape to secure the polyethylene film to the pipe. The polyethylene encasement shall be pulled taught against the pipe bottom and folded over itself at the top of the pipe to minimize bunching. Polyethylene adhesive tape must be used to secure the fold in no less than four equally spaced intervals between the pipe joints. For segments of pipe which are not full-length, the tape must be spaced no greater than 3 feet apart. Each piece of tape used must extend around the top one-half (1/2) of the pipe circumference as a minimum. Additionally, the overlap of the encasement must be secured by a complete wrap of tape passed completely around the circumference of the pipe on either side of each pipe joint to cinch the wrap tightly around the exterior of the pipe.

Hydrants shall be wrapped to the ground surface, with slots cut in the film for the weep holes. Valves shall be wrapped up to the operating nut and taped.

Areas to be tapped shall be encased with 2" polyethylene adhesive tape prior to tapping with three layers of tape wrapped completely around the pipe to cover the entire area to be touched by the tapping machine and chains. The corporation stop will be installed directly through the layers of tape and polyethylene encasement. After installation of the pipe tap is complete, the pipe wrapping system shall be inspected, and any cuts or tears will be repaired using polyethylene adhesive tape or it will be recovered using a new piece of polyethylene encasement sealed by tape.

### 3.6 THRUST RESTRAINT

All watermain shall be installed with approved joint restraint clamps, rods, and devices as approved by the Engineer at each fitting. The following shows the minimum length of pipe to be restrained for 6" and 8" diameter, poly-wrapped watermain assuming SM or SC soil types (This is intended to be a guide for these watermain sizes. An actual thrust restraint design will be necessary for variable conditions or larger pipe sizes):

Pipe Diameter	Dead End or Valves	Tee Branch or 90° Bend	45° Bend	22° Bend
6"	37'	12'	5'	2'
8"	49'	16'	7'	3'



An 8"x6" reducer needs an unobstructed length of 27' on the 8" side or 21' on the 6" side.

The cost of providing joint restraining shall be considered as incidental to the cost of the watermain installation. If the above joint restraint protection cannot be fully obtained due to the design or field alignment, concrete thrust blocking shall also be provided where specified by the Engineer. The concrete thrust blocking shall be cast-in-place concrete in direct contact with undisturbed, virgin soil (concrete blocks or wood blocking is prohibited).

Where restrained joints are required and the pipe is in a casing near the fitting to be restrained, the length of pipe in the casing shall not be included in the length of pipe necessary to develop sufficient soil friction to overcome thrust.

Where restrained joints are required, a mechanical joint restraint device, such as "MEGALUG" as manufactured by Ebaa Iron Sales, Inc. or approved equal, must be used. These joint restraint devices shall have a pressure rating of 350 psi with ductile iron glands meeting the dimensional requirements of ANSI/AWWA C111/A21.11. These joint restraint devices shall also have "twist-off" nuts to insure proper actuating of restraining force. Restraint joint pipe seals and couplers in which the pipe restraint system is integral to the seal, such as the "Alpha Restraint Coupling" manufactured by Romac Industries, is considered an approved equal to the "MEGALUG" for bell-and-spigot connections, however specific use of this type of restraint system must be approved by the engineer prior to including such devices in any project estimates or bill of materials. Push-on restraint gaskets with stainless steel locking segments vulcanized into the gasket may be used in ductile iron pipe sockets on straight-runs of pipe, however the gaskets must be readily identifiable by color other than black, must meet ANSI/AWWA C111/A21.11, and must be pre-approved by the engineer prior to use.

### 3.7 GATE VALVES

Gate valves shall be resilient-seated gate valves conforming to the requirements of ANSI/AWWA C509 and the following:

- (a) Valves shall have mechanical joints.
- (b) Valves shall have a non-rising stem with "O" ring seals designed for a minimum of 200 psi working pressure.
- (c) Valves shall be provided with a two (2) inch square operating nut and shall open in a counter-clockwise direction.
- (d) Valve boxes shall be Tyler 6860 Series (or approved equal), screw type with 5-1/4 inch shaft and round drop cover with "water" imprinted on the top.
- (e) Valve boxes shall be of sufficient length to provide for adjustment above and below grade of not less than six (6) inches when the pipe is laid to the specified depth. Off road gate valves shall be marked with 8'-2# safety green channel post 18" from valve box.
- (f) Valve boxes shall include a stationary valve rod extension whenever a valve has ten (10) feet or more of cover.
- (g) All direct bury valves shall be fitted with a valve box adapter/positioner.

- (h) All nuts and bolts shall be stainless steel.
- (i) All valves shall be wrapped with polyethylene plastic.

### 3.8 BUTTERFLY VALVES

Butterfly valves shall be rubber-seated butterfly valves conforming to the requirements of ANSI/AWWA C504 and the following (all 12" and larger valves shall be butterfly valves):

- (a) Valves shall be Class 150B mechanical-joint-end valves.
- (b) Valves shall be equipped with a two (2) inch square operating nut and shall open in the counter-clockwise direction.
- (c) Direct bury butterfly valves shall be provided with valve boxes and covers as described in 3.7  
(d, e, f).
- (d) Butterfly valves 16" and larger shall be placed in manholes as shown on Detail Drawing W-5.
- (e) All nuts and bolts used by the manufacturer in the assembly of the valve shall be 316 stainless steel.
- (f) All direct bury valves shall be wrapped with polyethylene plastic.

### 3.9 AIR RELIEF VALVES

Air relief valves shall be placed in manholes as shown on Detail Drawing W-4, and as specified in the Special Conditions.

### 3.10 HYDRANTS

Hydrants shall be Waterous "Pacer" WB-67, pressure rated for 250 p.s.i., or City Engineer - approved equal. These traffic flange hydrants shall conform to AWWA C502 specifications and to Detail Drawing W-3 along with the following:

Hydrants shall have a five (5) inch minimum valve opening; one (1) four and one-half inch (4-1/2") nozzle and two (2) two and one-half inch (2-1/2") nozzles with National Hosethreads (5-3/4" O.D., 4 threads per inch and 3-1/16" O.D., 7-1/2 threads per inch, respectively).

The hydrant main valve shall be of the compression type and shall open against the pressure. The valve shall be faced with a resilient material which resists damage by rocks and other foreign matter and shall be so designed that together with the seat, it is removable for repairs and replaceable without digging up the hydrant.

"O" ring seals shall be provided to prevent water from reaching the operating mechanism. The operating mechanism shall be lubricated without the need to remove the bonnet.

The length of hydrants shall be approximately nine and one-half (9-1/2) feet from springline of the connecting pipe to the center of the outlet nozzles. This dimension shall be divided so that there will be eight (8) feet from the centerline of the connecting pipe to the grade line (safety flange). At the

Contractor's option, this eight (8) foot barrel length dimension may be divided so there is seven feet-six inches (7'-6") from the centerline of the connecting pipe to the top of the barrel and a six-inch (6") extension kit installed between the top of the barrel and the grade line (safety flange). The dimension from the grade line (safety flange) to the center of the outlet nozzles shall be approximately eighteen inches (24").

