

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" (Green) EIR.

STANDARD DETAIL SPECIFICATIONS
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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 his 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 will operate 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. 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.

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 SPECIFICATIONS (DIP)**

- (a) Ductile iron watermain pipe 12" and larger, shall conform to ANSI/AWWA C151/A21.51 (pressure class of 350 psi) with cement-mortar lining in accordance

with ANSI/AWWA C104/A21.4. D.I.P. 10" and smaller shall be special thickness CL. 52.

- (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.
- (d) Joint conductivity shall be accomplished by use of external copper strap type jumpers.

3.2 POLYETHYLENE ENCASEMENT

All watermain shall be encased with polyethylene film in the "tube" form using installation method A. Two (2) inch wide polyethylene adhesive tape shall be used to secure the polyethylene film to 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" tape prior to tapping so that the polyethylene encasement is not breached. Polyethylene encasement shall be in accordance with ANSI/AWWA C105/A21.5.

3.3 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 (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.

All hydrants, valves, services, stubs and extensions, blind flanges, plugs, and all things retaining water pressures must be tied with tie rods as a pressure restraint. All tie rods or bare metals shall be coated with bitumastic or approved equal.

In lieu of providing tie rods where restrained joints are required, a mechanical joint restraint device, such as "MEGALUG" as manufactured by Ebaa Iron Sales, Inc. or approved equal, may 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.

3.4 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 nuts and bolts shall be stainless steel.

3.5 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) Butterfly valves shall be provided with valve boxes and covers as described in 3.4 (4, 5 & 6).
- (d) Butterfly valves 16" and larger shall be placed in manholes as shown on Detail

Drawing W-5.

- (e) All nuts and bolts shall be stainless steel.

3.6 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.

3.7 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 nozzle and two (2) one-half inch 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 proved to prevent water from reaching operating mechanism. Operating mechanism shall be lubricated without the need to remove the bonnet. All moving parts are to be bronze or a non-corrodible metal.

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 (18").

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 two (2) 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.

Cover all material placed for drainage with a minimum of two layers of filter fabric. No drainage system shall be connected to a sewer.

3.8 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. 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; therefore, service lines must be placed (incidental to the project) beneath any obstruction which would prohibit the stated cover if the service line was placed on top of the said obstruction. 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.

3.9 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.

3.10 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 #313 or approved equal with double stainless steel straps.

3.11 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.

3.12 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 without 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 or 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.

3.13 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 coated. The tapping sleeve and affected pipe area shall be encased in polyethylene wrapping.

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 encase the entire sleeve and appurtenances with polyethylene wrapping 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 customer notification.

If a Contractor, acting on his own, operates a fire hydrant or watermain valve without a valid permit in his 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, the test shall be considered satisfactory if without additional water, the pressure remains constant for a period of two (2) hours at any specific pressure between 125 psi and 150 psi. Test gauges shall be faced, showing the testing pressure in 2 lbs. increments or less.

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. 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.

6. DISINFECTION OF WATERMAINS

6.1 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.

6.2 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 is required to the City Utility Division.

6.3 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.

6.4 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 shall be prohibited. During disinfection, all valves and hydrants shall be operated to insure that all appurtenances are disinfected.

6.5 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 by the City Utility Division personnel and the cost of these tests paid for by the City. Any re-tests that are required due to improper disinfection will be charged to the Contractor. A 24-hour notice is required to the City Utility Division for pipeline flushing.

6.6 REPEAT TESTING

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

6.7 INSPECTION

The above operation shall be supervised by a qualified Inspector furnished by the Consultant.

