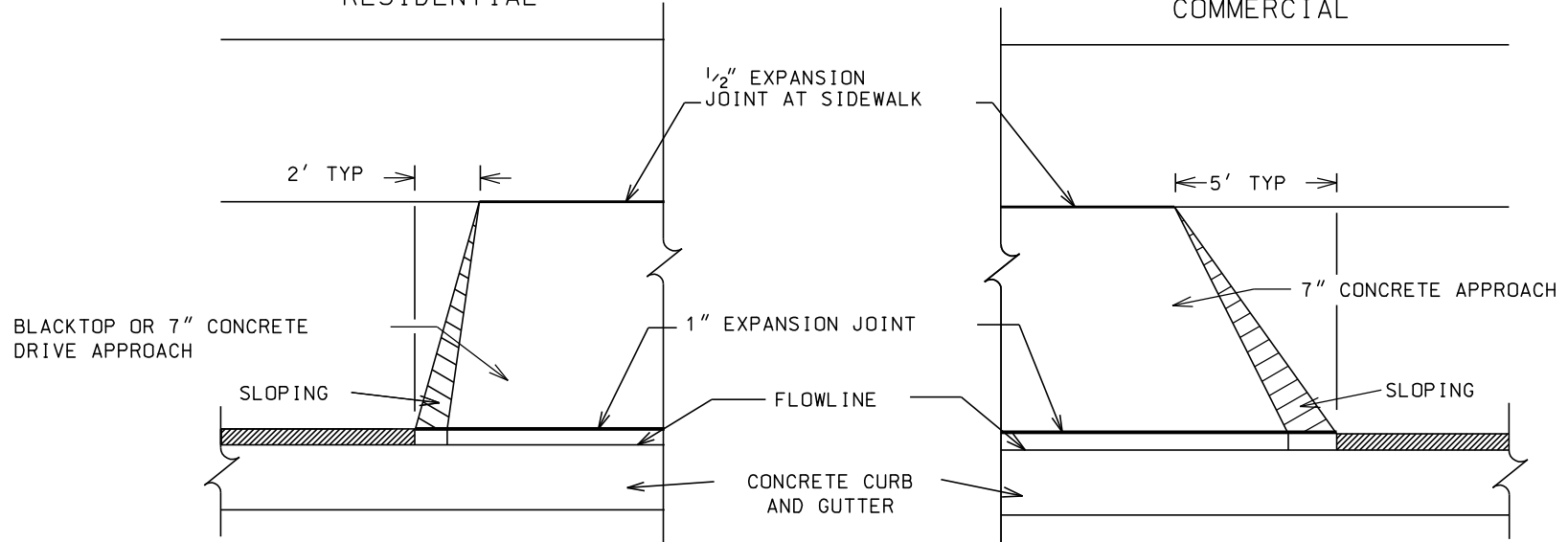
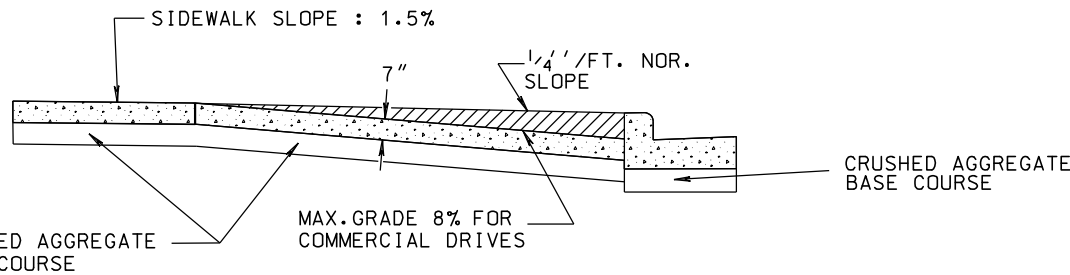


RESIDENTIAL

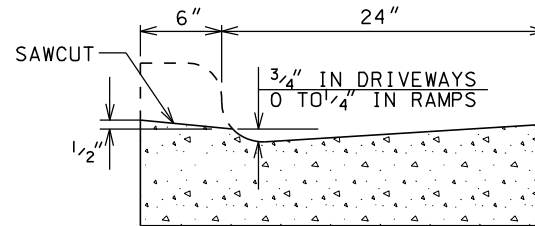
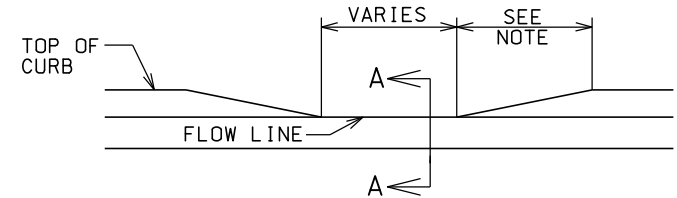
COMMERCIAL



EXPANSION JOINTS IN ACCORDANCE WITH REQUIREMENTS OF 302.2d and 303.2d



PROFILE



DRIVEWAY SECTION TYPE 'A'  
CONCRETE CURB & GUTTER

SECTION A-A

NOTE:  
12" TO 18" TAPER FOR STANDARD DRIVEWAY APPROACH  
18" TO 24" TAPER FOR STANDARD RAMP

TYPICAL CURB CUT TAPER

GENERAL NOTE:

IF THE CURB CUT IS NOT CONSTRUCTED WITH THE INITIAL CURB AND GUTTER CONSTRUCTION, THE CURB CUT CAN BE MADE BY REMOVING AND REPLACING THE ENTIRE CURB AND GUTTER SECTION OR BY SAWCUTTING THE EXISTING CURB HEAD BY MEANS OF A SPECIAL SAW DESIGNED TO MEET THE DETAILS ABOVE FOR MADISON STANDARD CURB CUTS.

ALL EXPANSION JOINTS SHALL EXTEND THROUGH THE ENTIRE THICKNESS OF THE APPROACH OR SIDEWALK, WHICHEVER IS THICKER.