Each hydrant shall have a safety stem coupling and safety flange so constructed that, if hit, the stem will not bend and the hydrant barrel will not break. It shall also permit rotation for the upper barrel or addition of extension sections.

A non-corrodible drain valve shall be provided and arranged so that it will automatically drain the hydrant barrel when the main valve is closed and prevent any leakage when the main valve is open. The drain valve shall be faced with leather, or approved equal material, or have a tapered plug and seal for positive closure. The entire drain mechanism shall be lubricated with waterproof graphite grease.

Hydrants shall have satisfactory self-lubricating features for the stem threads. Where the stem (valve rod) or operating nut comes in contact with the packing, it shall be bushed with bronze or non-corrodible metal, and no leakage shall be permitted under the bushed surface. All movable parts within the hydrant shall be bronze or non-corrodible metal

Outlet nipples shall be of bronze or suitable non-corrodible metal securely pinned or locked in and caulked in place.

Nozzle caps which will be provided for all outlets shall be equipped with rocker lugs and must be securely attached to the barrel with a chain constructed of material not less than one-eighth (1/8) inch in diameter and painted red. A leather, rubber or lead washer shall be provided in each cap and set in a groove to prevent its falling out when the cap is removed. All caps shall be lubricated with waterproof graphite grease.

The size and shape of the operating nut shall be the National Standard pentagon nut, measuring 1-1/2 inch from point to flat.

Hydrants shall open to the left (counter-clockwise) and shall be marked with an arrow to show the direction of opening. The hydrant will be marked with the name of the manufacturer. All hydrants shall be repainted prior to final mechanical inspection. "Federal Safety Red" oil-based enamel paint shall be used.

All hydrants shall have a 6-inch mechanical joint inlet for connecting to a 6-inch ductile iron lead from the main. There shall be a gate valve between the hydrant and the watermain or lateral.

Whenever a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant with coarse gravel or crushed stone mixed with coarse sand, from the bottom of the trench to at least 6" above the waste opening in the hydrant and to a distance of one foot around the base elbow.

Whenever a hydrant is set in clay or other impervious soil, a drainage pit three (3) feet in diameter and three (3) feet deep shall be excavated below each hydrant base and filled compactly with coarse gravel or crushed stone and coarse sand, under and around the elbow and concrete base to a level of six (6) inches above the waste opening. A City approved hydrant tag system shall be installed on hydrants with the drain plug installed.

Cover all material placed for drainage with a minimum of two layers of geotextile approved by the engineer. No drainage system shall be connected to a stormwater or wastewater sewer.

3.11 BUILDING SERVICES

Building services shall be constructed as shown on Detail Drawing W-2. The copper service pipe shall be Type K and shall be one (1) inch diameter unless otherwise specified. All field taps for corporation stops shall be made while the mainline is under working pressures and shall follow the protective measures prescribed in section 3.5 POLYETHYLENE ENCASUREMENT for pipe tapping after first thoroughly cleaning the entire circumference of the water main of all soil and corrosion within two linear feet of either side of the pipe tap. The project inspector shall view each complete building service installation prior to backfilling and while the service pipe is under working pressure.

Copper tubing shall comply with the following:

Federal Specifications	WW-T-799	Type K
ASTM Specifications	B-88-47	Type K
AWWA Specifications	C-800	Type K

The copper service lines, as placed between the watermains and the curb boxes, shall have a minimum of 7-1/2 feet of cover over the entire length of pipe, including the highest portion of the bend immediately adjacent to the corporation stop; therefore, service lines must be placed (incidental to the project) beneath any obstruction which would prohibit the stated cover. If tunneling or jacking of watermain building services is required, the method used shall be approved by the Engineer.

All building service locations will be established in the field by the Engineer. Generally, these locations will agree with those shown on the Plans, however, the Contractor shall not install a service until its location is verified by the Engineer. It will be the Contractor's responsibility to keep an accurate written record of the location of each service and submit this to the Engineer prior to backfilling.

All copper services installed, shall be done so using flare fittings only. Splices in the building service between the watermain lateral and the curb box is prohibited.

3.12 CORPORATION STOPS

Corporation stops shall be Mueller H-15000, Ford F600, or approved equal. The sizes of the inlet thread and the size of the copper service coupling shall be: 3/4"x1", 1-1/4"x1-1/2" and 1-1/2"x2" for 1", 1-1/2" and 2" services respectively.

3.13 SERVICE SADDLES

Service saddles shall be used wherever the tap size exceeds 3/4" for 6" - 10" pipe size, 1" for 12" diameter, and 1-1/4" for 16" diameter. Service saddles shall be Smith-Blair Type #317 or approved equal with double stainless-steel straps.

Saddles for HDPE Pipe shall conform to the requirements of AWWA C800 and shall be thermal fusion polyethylene type; ductile iron with dual stainless steel straps, spring washers, bolts and washers; or stainless steel sleeve type, with stainless steel bolts, nuts, and spring washers. Stainless

steel bolts, nuts, and washers. Spring washers shall be manufactured from type 304 stainless steel, special "spring grade". Saddles shall include threaded outlet tapping sleeves and Nitrile Butadiene Rubber (NBR) gaskets.

### 3.14 CURB STOPS

Curb stops shall be Mueller B-25154, Ford B22-444M, McDonald 6104 "Full Ported ball design", or approved equal (no drain). The ball size of the curb stop shall be equivalent to the inlet and outlet size. A one (1) inch minimum inlet size shall be required.

### 3.15 CURB BOXES

Curb boxes (7-1/2 feet long) shall be Mueller H-10300, Ford EM-2-75-56, or A.Y. McDonald 5614, for the one (1) inch size and H-10304, Ford EM-2-75-57, or A.Y. McDonald 5615, for the 1-1/2" and 2" sizes. The box shall be supplied complete with lid and stationary rods.

The curb stops shall be installed on the property line and left in the "off" position. The curb box shall be installed to match the finished grade surface, with the ability to be adjusted up and down a minimum of six (6) inches. It shall be the responsibility of the Contractor to plainly and accurately mark the installed curb stop locations with a 6' long 1# per foot metal post placed vertically in the backfill material directly behind each curb stop. This stake will be placed to extend four (4) feet above grade and behind the stop box assembly.

### 3.16 WET TAPS

Where the interruption of water services is prohibited, the contractor may be allowed to wet tap the existing watermain.