7. WATERMAINS CROSSING SEWERS

Watermains crossing sanitary sewers, storm sewers or house sewers shall be laid to provide a separation of at least 18 inches between the bottom of the watermain and the top of the sewer. When local conditions prevent a vertical separation as described, the following shall be used:

- A. Sewers passing over or under watermain shall be constructed of materials equal to watermain standards of construction.
- B. Watermains passing under sewers shall, in addition, be protected by providing:
 - 1. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the watermain.
 - 2. Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking the watermains.
 - 3. That the length of water pipe be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

Watermains shall be laid at least 10 feet horizontally from any sanitary sewer, storm sewer or sewer manhole whenever possible. When local conditions prevent a horizontal separation of 10 feet, a watermain may be laid closer to a storm or sanitary sewer provided that:

- A. The bottom of the main is at least 18 inches above the top of the sewer.
- B. Where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to watermain standards of construction and shall be pressure tested to assure water tightness prior to backfilling.

8. MEASUREMENT AND PAYMENT

8.1 DUCTILE IRON PIPE (DIP)

Payment will be made at the Contract price per lineal foot for each 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.

8.2 PIPE FITTINGS

Ductile iron fittings and specials will be paid for at the Contract unit price per pound for the standard weight of 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.

8.3 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.

8.4 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.

8.5 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.

8.6 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.

8.7 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.

8.8 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.

8.9 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.

8.10 SAND-GRAVEL MATERIAL AND BINDER STONE

Payment shall be for cubic yards furnished, installed and properly compacted with measurement based upon vehicular measure (MnDOT 1901). The unit price bid for sand-gravel 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.

8.11 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 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.

8.12 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.

8.13 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.

8.14 MERGED 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 merged with the various unit prices bid and no additional compensation allowed.

8.15 INSULATION BOARD

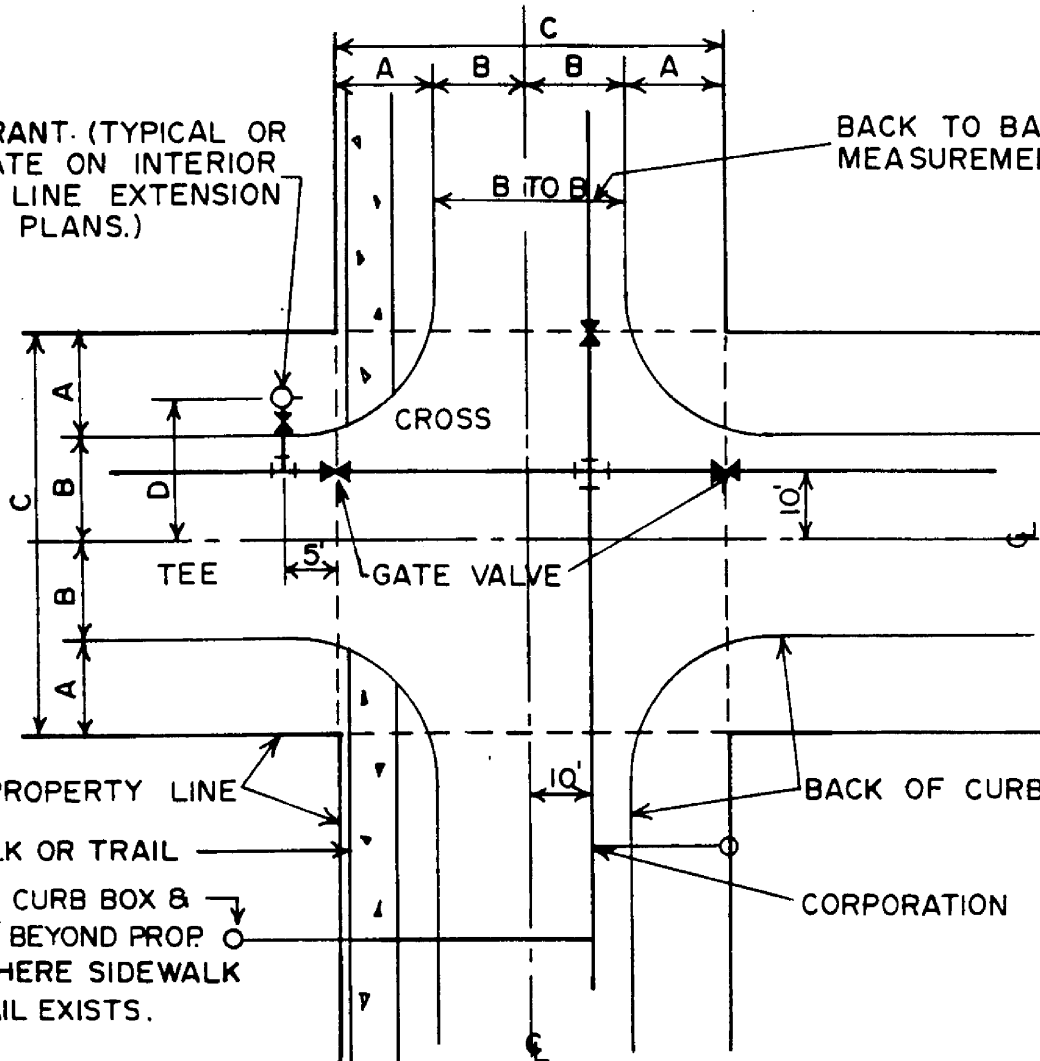
Insulation Board will be paid for by the square foot furnished and installed at the thickness and dimension shown on the Plans and shall be compensation in full for all labor, materials, tools, etc., necessary to complete the work.