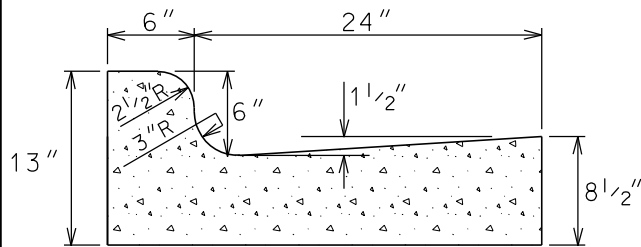
2016

CITY OF MADISON  
ENGINEERING DIVISION

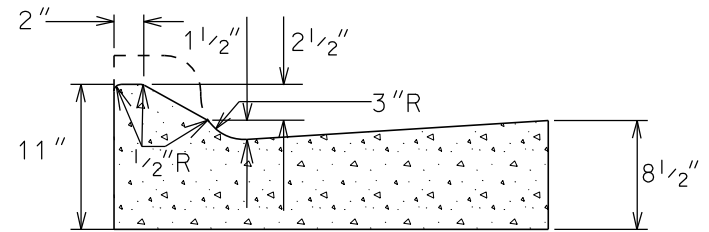
MADISON STANDARD  
CURB CUT DETAILS

STANDARD DETAIL DRAWING 3.02

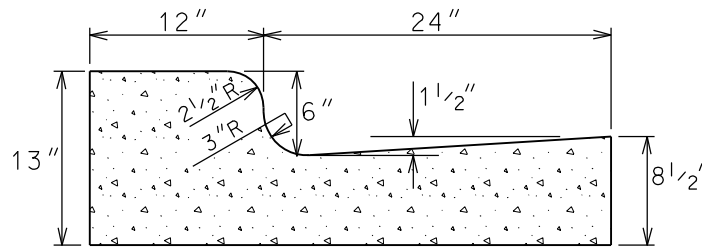
3.02



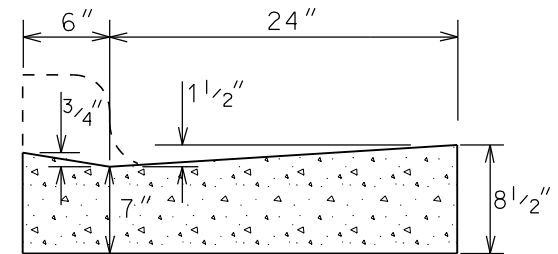
TYPE 'A' CONCRETE CURB & GUTTER



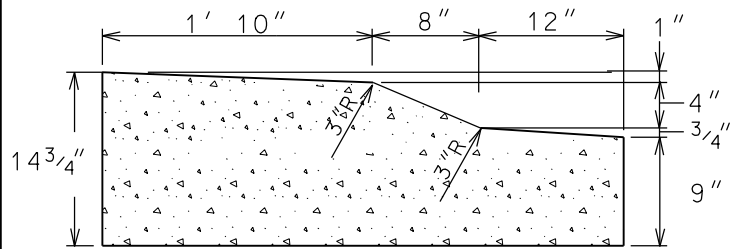
TYPE 'A' MOUNTABLE CONCRETE CURB & GUTTER  
(PAY AS TYPE 'A' CURB AND GUTTER)



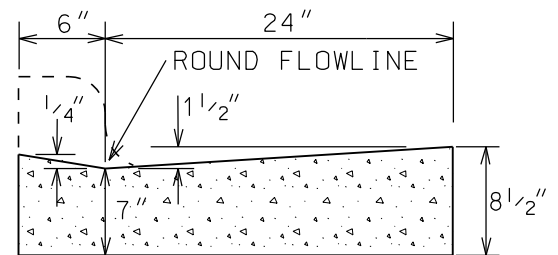
TYPE 'B' CONCRETE CURB & GUTTER



DRIVEWAY SECTION TYPE 'A' CONCRETE CURB & GUTTER  
(PAY AS TYPE 'A' CURB AND GUTTER)



TRAFFIC CIRCLE MOUNTABLE CONCRETE CURB & GUTTER



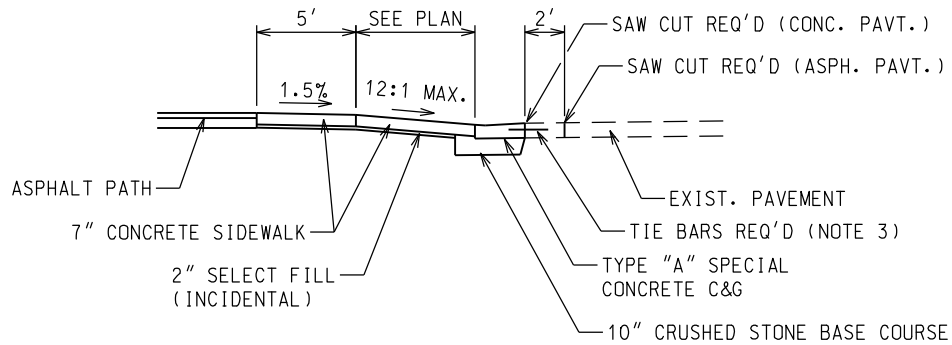
BIKE/PED. RAMP SECTION TYPE 'A' CONCRETE CURB & GUTTER  
(PAY AS TYPE 'A' CURB AND GUTTER)

GENERAL NOTES:

LATERAL CONTRACTION JOINTS SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 15' NOR LESS THAN 6' IN LENGTH. THE JOINTS SHALL BE A MINIMUM OF 3" IN DEPTH

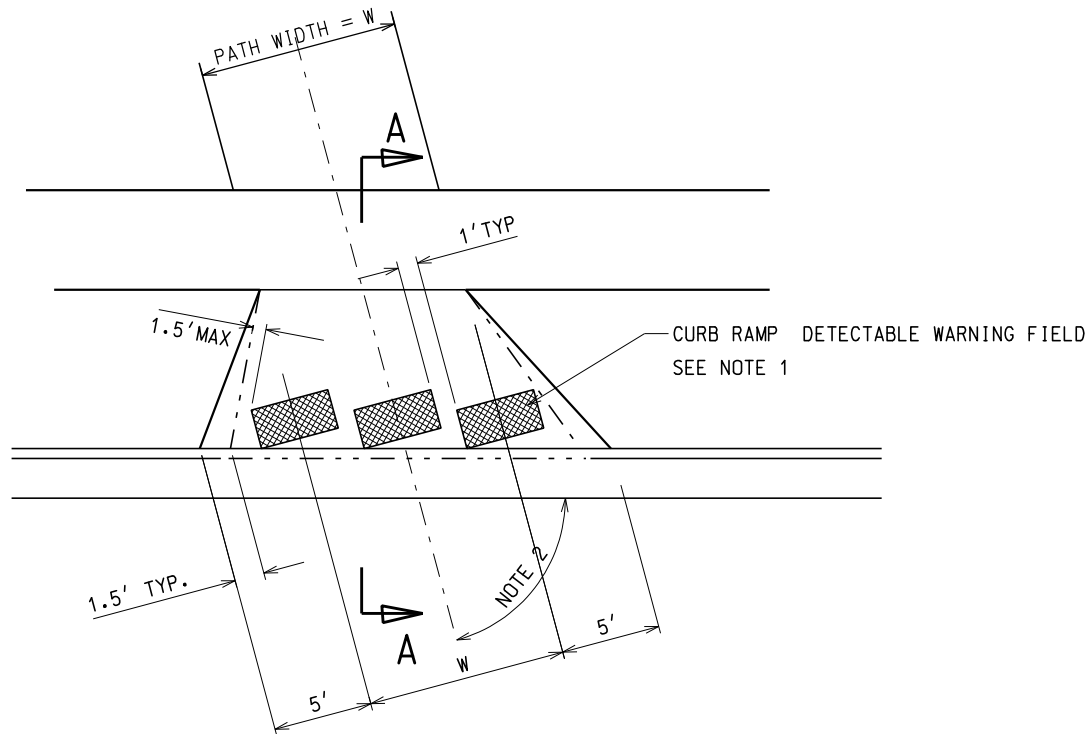
EXPANSION JOINTS SHALL BE PLACED TRANSVERSLY AT RADIUS POINTS ON CURVES OF RADIUS 200' OR LESS, AND AT ANGLE POINTS, OR AS DIRECTED BY THE ENGINEER. THE EXPANSION JOINT SHALL BE A ONE PIECE ASPHALTIC MATERIAL HAVING THE SAME DIMENSIONS AS CURB & GUTTER AT THAT STATION AND BE 1/2" THICK.