For ductile iron or cast iron watermain, the tapping sleeve and appurtenances shall be ROMAC Model SST or SSTIII or approved equal and shall conform to all ASTM requirements. The shell shall be stainless steel. All lugs, nuts and bolts shall be either stainless steel or Cor-Blue. The tapping sleeve and affected pipe area shall be encased in polyethylene film and the immediate area prepared and taped in accordance with section 3.5 POLYETHYLENE ENCASEMENT.

For concrete cylinder pipe, the tapping sleeve and appurtenances shall be ROMAC Model FT425 or approved equal. All nuts and bolts of the tapping sleeve shall be coated with a bitumastic sealer. The contractor shall enclose the entire sleeve and appurtenances with tightly wrapped and taped polyethylene film followed by concrete encasement of the entire sleeve and appurtenances.

In all cases, the plug or tapped portion of the existing main shall be extracted and visually inspected by a City representative.

A 24-hour notice shall be given to the City of Eden Prairie Utility Department prior to wet tapping any watermain.

## 4. HYDROSTATIC PRESSURE TEST

Before a new watermain can be filled for testing or flushing, a "24" hour notice" must be given to the Eden Prairie Utility Division. A permit may be issued for this purpose when Utility Division personnel are not available for valve operation, but only after a "24" hour notice" has been given.

If it becomes necessary to interrupt water service because of new utility construction, a 72-hour notice must

be given to the Eden Prairie Utility Division so that written notice may be given to the affected customers "24" hours prior to interruption of service. When notified, the Eden Prairie Utility Division will take the responsibility for informing the impacted water customers of the service interruption.

If a Contractor, acting on their own, operates a fire hydrant or watermain valve without a valid permit in their possession, the Eden Prairie Utility Division and the Police Department will seek the maximum allowable penalty because of the potential for jeopardizing the public's safety and health.

After the pipe has been laid, including fittings, services, valves and hydrants, and the line has been backfilled in accordance with these Specifications, all newly laid pipe, or any valved section thereof, including building services, unless otherwise directed by the Engineer, shall be subjected to a hydrostatic pressure test.

Each valved section of pipe shall be slowly filled with water. The specified test pressure, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, gauges and all necessary apparatus shall be furnished by the Contractor. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at points of highest elevation and afterward tightly plugged.

The test pressure shall be brought to 150 psi. Thereafter, a maximum pressure drop of 2 psi during the last hour of the test, and a total pressure drop not more than 5 psi for the entire 2 hour period is considered satisfactory. The pressure gauge shall be a standard pressure gauge. The dial shall register from 0 - 200 psi and have a dial size of four and one half inches (4 ½") with one (1) psi increments.

Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of the pressure test shall be removed and replaced by the Contractor and the test shall be repeated until satisfactory to the Engineer.

#### 5. PVC DEFLECTION AND TESTING

Joint deflection of PVC pressure pipe is allowed but limited to a 4-inch or 1-degree maximum offset per 20-foot length of pipe. In addition, the Contractor shall measure the deflection of all PVC water main after placement of backfill material in the trench. The owner reserves the right to measure deflection of PVC pipe at any time during the warranty period. Deflections greater than 5% of the inside pipe diameter shall be considered failure of the bedding procedure and the Contractor will be required to re-excavate the trench and replace or re-compact the bedding material as required.

#### 6. ELECTRICAL CONDUCTIVITY TEST

After the hydrostatic test has been completed, a conductivity test shall be conducted in accordance with the following specification:

##### TEST PROCEDURE

The system (pipeline and hydrants) shall be tested for electrical continuity and current capacity. The electrical test shall be made after the hydrostatic pressure test. Backfilling shall have been completed. The line may be tested in sections of convenient length as approved by the Engineer.

Direct current of 350 amperes, +/- 10%, shall be passed through the pipe line for five (5) minutes. Current flow through the pipe shall be measured continuously on a suitable ammeter and shall remain steady without interruption or excessive fluctuation throughout the five (5) minute test period.

Insufficient current or intermittent current or arcing, indicated by large fluctuation of the ammeter

needle, shall be evidence of defective electrical contact in the pipe line. The cause shall be isolated and corrected. Thereafter, the section in which the defective test occurred shall be retested as a unit and shall meet the requirements.

#### NOTES ON TEST PROCEDURE

Sources of D.C. current for these tests may be motor generators, batteries, arc welding machines, etc.; D.C. arc welding machines will probably be the usual source. These machines are available in adequate capacity for these tests and are equipped with controls for regulating the current output.

Cables from the power source to the section of the system under test should be of sufficient size to carry the test current without overheating or excessive voltage drop. Usable sizes will probably be in the range of 2/0 to 4/0 A.W.G.

Connections for the test shall be made at hydrants. The hydrant shall be in the open position with the caps on during the test. The cable shall be clamped to the top operating nut. Note: After the test, the hydrant shall be shut off and a cap loosened to allow hydrant drainage. Tighten cap after drainage.

A hook-on type D.C. ammeter placed on one of the cables leading to the hydrant is a convenient method of measuring current.

In using arc welding machines, the current control should be set at a minimum before starting. After starting the machine, advance the control until the current indicated on the ammeter is at the desired test value. CAUTION: In case of open circuits at joints or connections, the voltage across the defective joint or connection will be in the order of 50-100 volts.

### 7. DISINFECTION OF WATERMAINS

#### 7.1 GENERAL

All pipelines installed shall be disinfected with a strong chlorine solution in accordance with ANSI/AWWA C-651-Section 5. Disinfecting may be done concurrently with pressure and leakage testing or after pressure and leakage testing at the option of the Contractor. Each section line that is repaired shall be disinfected after such repairs are made in accordance with ANSI/AWWA C651-Section 10. All necessary disinfection equipment and materials shall be provided by the Contractor.

#### 7.2 FLUSHING

The pipeline shall be flushed at a velocity of at least 2.5 feet per second immediately prior to disinfection. A 24-hour notice to the Eden Prairie Utility Division is required before performing any watermain flushing activities.

#### 7.3 DISINFECTANTS

Disinfection shall be performed using calcium hypochlorite solution. Calcium hypochlorite shall conform to AWWA B300 and shall be granules with 70 percent available chlorine.

#### 7.4 FEEDING

The calcium hypochlorite solution shall be introduced into the pipe line in accordance with ANSI/AWWA 651-Section 5 methods and applications. Chlorine gas, chlorinators and booster pumps are prohibited. During disinfection, all valves and hydrants shall be operated to ensure that

all appurtenances are disinfected.

#### 7.5 BACTERIOLOGICAL TESTS

The chlorine solution shall be flushed out of the line and samples shall be collected and tested for bacteriological quality after the line has set for a minimum of 24 hours in accordance with ANSI/AWWA 651-Section 7. The samples shall be collected and tested by the City Utility Division personnel at no cost to the contractor.