9. 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.

HYDRANT. (TYPICAL OR LOCATE ON INTERIOR LOT LINE EXTENSION PER PLANS.)

BACK TO BACK CURB MEASUREMENT



INSTALL CURB BOX & STOP 10' BEYOND PROP. LINE WHERE SIDEWALK OR TRAIL EXISTS.

CURB MEASUREMENTS																
	50' R/W				60' R/W				70' R/W				80' R/W			
BTO 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.

1-98

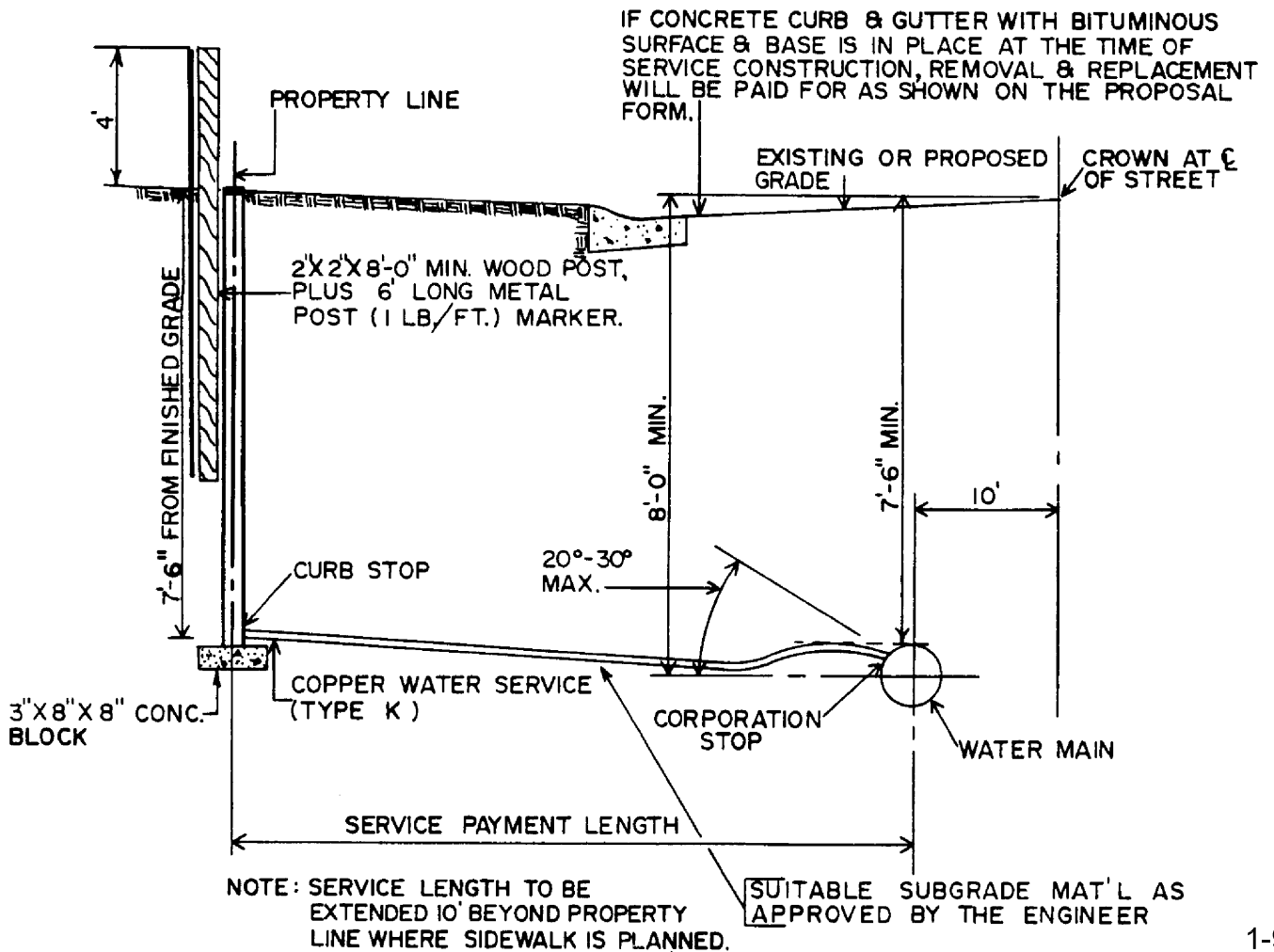
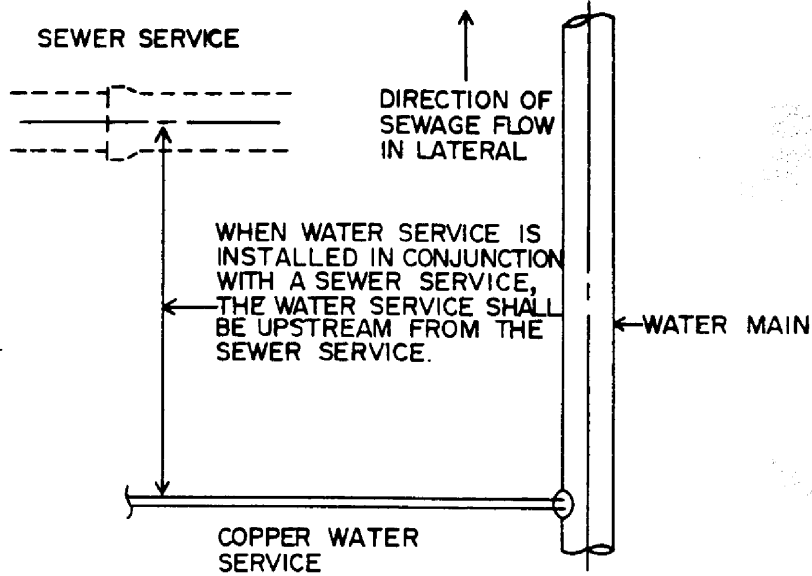