IN ALL CASES, CONCRETE CURB & GUTTER SHALL BE PLACED ON THOROUGHLY COMPACTED CRUSHED STONE



BIKE PATH RAMP SECTION A-A

SEE DETAIL 3.06 FOR BIKE/PED.  
RAMP SECTION TYPE 'A' CURB & GUTTER



BIKE PATH RAMP PLAN

NOTES:

1. CURB RAMP DETECTABLE WARNING FIELDS REQUIRED WHERE PATH RAMP ENTERS A STREET.
2. FOR ANGLES LESS THAN 75° OR GREATER THAN 105° FLARE DIMENSIONS SHALL BE AS SHOWN ON THE PLANS OR SHALL BE REVIEWED BY THE CONSTRUCTION ENGINEER PRIOR TO CONSTRUCTION.
3. THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6 INCHES MINIMUM AND 8 INCHES MAXIMUM FROM THE CURB LINE

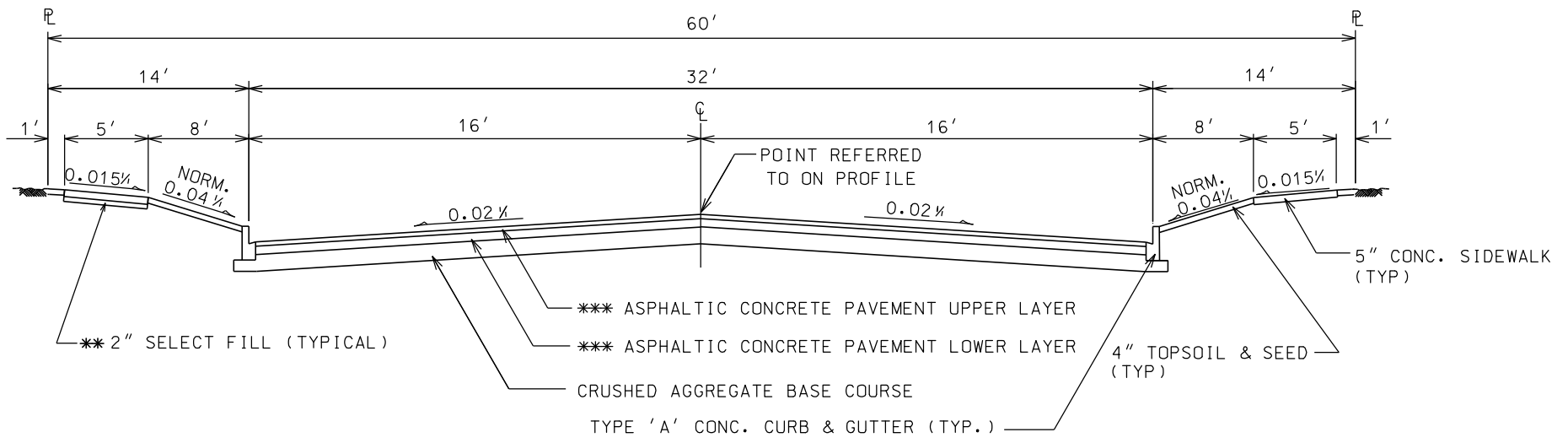
2016

CITY OF MADISON  
ENGINEERING DIVISION

BIKE/PED. RAMP  
DETAIL

STANDARD DETAIL DRAWING 3.14

3.14



NOTES:

\* A PAVEMENT DESIGN IN ACCORDANCE WITH STANDARD  
 DETAIL DRAWING 4.06 IS REQUIRED ON ALL PROJECTS.

\*\* 3" OF CRUSHED AGGREGATE BASE COURSE GRADATION 3  
 SHALL BE PLACED UNDER THE SIDEWALK WHERE THE  
 CENTERLINE GRADE OF THE STREET EXCEEDS 5%.

\*\*\* ALL UPPER LAYER PAVEMENTS ARE 12.5 mm; LOWER LAYER  
 PAVEMENT IS 12.5 mm FOR TYPE A & 19 mm FOR TYPE B & C.

\*CITY OF MADISON MINIMUM PAVEMENT DESIGN

TYPE	CRUSHED AGGREGATE BASE COURSE		ASPHALTIC CONCRETE PAVEMENT			
	LOWER LAYER GRADATION 1	UPPER LAYER GRADATION 2	LOWER LAYER		UPPER LAYER	
			TYPE	THICKNESS	TYPE	THICKNESS
A	6"	4"	E-0.3	1.75"	E-0.3	1.75"
B	6"	4"	E-1	2.25"	E-1	2.00"
C	6"	4"	E-3	3.25"	E-3	2.00"

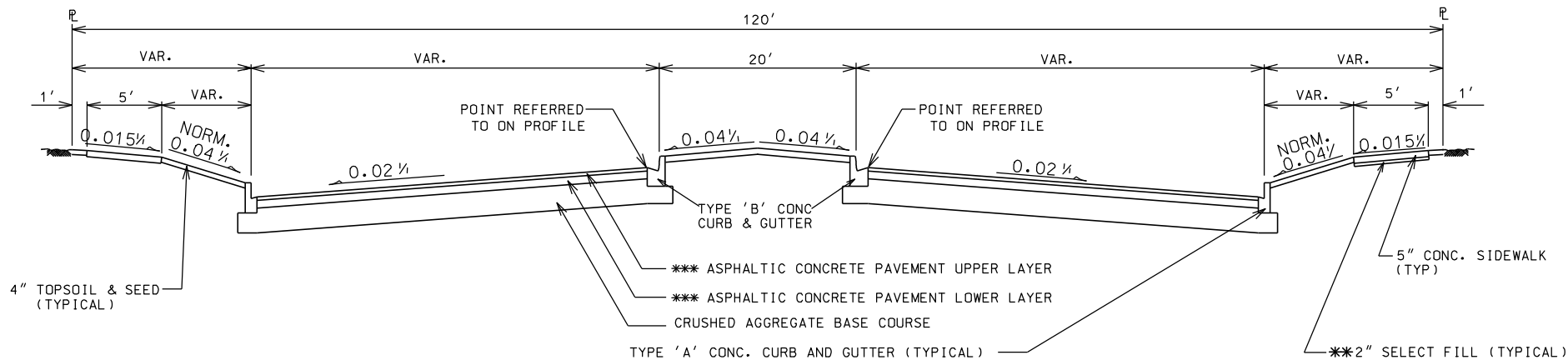
2016

CITY OF MADISON  
 ENGINEERING DIVISION

TYPICAL SECTION  
 32' STREET

STANDARD DETAIL DRAWING 4.01

4.01



**NOTES:**

- \* A PAVEMENT DESIGN IN ACCORDANCE WITH STANDARD DETAIL DRAWING 4.06 IS REQUIRED ON ALL PROJECTS.
- \*\* 3" OF CRUSHED AGGREGATE BASE COURSE GRADATION 3 SHALL BE PLACED UNDER THE SIDEWALK WHERE THE CENTERLINE GRADE OF THE STREET EXCEEDS 5%.
- \*\*\* ALL UPPER LAYER PAVEMENTS ARE 12.5 mm; LOWER LAYER PAVEMENT IS 12.5 mm FOR TYPE A & 19 mm FOR TYPE B & C.