#### 7.6 REPEAT TESTING

If initial disinfection fails to produce satisfactory bacteriological samples, the disinfection and testing shall be repeated per paragraph 6.5 until satisfactory bacteriological samples are obtained. Costs for additional disinfection shall be borne by the Contractor.

#### 7.7 INSPECTION

The above operation shall be supervised by a qualified Inspector furnished by the City or it's representative.

### 8. WATERMAINS CROSSING SEWERS

In areas where direct conflicts arise between watermain and water services, with storm sewer, sanitary sewer, sanitary sewer services, sewer forcemains, septic tanks, or subsoil treatment systems, the following shall apply:

Watermain and services located near sewer forcemains:

1. A minimum of ten feet (10') of separation, measured horizontally between the outer surfaces of the pipes is required.
2. If ten feet (10') of separation cannot be provided, an approved additional measure of containment must be provided for either the watermain or the sewer forcemain.

Watermain and services located near septic tanks, or subsoil treatment systems:

1. A minimum of ten feet (10') measured horizontally between the outer surfaces of the watermain, tank and subsoil treatment system is required.

Watermain and services located near gravity sanitary and storm sewers:

1. A minimum of ten feet (10') measured horizontally between the outer surfaces of the pipes is required.
2. In locations where local conditions prevent the required separation indicated above (due to the presence of rock, buildings, other significant obstructions), the watermain may be laid closer to gravity sewer if one (1) of the following conditions is met:
3. The bottom of the watermain is laid at least eighteen inches (18") above the top of the sewer on a separate shelf; or
4. The sewer is constructed of materials and with joints that are equivalent to watermain standards of construction and is pressure tested to assure water tightness prior to backfilling.

Watermain and services crossing gravity sanitary and storm sewers:



1. A minimum vertical separation of eighteen inches (18") must be provided between the outer surfaces of the pipes, with preference that the watermain cross above the sewer, wherever possible.
2. One full length of water pipe shall be located so both joints will be as far from the sewer as possible.

Watermain above-water crossings:

1. The pipe shall be adequately supported and anchored, protected from vandalism, damage and freezing, and accessible for repair or replacement.

Watermain underwater crossings:

1. A minimum cover of five feet (5') shall be provided over the pipe unless otherwise approved by the Department of Health. When crossing water courses which are greater than fifteen feet (15') in width, the following shall be provided:
  - The pipe shall be of special construction, having flexible, restrained or welded watertight joints
  - Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding
  - Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source.

## 9. MEASUREMENT AND PAYMENT

### 9.1 WATER PIPE

Payment will be made at the Contract price per lineal foot for each material type and diameter of pipe furnished, which shall include the cost of furnishing the pipe, gaskets, joints, and other materials and of delivering, handling, laying, trenching, backfilling, compacting, testing, disinfection and inspection and all material or work necessary to install the pipe complete in place at the depth specified.

The length of pipe for which payment is made shall be the actual overall length measured along the axis of the pipe without regard to intervening valves or specials. All lengths will be measured parallel with the centerline of the pipe as laid in the trench. Lengths of branches will be measured from the centers of connecting pipes to centers of valves or hydrants or end of the last pipe installed. Connection to the existing system shall be incidental to the pipe installation, with no additional compensation.

### 9.2 PIPE FITTINGS

Ductile iron fittings and specials will be paid for at the Contract unit price per each for the fittings and specials installed. No additional payment will be made for glands, gaskets, rods, bolts, or other accessories necessary for proper installation of fittings.

### 9.3 POLYETHYLENE ENCASEMENT

The unit bid price per lineal foot of ductile iron pipe shall include the cost of furnishing and installing the polyethylene film and shall be compensation in full regardless of the size of the pipe or appurtenances to be protected.

#### 9.4 HYDRANTS

Hydrants will be paid for at the unit price per hydrant installed complete including drainage pit, gate valve and box as shown on Detail Drawing W-3.

#### 9.5 GATE VALVES AND BOXES

Gate valves and boxes including extensions will be paid for at the Contract unit price bid for each size valve and box furnished and installed complete.

#### 9.6 AIR RELIEF VALVE AND MANHOLE

The Contract unit price per air relief valve and manhole shall include the complete manhole, granular fill, corporation stop and tap or outlet and accessories as per Detail Drawing W-4.

#### 9.7 COPPER WATER SERVICE

Copper water service pipe will be paid for at the Contract price per lineal foot, for each diameter of pipe furnished, measured horizontally from the centerline of pipe to the centerline of curb box.

#### 9.8 CURB STOPS AND BOXES

Curb stops including boxes and extensions will be paid for at the Contract unit price for each size furnished and installed.

#### 9.9 CORPORATION STOPS

Corporation stops will be paid for at the Contract unit price for each size furnished and installed and shall include the saddle where required and the tap or connection to the watermain.

#### 9.10 GRANULAR BEDDING (3149.2F) AND STABILIZING AGGREGATE (3149.2C)

Payment shall be for cubic yards furnished, installed and quality compacted with measurement based upon compacted volume (CV). The unit price bid for bedding and aggregate material shall include the cost of all excavation and compaction required to place these materials and also the cost to dispose of any undesirable material so replaced unless otherwise specified in the Special Conditions.

#### 9.11 JACKING OPERATIONS

Unless otherwise specified, payment for jacking operations shall be as follows:

If steel casing pipe is required, measurement for payment will be made horizontally from end to end of the casing installed. Payment for the carrier pipe to be threaded through the casing will be made separately at the corresponding mainline or building service unit bid price. The unit bid price for the casing pipe shall include all labor, equipment and materials necessary to install the casing pipe complete as specified. Cathodic protection, bulkheading casing ends and backfilling the casing is required on all casing installations and shall be incidental to the jacking price.

If the carrier pipe is jacked, tunneled or augered directly into place without the use of casing pipe, the unit bid price for the pipe so installed shall include all labor, equipment and materials necessary to install the pipe complete as specified. Depth zones will not be a factor in payment. Measurement for payment will be made horizontally from end to end of the jacked, tunneled or augered pipe installed.

The Contractor shall pay all charges for bonds, permits and/or inspection fees required in connection with jacking operations or other special crossing at no additional compensation.

9.12 SHEETING AND BRACING

Measurement for payment shall be based upon units of thousand board feet (MBF) in place. Payment will be made only for the portion of sheeting or bracing which is ordered to be left in place by the Engineer except that payment will be made for the upper four (4) feet of "Cut-off" section of the sheeting.

9.13 PILING

Pile bents shall be paid for at the Contract unit price for a bent in place with the number of piles specified, assuming piles to be 20 feet long, and shall be complete with caps, cradles and accessories required. The caps and cradles shall be included as part of the 20-foot minimum length. Any piling required over 20 feet in length shall be paid for as excess length of piling and shall be paid for at the Contract unit price per lineal foot driven in place over 20 feet. Payment will not be made for piling above the cut-off line for piling over 20 feet long.