CITY OF EDEN PRAIRIE, MINNESOTA

WATERMAIN LAYOUT

DEPARTMENT OF ENGINEERING

W-1



1-98



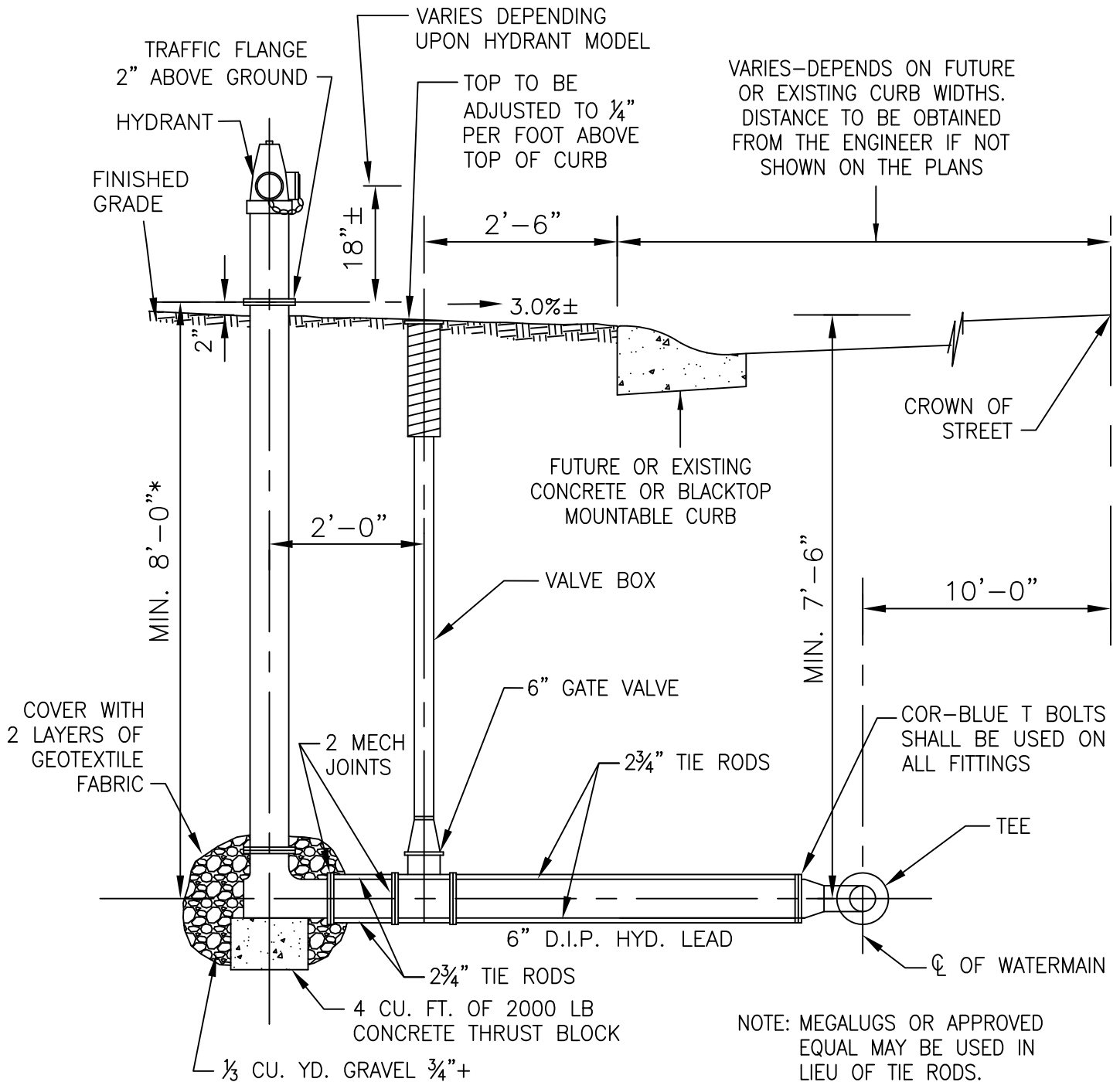
CITY OF EDEN PRAIRIE, MINNESOTA

COPPER WATER SERVICE

DEPARTMENT OF ENGINEERING W-2

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

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



* 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.