**\*CITY OF MADISON MINIMUM PAVEMENT DESIGN**

TYPE	CRUSHED AGGREGATE BASE COURSE		ASPHALTIC CONCRETE PAVEMENT			
	LOWER LAYER GRADATION 1	UPPER LAYER GRADATION 2	LOWER LAYER		UPPER LAYER	
			TYPE	THICKNESS	TYPE	THICKNESS
A	6"	4"	E-0.3	1.75"	E-0.3	1.75"
B	6"	4"	E-1	2.25"	E-1	2.00"
C	6"	4"	E-3	3.25"	E-3	2.00"

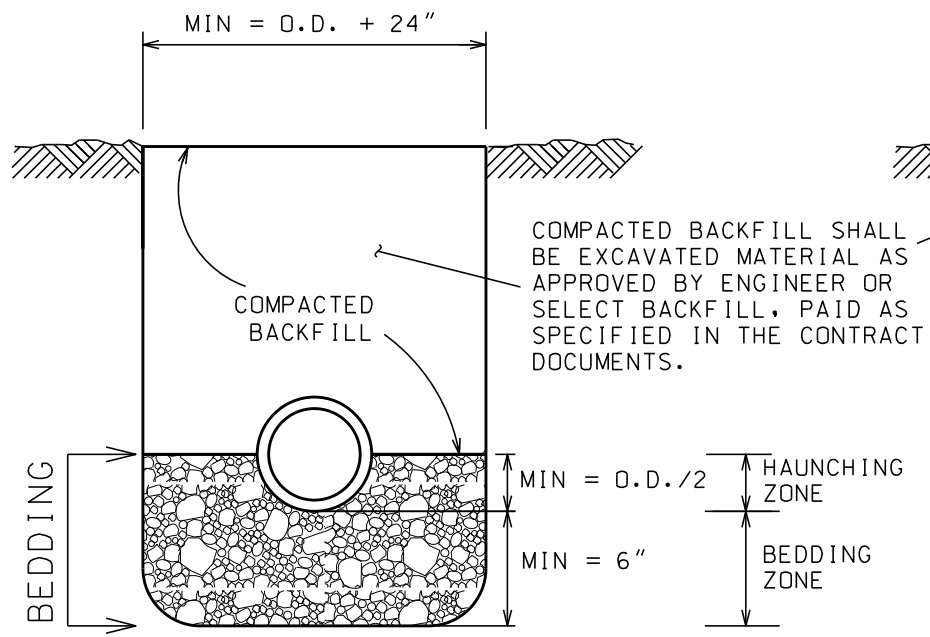
2016

CITY OF MADISON  
ENGINEERING DIVISION

**TYPICAL SECTION  
BOULEVARD STREET**

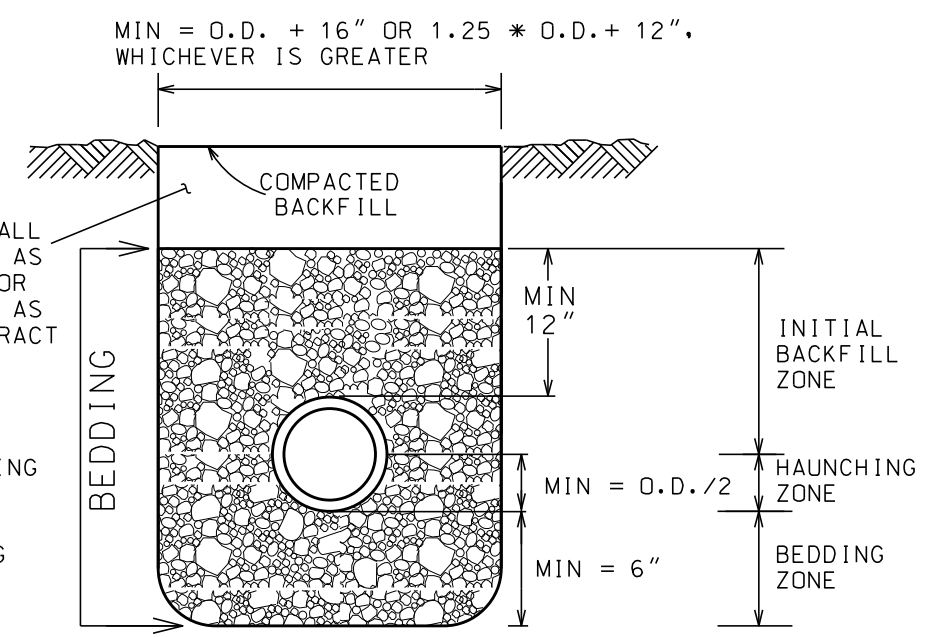
STANDARD DETAIL DRAWING 4.03


5.2.1



 WASHED GRAVEL OR CRUSHED STONE AS SPECIFIED IN SECTION 502.1 (d), BEDDING OF SEWER PIPES

### BEDDING FOR REINFORCED CONCRETE SEWER PIPES



 WASHED GRAVEL, CRUSHED STONE, SAND OR LIMESTONE SCREENINGS FOR PIPE SIZES 10" IN DIAMETER OR LESS. WASHED GRAVEL OR CRUSHED STONE FOR PIPE SIZES OVER 10" IN DIAMETER. AS SPECIFIED IN SECTION 502.1 (d), BEDDING OF SEWER PIPES

### BEDDING FOR SANITARY PIPE

**NOTES:**

UNLESS OTHERWISE SPECIFIED, ALL SANITARY PIPES, INCLUDING LATERALS AND LEADS, SHALL BE INSTALLED WITH THE TYPE OF BEDDING SHOWN FOR THE TYPE AND SIZE OF PIPE INSTALLED.

THE COSTS OF BEDDING SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE PIPE. FOR RCP, BEDDING INCLUDES THE HAUNCHING & BEDDING ZONES. FOR PLASTIC PIPES, THE BEDDING INCLUDES THE HAUNCHING, BEDDING & INITIAL BACKFILL ZONES. THE BEDDING SHALL BE INSTALLED & COMPACTED IN 6" MAXIMUM LIFTS.