Unless otherwise specified, there will be no additional compensation for piling delivered only.

9.14 INCIDENTAL ITEMS

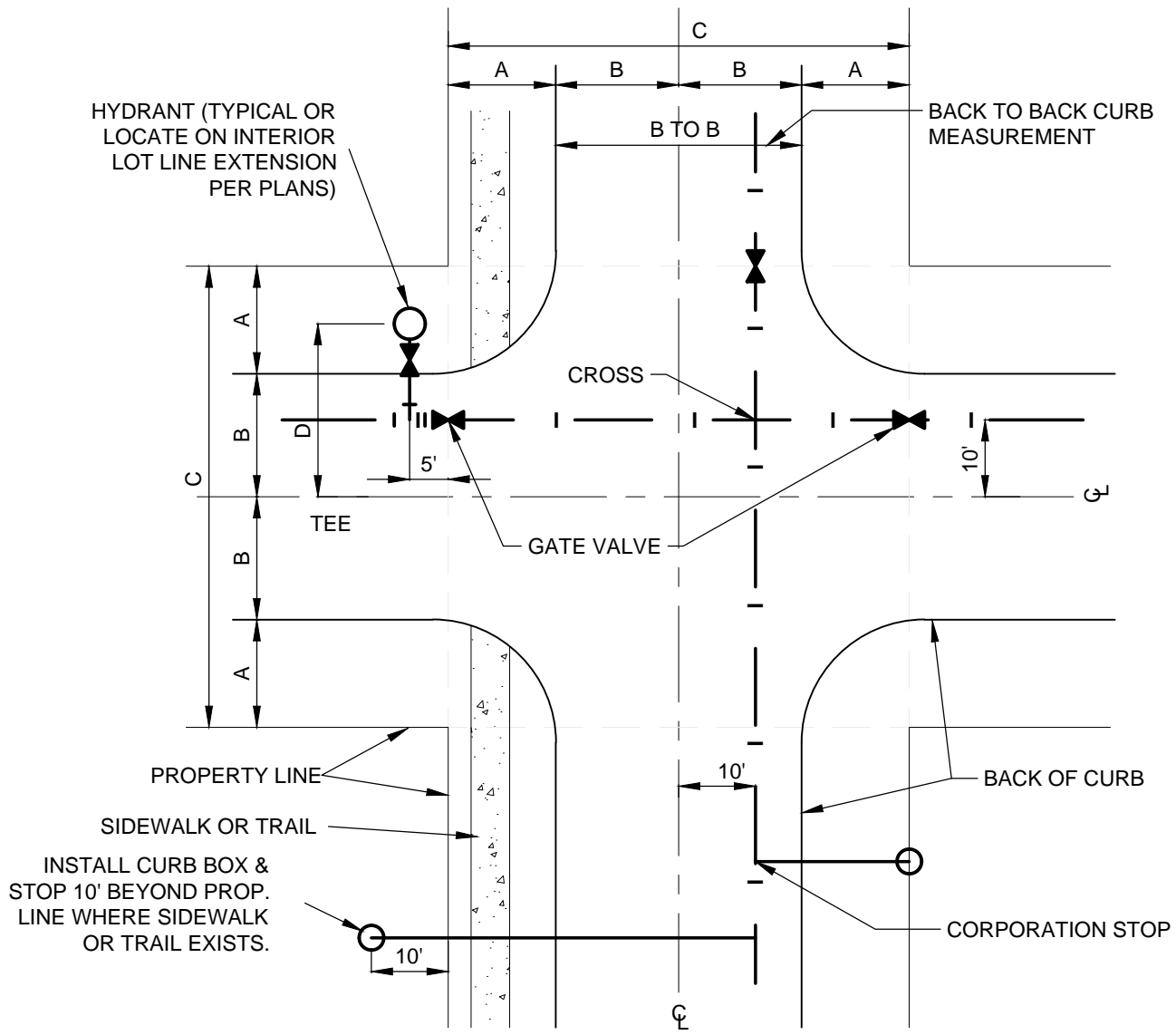
The cost of all materials and labor required to complete this project as specified and shown on the Plans, but not specifically included as a pay item, shall be considered incidental to the various unit prices bid and no additional compensation allowed.

9.15 INSULATION BOARD

Insulation Board will be paid for by the square foot furnished and installed at the thickness and dimension shown on the Plans and shall be compensation in full for all labor, materials, tools, etc., necessary to complete the work.

10. FINAL INSPECTION

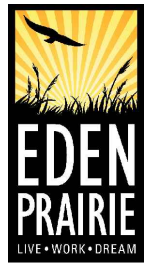
Prior to acceptance of the City utilities, the City of Eden Prairie Utility Division will perform a final utility inspection. If conditions of the City utilities are unacceptable and a re-inspection is necessary, the City reserves the right to charge the cost of this re-inspection to the Contractor on a time and material basis.



CURB MEASUREMENTS																
	50' R/W				60' R/W				70' R/W				80' R/W			
B TO B	A'	B'	C'	D'	A'	B'	C'	D'	A'	B'	C'	D'	A'	B'	C'	D'
28'	11'	14'	50'	18.5'												
32'					14'	16'	60'	20.5'								
37'									16.5'	18.5'	70'	23.5'				
48'													16'	24'	80'	28.5'

NOTE: FOR R/W WIDTHS OTHER THAN SHOWN, THE WATERMAIN LAYOUT SHALL BE AS APPROVED BY THE CITY ENGINEER.