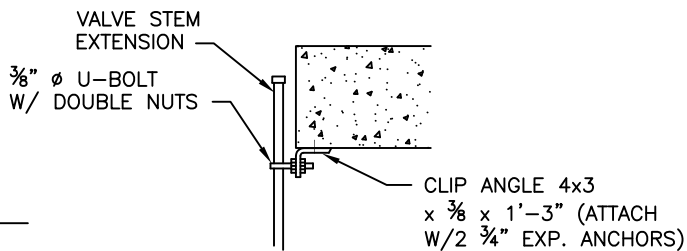
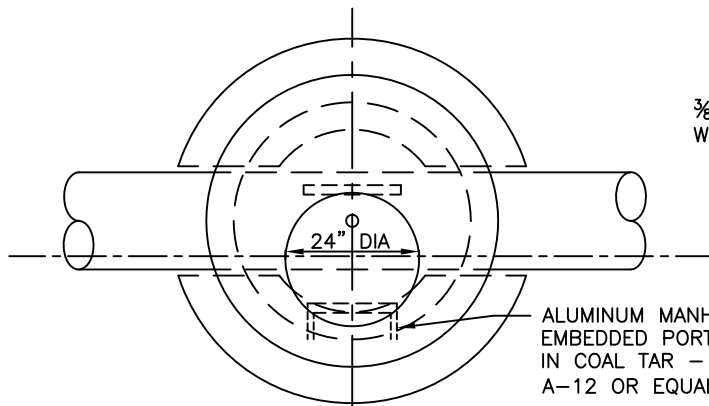
3-09