ALL TRENCHES SHALL BE HAND BACKFILLED TO A POINT 12" ABOVE THE TOP OF THE PIPE. ALL BEDDING SHALL BE MECHANICALLY COMPACTED.

PAYMENT SHALL NOT BE MADE FOR BACKFILL WITH EXCAVATED MATERIAL, IF APPROVED. SELECT FILL, IF REQUIRED, SHALL BE PAID PER CONTRACT.

THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE 3 \* O.D., THE MINIMUM TRENCH WIDTH AS SPECIFIED, AND SHALL APPLY FROM THE BOTTOM OF THE TRENCH TO A POINT 12" ABOVE THE TOP OF THE PIPE. WHERE THIS WIDTH IS EXCEEDED, THE CONTRACTOR SHALL FURNISH AND INSTALL A HIGHER TYPE OF BEDDING AT **NO EXTRA COST**. THE TYPE OF BEDDING SHALL BE DETERMINED BY THE ENGINEER.

O.D. EQUALS THE OUTSIDE DIAMETER OF THE PIPE.

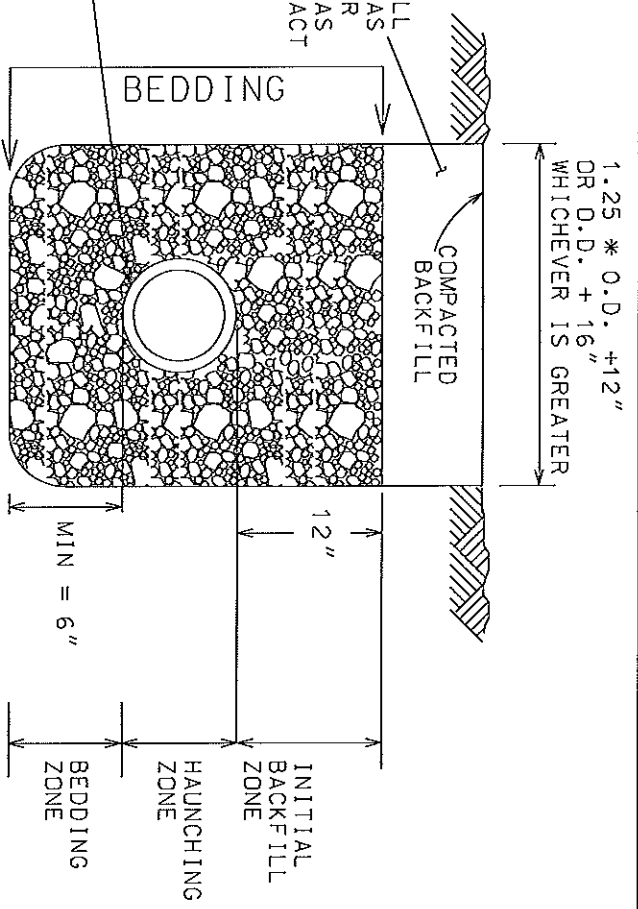
2016

CITY OF MADISON ENGINEERING DIVISION
<b>PIPE BEDDING AND BACKFILL</b>
STANDARD DETAIL DRAWING 5.2.1

DRAWING NOT TO SCALE

COMPACTED BACKFILL SHALL BE EXCAVATED MATERIAL AS APPROVED BY ENGINEER OR SELECT BACKFILL, PAID AS SPECIFIED IN THE CONTRACT DOCUMENTS.

SHOVEL  
COMPACTION  
REQUIRED  
IN THIS AREA



GRANULAR MATERIAL  
GRADATION #3  
(3/4" MAXIMUM)

BEDDING FOR  
TYPE II, TYPE III,  
AND TYPE IV STORM PIPE,  
SECTION 1 OF S.D.D 5.2.2

NOTES:

BEDDING SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321-14

THE COSTS OF BEDDING SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE PIPE. THE BEDDING INCLUDES THE HAUNCHING, BEDDING & INITIAL BACKFILL ZONES. HAUNCH OF PIPE IS REQUIRED.

ALL TRENCHES SHALL BE HAND BACKFILLED TO A POINT 12" ABOVE THE TOP OF THE PIPE. ALL BEDDING SHALL BE MECHANICALLY COMPACTED.

PAYMENT SHALL NOT BE MADE FOR BACKFILL WITH EXCAVATED MATERIAL. IF APPROVED. SELECT FILL. IF REQUIRED. SHALL BE PAID PER CONTRACT.

THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE THE MIN SPECIFIED PLUS 12" AND SHALL APPLY FROM THE BOTTOM OF THE TRENCH TO A POINT 12" ABOVE THE TOP OF THE PIPE. WHERE THIS WIDTH IS EXCEEDED, THE CONTRACTOR SHALL FURNISH AND INSTALL A HIGHER TYPE OF BEDDING AT NO EXTRA COST. THE TYPE OF BEDDING SHALL BE DETERMINED BY THE ENGINEER.

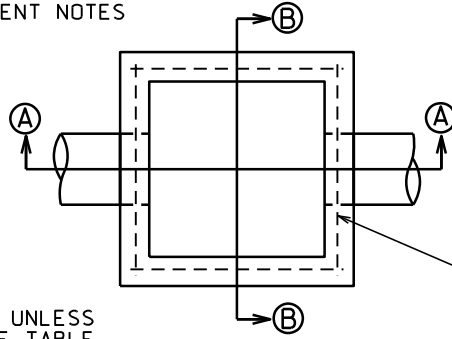
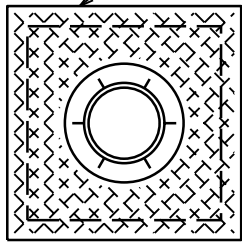
O.D. EQUALS THE OUTSIDE DIAMETER OF THE PIPE.

DRAWING NOT TO SCALE

CITY OF MADISON ENGINEERING DIVISION	2016
STORM PIPE BEDDING AND BACKFILL- SECTION 1 OF S.D.D.5.2.2	
STANDARD DETAIL DRAWING 5.2.1A	

# SEWER ACCESS STRUCTURES

SEE ROOF REINFORCEMENT NOTES



## ROOF REINFORCEMENT NOTES:

- 1) EPOXY COATED REBARS SHALL BE USED IN ALL CASES
- 2) #6 BARS PLACED ON 6" CENTERS FOR 3'X3', 3'X4', 4'X4', 4'X5', 5'X5' STRUCTURES
- 3) #6 BARS PLACED ON 4" CENTERS FOR 6'X5', 6'X6' AND LARGER STRUCTURES
- 4) 3" CLEAR SHALL BE MAINTAINED IN ALL CASES
- 5) ROOF THICKNESS SHALL BE 8" MINIMUM UNLESS SPECIFIED OTHERWISE.