REV 03/15/2022

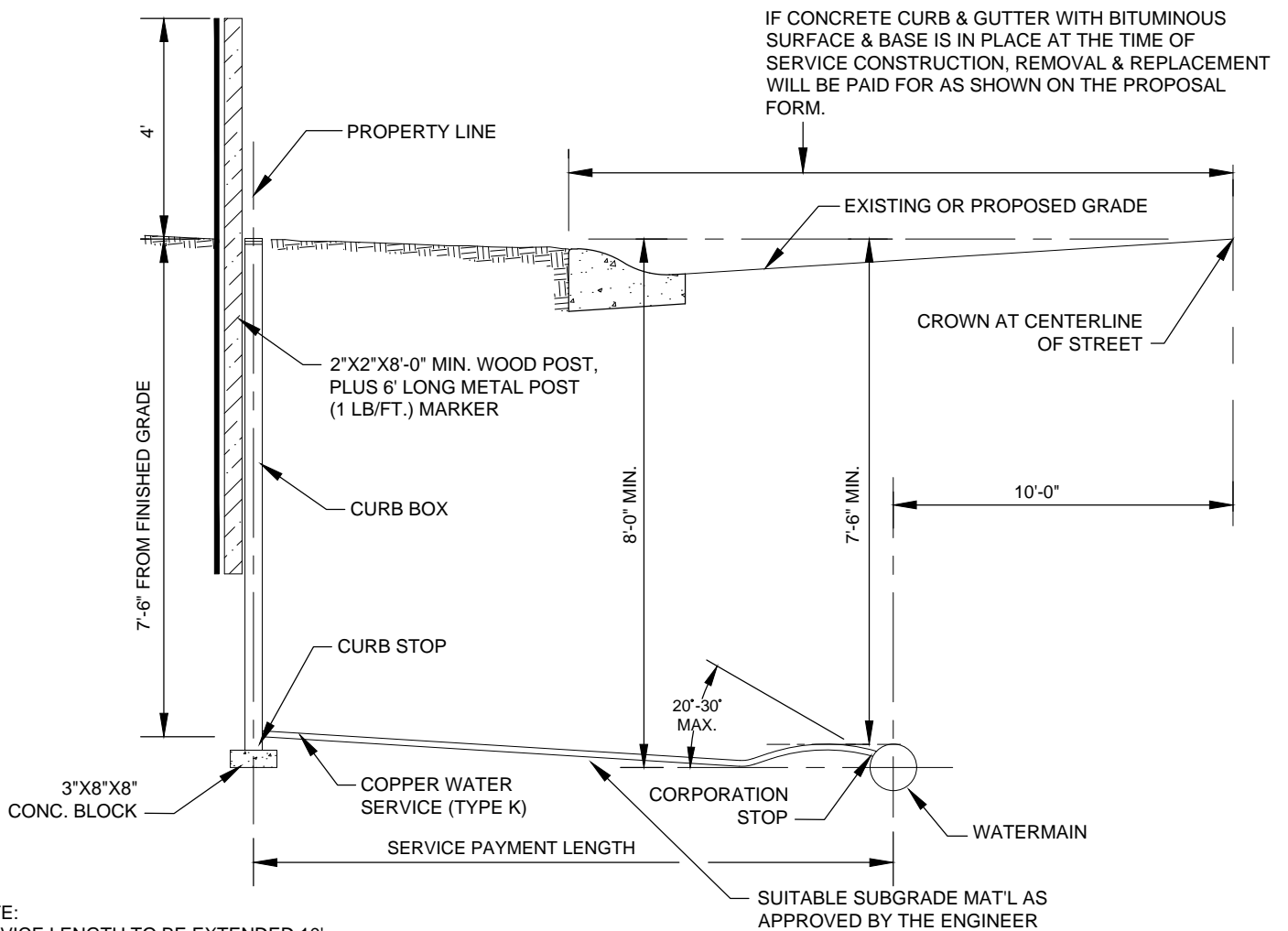
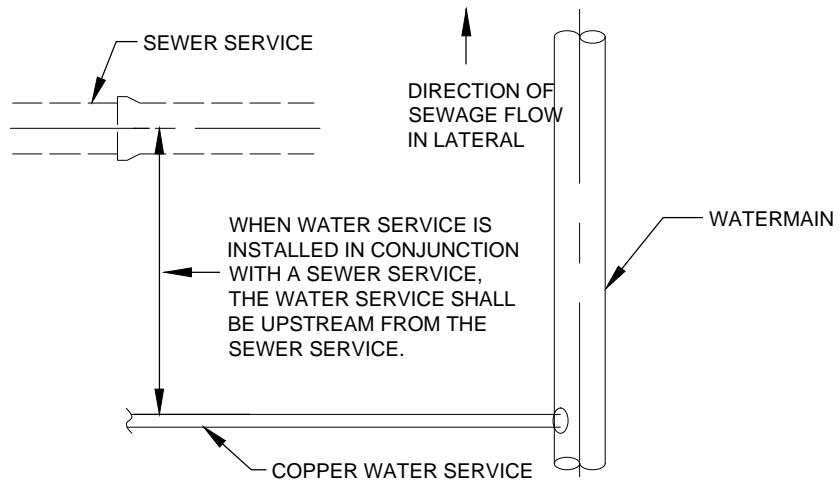


# WATERMAIN LAYOUT

CITY OF EDEN PRAIRIE  
DEPARTMENT OF ENGINEERING

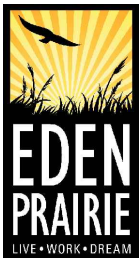
DETAIL NO.

W-1



NOTE:  
SERVICE LENGTH TO BE EXTENDED 10'  
BEYOND PROPERTY LINE WHERE  
SIDEWALK IS PLANNED.

REV 03/15/2022



# COPPER WATER SERVICE

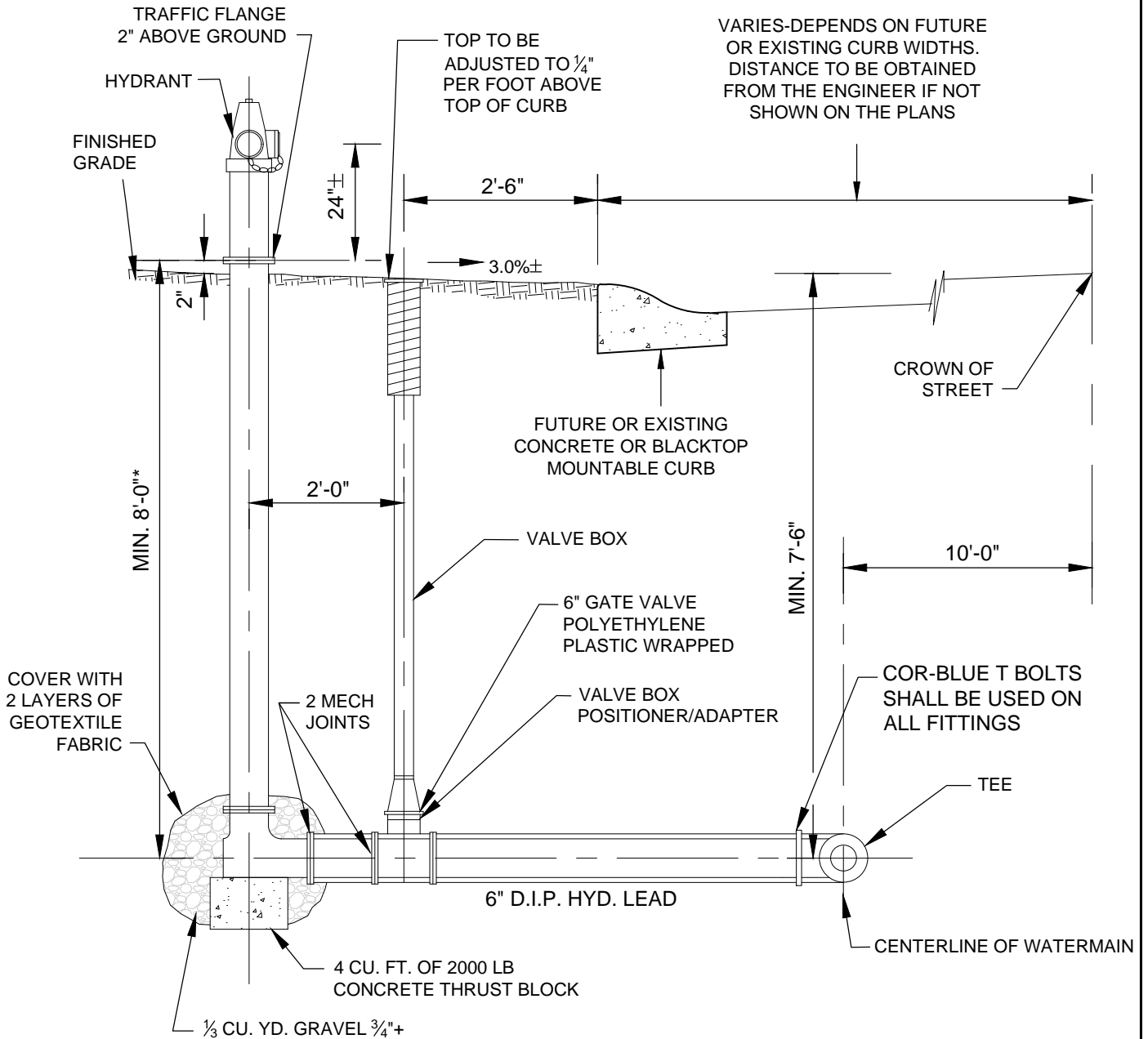
CITY OF EDEN PRAIRIE  
DEPARTMENT OF ENGINEERING