CITY OF EDEN PRAIRIE, MINNESOTA

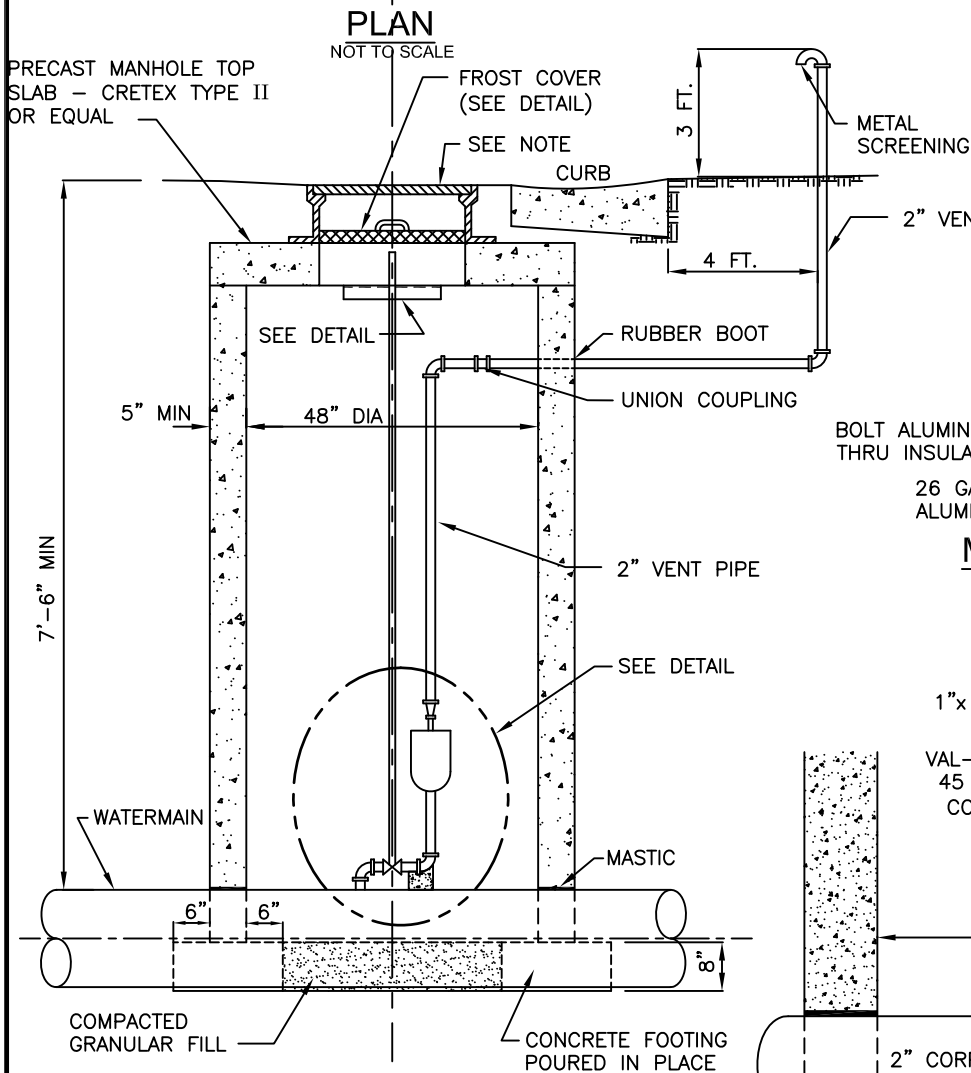
TYPICAL HYDRANT DETAIL

DEPARTMENT OF ENGINEERING **W-3**

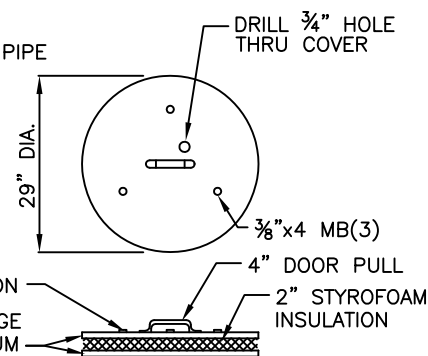


EXTENSION MOUNT
NOT TO SCALE

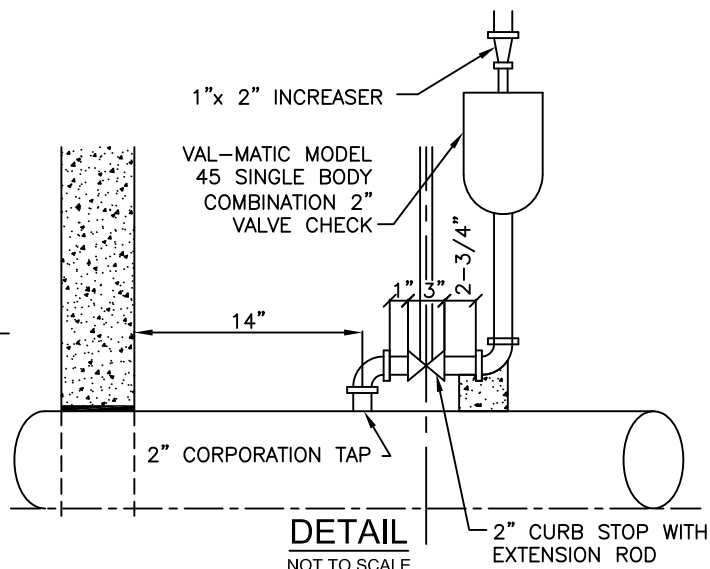
NOTE:
MANHOLE FRAME - NEENAH R-1740-B OR EQUAL WITH CENTER PICK HOLE AND STAMPED WATER. USE 2 OR 3 36" ADJUSTING RINGS



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.