#6 BARS CENTERED IN WALL

NOTE: CASTING TO BE CENTERED UNLESS NOTED IN STORM STRUCTURE TABLE

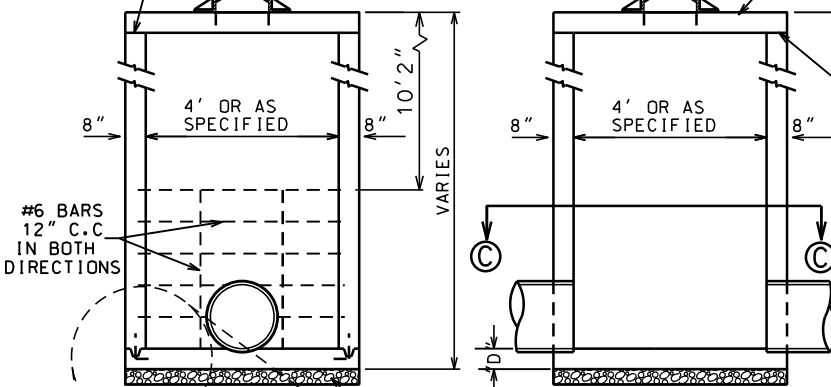
## TOP VIEW

## SECTION C-C

CONSTRUCTION JOINT

CASTING PER STORM CHART AND SECTION 507.3 (c)

ROOF TO BE POURED SEPERATELY FROM WALLS



JOINT TO BE SEALED WITH CONSEAL (CS-102 OR CS-202) DEPENDING ON FIELD TEMPERATURES

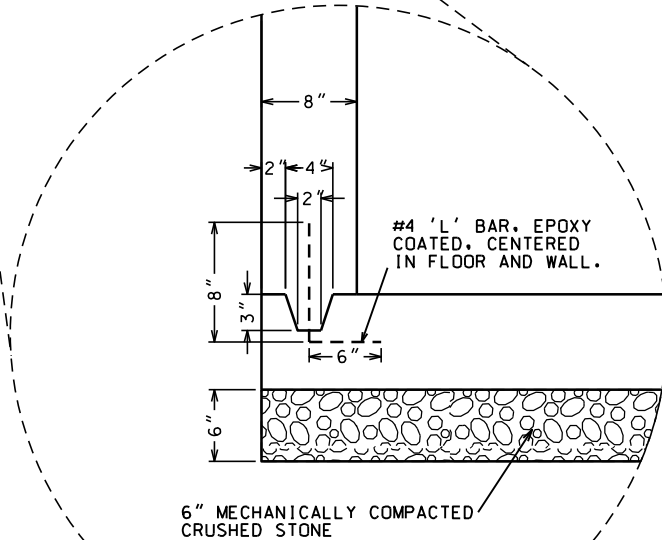
#6 BARS 12" C.C. IN BOTH DIRECTIONS

6" MECHANICALLY COMPACTED CRUSHED STONE

## SECTION A-A

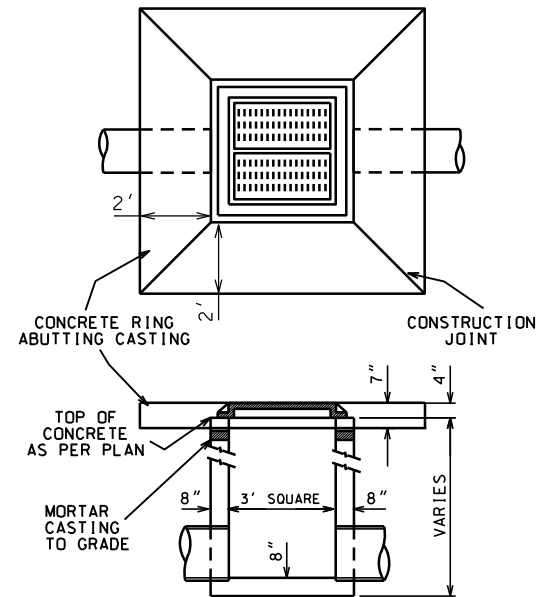
NOTE: THICKNESS OF FLOOR (DIMENSION "D") TO BE 8" UP TO 10' DEPTHS AND 10" FOR GREATER DEPTHS

## SECTION B-B



6" MECHANICALLY COMPACTED CRUSHED STONE

## 3'X3' CATCH BASIN



PRECAST REINFORCED CONCRETE STRUCTURES MAY BE USED IF APPROVED ACCORDING TO ARTICLES 106.3 AND 507.3 (b) OF THE STANDARD SPECIFICATIONS

NEENAH FOUNDRY CASTINGS AS LISTED OR EQUAL. ALL CASTING WITH FLANGE AT BASE.

LIGHT DUTY	R-1879-A10G	FOR OPEN GRATE
	R-1879-A10L	FOR SOLID LID
HEAVY DUTY	R-1878-A10G	FOR OPEN GRATE
	R-1878-A10L	FOR SOLID LID