DETAIL NO.

W-2

NOTE: OFF-ROAD G.V. SHALL BE MARKED  
WITH AN 8'-2" SAFETY GREEN  
CHANNEL POST 18" BEHIND VALVE

ALL HYDRANTS SHALL BE PAINTED "FIRE SAFETY  
RED" AFTER INSTALLATION OR RELOCATION



NOTE: MEGALUGS OR APPROVED EQUAL MUST BE USED FOR RESTRAINED JOINTS

\* 7'-6" BARREL WITH 6" EXTENSION KIT MAY BE USED IN LIEU OF 8'-0" BARREL. ALL HYDRANTS SHALL BE MARKED WITH AN 8'-2" SAFETY GREEN CHANNEL POST 18" BEHIND HYDRANT.

REV 04/13/2022

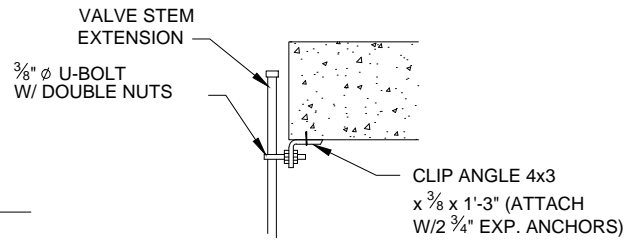
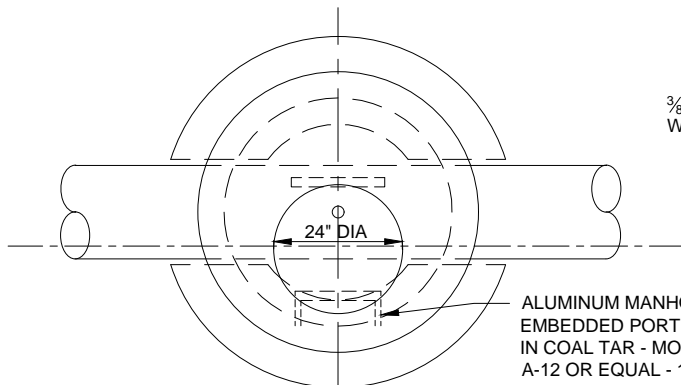


## TYPICAL HYDRANT DETAIL

CITY OF EDEN PRAIRIE  
DEPARTMENT OF ENGINEERING

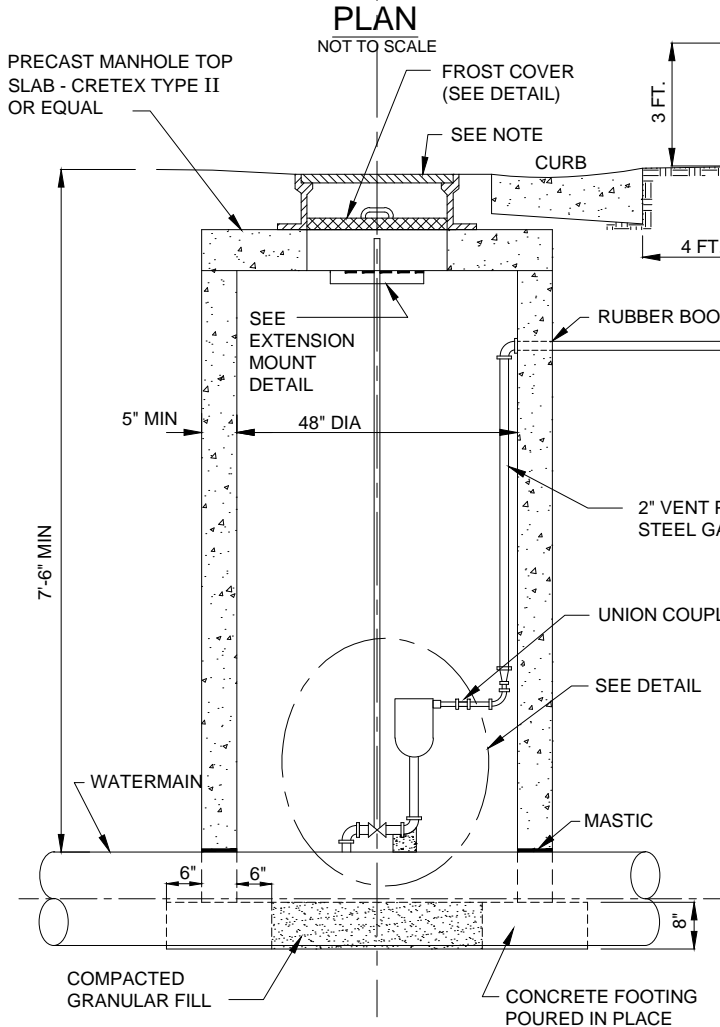
DETAIL NO.