3-09

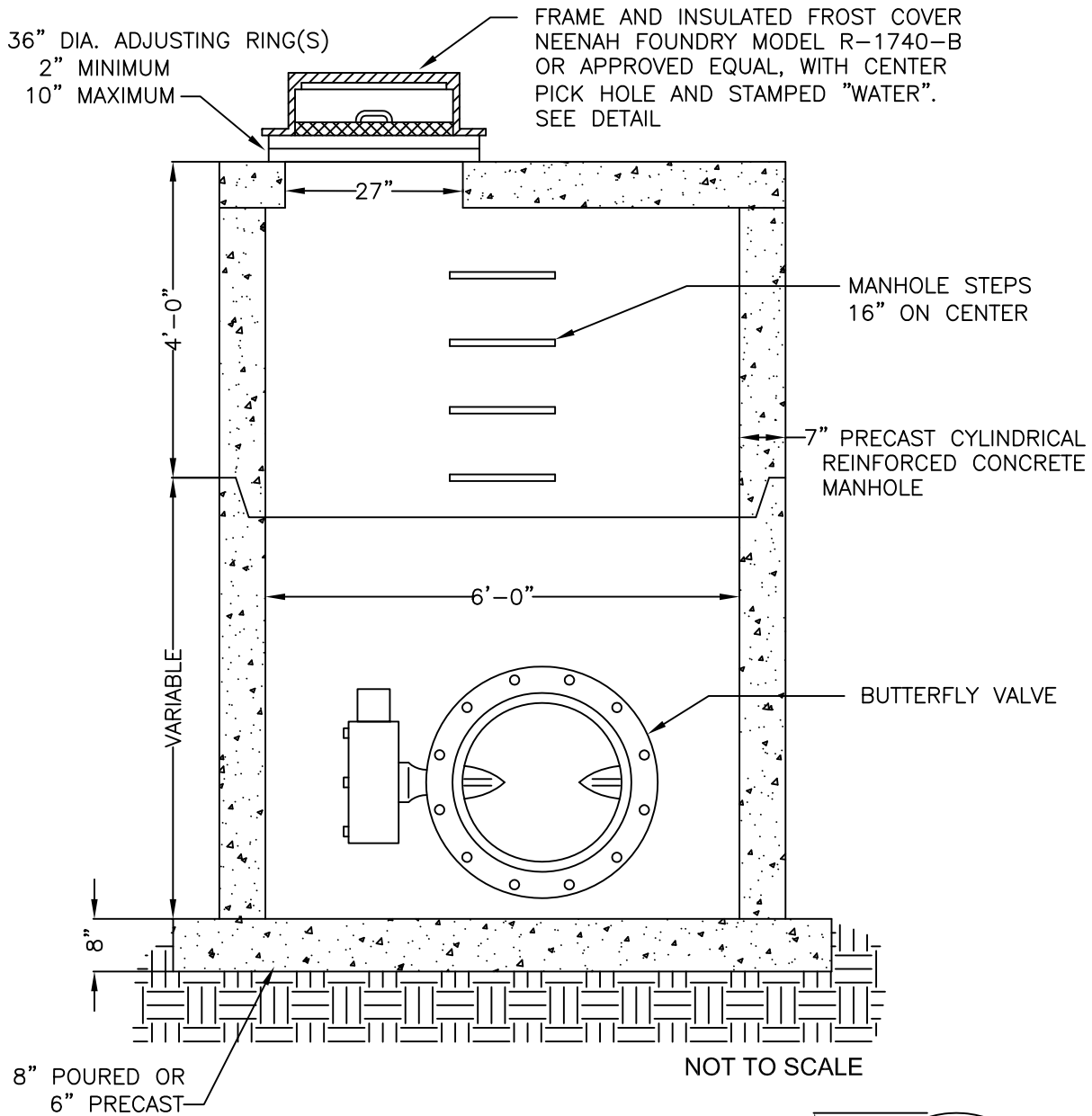


CITY OF EDEN PRAIRIE, MINNESOTA

AIR RELIEF MANHOLE DETAIL

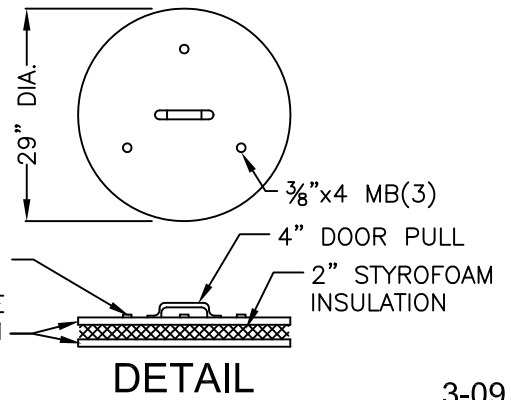
DEPARTMENT OF ENGINEERING

W-4



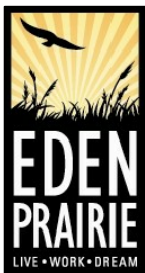
NOTE: OPENING AROUND PIPE TO BE SEALED WITH BITUMINOUS EXPANSION MATERIAL

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



DETAIL

3-09



CITY OF EDEN PRAIRIE, MINNESOTA

M.H. for 16" and Larger Butterfly Valves

DEPARTMENT OF ENGINEERING **W-5**