2016

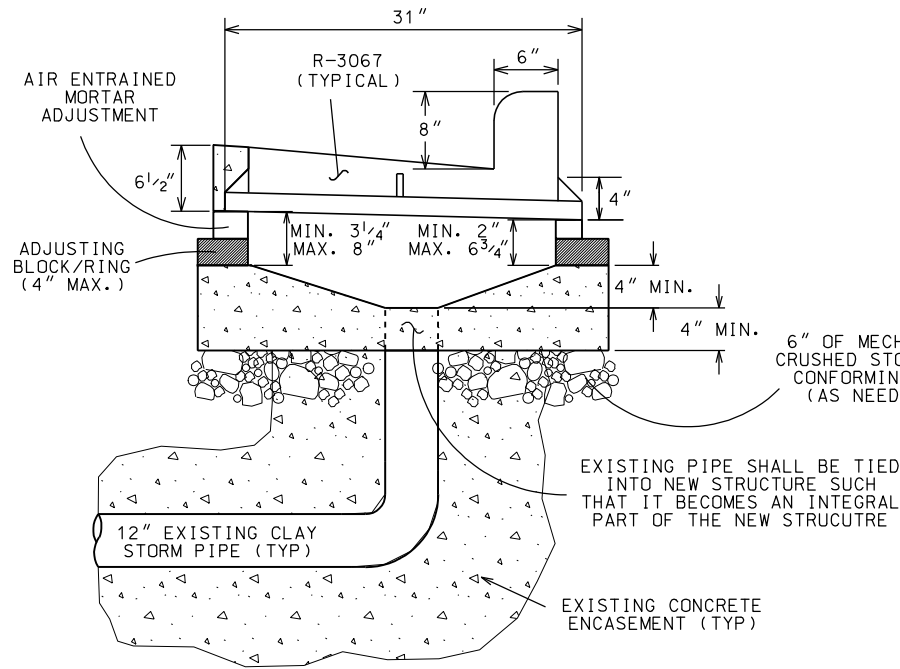
CITY OF MADISON  
ENGINEERING DIVISION

STORM SEWER  
FIELD POURED SAS  
AND CATCH BASINS

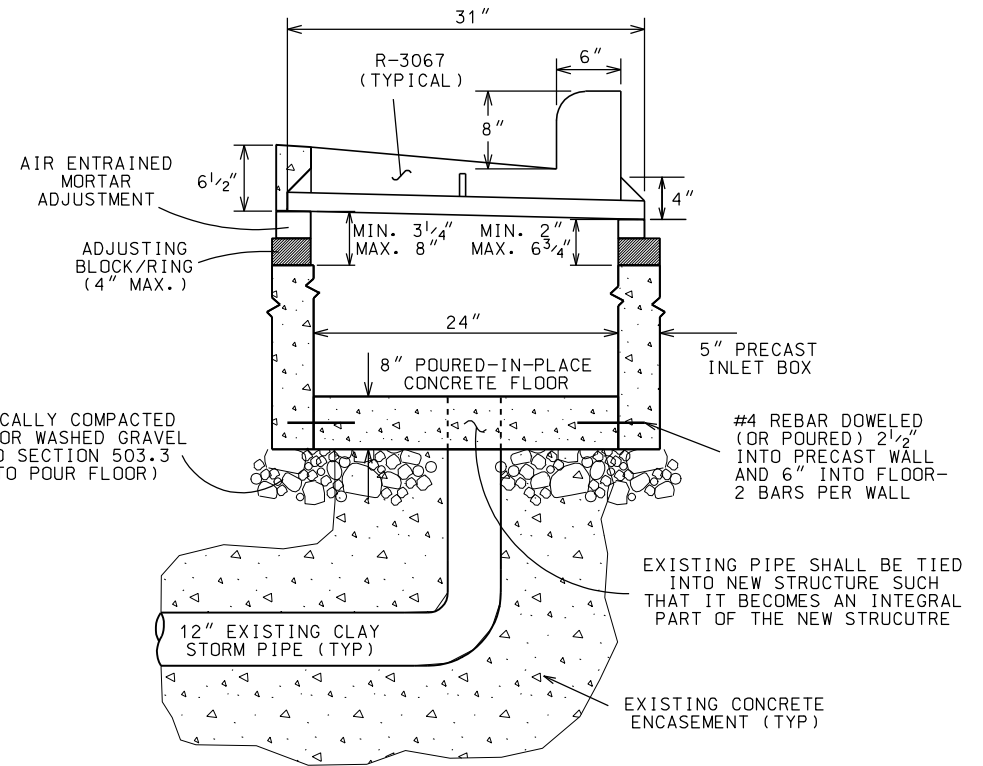
STANDARD DETAIL DRAWING 5.7.3



5.7.11



FIELD POUR OPTION



PRECAST OPTION

DESIGN OPTIONS:

- (1) FIELD POUR-  
PER THE DESIGN IN THE DETAIL DRAWING, THE MINIMUM DEPTH FOR THE FIELD POUR OPTION SHALL BE 19" (4" WALL + 2" MORTAR ADJUSTMENT + 13" CASTING) WITH AN ADDITIONAL MINIMUM 4" OF EXCAVATION REQUIRED FOR THE FLOOR.
- (2) PRECAST  
PER THE DESIGN IN THE DETAIL DRAWING, THE MINIMUM DEPTH FOR THE PRECAST OPTION SHALL BE 19" (12" INLET WALL - 8" FLOOR + 2" MORTAR ADJUSTMENT + 13" CASTING) WITH AN ADDITIONAL MINIMUM OF 8" OF EXCAVATION REQUIRED FOR THE FLOOR.
- (3) FIELD STACKED  
THE DESIGN CONSISTS OF AN 8" FIELD Poured CONCRETE FLOOR, STACKED ADJUSTMENT RINGS, AIR ENTRAINED MORTAR ADJUSTMENT, AND H CASTING.  
THE MINIMUM DEPTH FOR THE STACKED OPTION SHALL BE 17" (2" ADJUSTMENT RING, 2" MORTAR ADJUSTMENT, 13" CASTING).  
THE MAXIMUM DEPTH SHALL BE 19" (4" ADJUSTMENT RINGS, 2" MORTAR ADJUSTMENT, 13" CASTING)

GENERAL NOTES:

- (1) REMOVE EXISTING INLET AND CLAY PIPE TO A STABLE LOCATION
- (2) REMOVE MATERIAL SURROUNDING PIPE TO A DEPTH OF FOURTEEN (14) INCHES BEYOND THE STABLE LOCATION REFERRED TO ABOVE
- (3) INSTALL NEW INLET CASTING ADJUSTMENTS.
- (4) IF, TO FIND A STABLE PIPE LOCATION, THE EXISTING PIPE IS REMOVED BEYOND THE ELBOW, THE ADJUST TUB INLET SPECIFICATION IS NO LONGER APPLICABLE. THE RELEVANT ITEMS BECOME REMOVE INLET AND REPLACE WITH TYPE 'H' INLET OR REBUILD INLET - RESURFACING

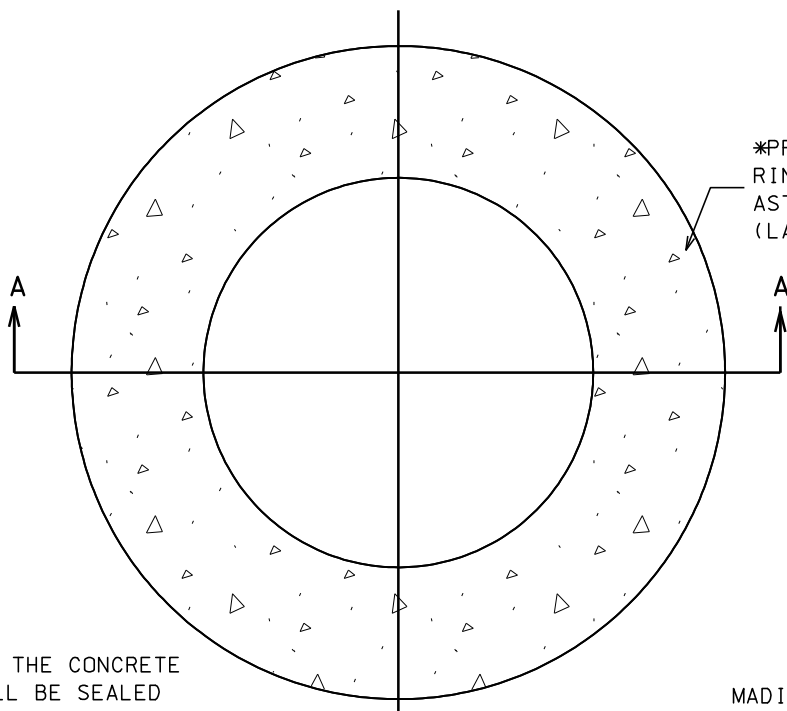
DRAWINGS NOT TO SCALE

2016

CITY OF MADISON  
ENGINEERING DIVISION

ADJUST  
TUB INLET

STANDARD DETAIL DRAWING 5.7.11



\*PRE-CAST CONCRETE GRADE RINGS IN CONFORMANCE WITH ASTM C-478 OR HDPE RINGS (LADTECH OR APPROVED EQUAL)