W-3

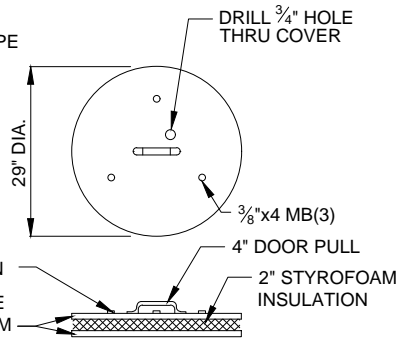


**EXTENSION MOUNT**  
NOT TO SCALE

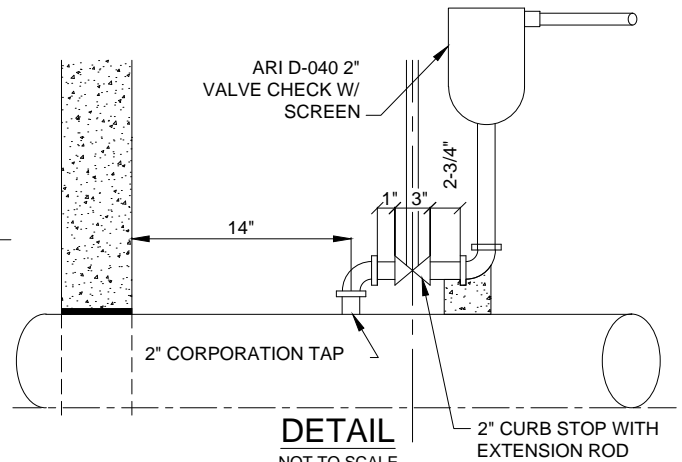
NOTE:  
MANHOLE FRAME - NEENAH R-1740-B OR EQUAL WITH CENTER PICK HOLE AND STAMPED WATER. USE 2 OR 3 36" ADJUSTING RINGS



**SECTION**  
NOT TO SCALE



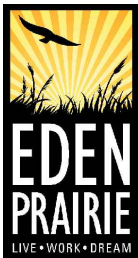
**MANHOLE FROSTCOVER**  
NOT TO SCALE



**DETAIL**  
NOT TO SCALE

NOTE:  
ALL OFF ROAD, AIR RELIEF AND VALVED MANHOLES SHALL BE MARKED WITH AN 8' - 2 LB. SAFETY GREEN CHANNEL POST.

REV 03/15/2022



**AIR RELIEF MANHOLE DETAIL**

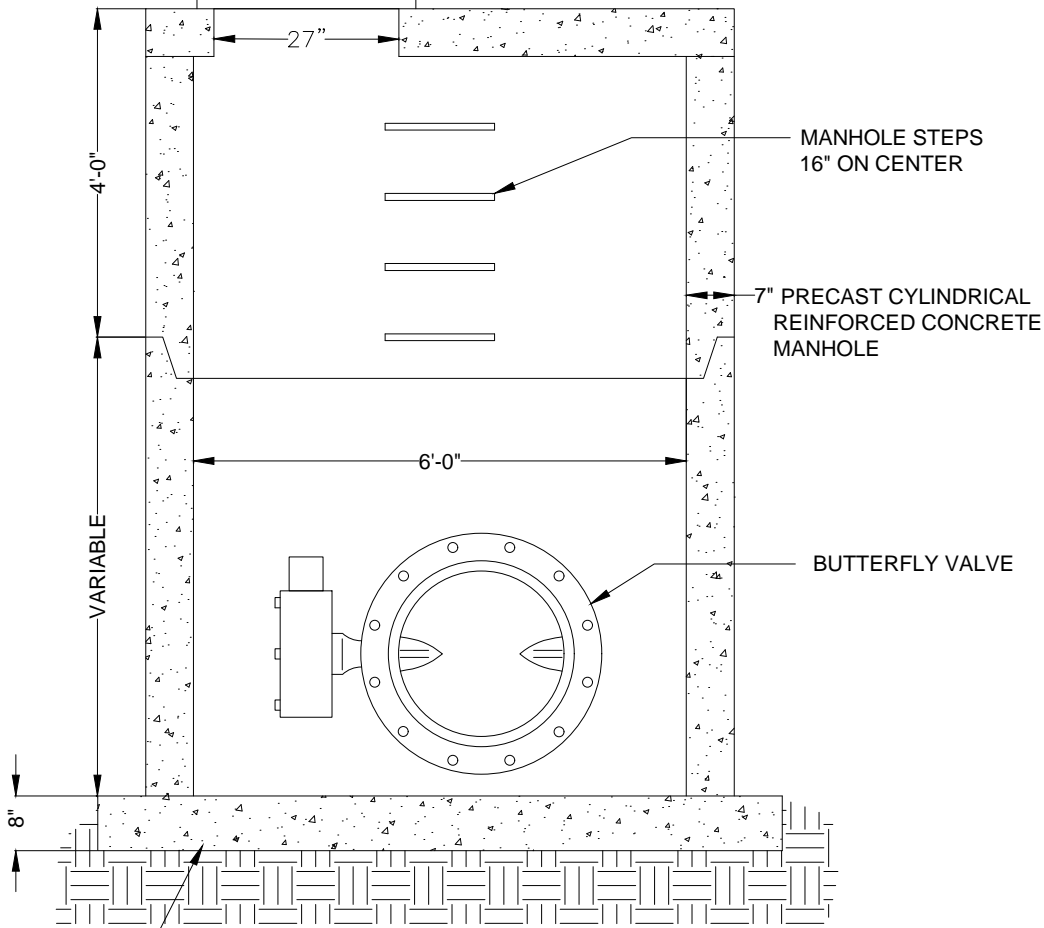
CITY OF EDEN PRAIRIE  
DEPARTMENT OF ENGINEERING

DETAIL NO.

W-4

36" DIA. PLASTIC ADJUSTING RING(S) 2" MINIMUM 10" MAXIMUM

FRAME AND INSULATED FROST COVER NEENAH FOUNDRY MODEL R-1740-B OR APPROVED EQUAL STAMPED "WATER". SEE DETAIL

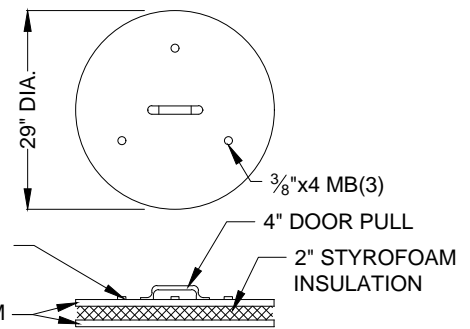


8" POURED OR 6" PRECAST

NOT TO SCALE

NOTE: OPENING AROUND PIPE TO BE SEALED WITH BITUMINOUS EXPANSION MATERIAL

NOTE:  
ALL OFF ROAD VALVED MANHOLES SHALL BE MARKED WITH AN 8" - 2 LB. SAFETY GREEN CHANNEL POST.



**DETAIL**

REV 03/01/2013



# MANHOLE FOR 16" AND LARGER BUTTERFLY VALVES

CITY OF EDEN PRAIRIE  
DEPARTMENT OF ENGINEERING

DETAIL NO.

W-5