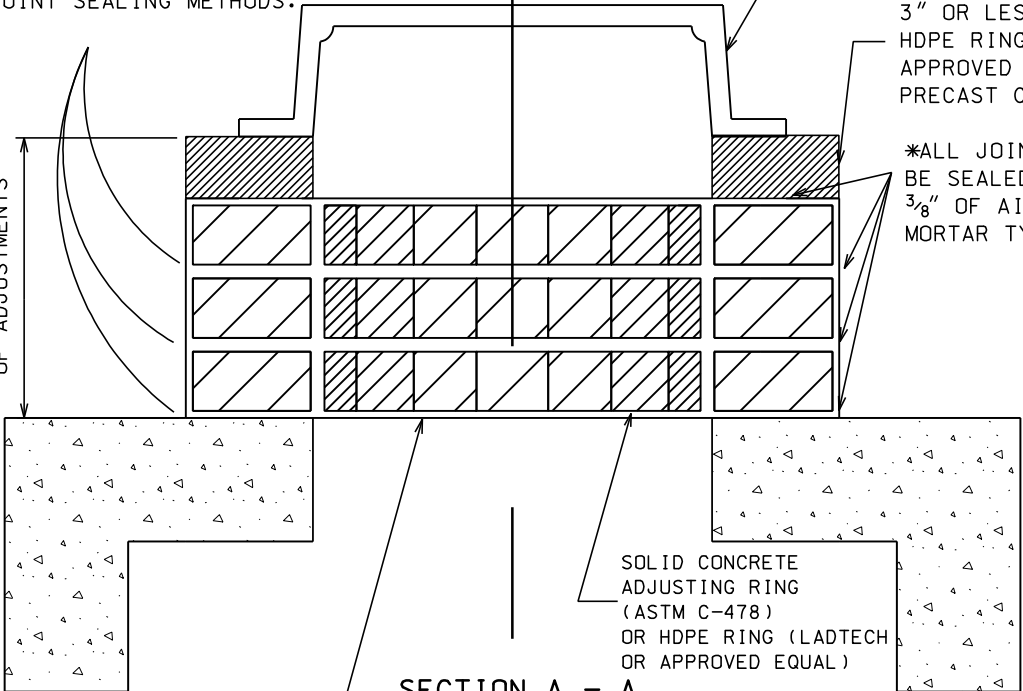
\*THE OUTSIDE OF THE CONCRETE ADJUSTING RINGS SHALL BE SEALED WITH A 1/2" THICK, AIR ENTRAINED MORTAR TYPE M OR S SEAL. THE METHOD USED WILL BE COMPATIBLE WITH THE ADJUSTING RING JOINT SEALING METHODS.

MADISON STANDARD MACHINED CAST IRON ACCESS STRUCTURE COVER

TOP ADJUSTMENT RING 3" OR LESS SHALL BE HDPE RING (LADTECH OR APPROVED EQUAL) OR PRECAST CONCRETE RING

\*ALL JOINTS SHALL BE SEALED WITH 3/8" OF AIR ENTRAINED MORTAR TYPE M OR S.

MIN. 3" / MAX. 9" OF ADJUSTMENTS



SECTION A - A

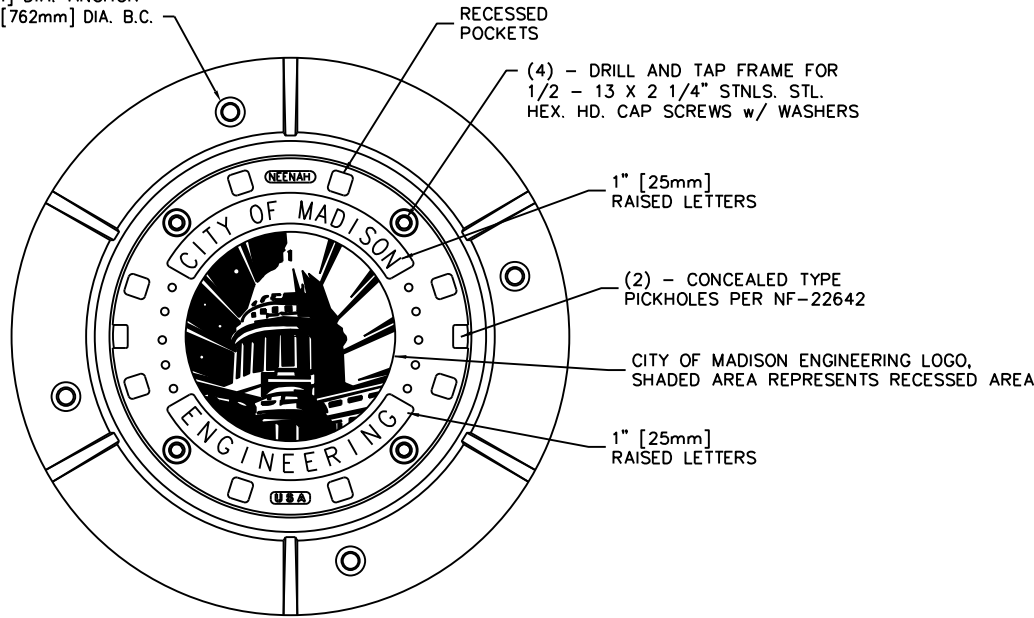
\*\* PRE-CAST CONCRETE GRADE RINGS IN CONFORMANCE WITH ASTM C-478

SOLID CONCRETE ADJUSTING RING (ASTM C-478) OR HDPE RING (LADTECH OR APPROVED EQUAL)

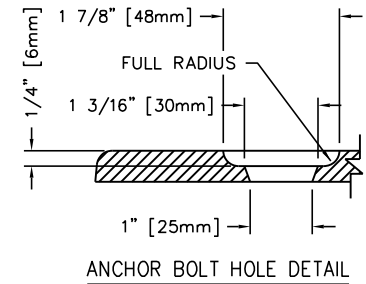
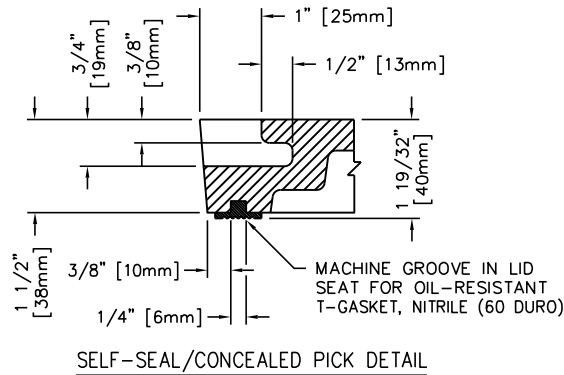
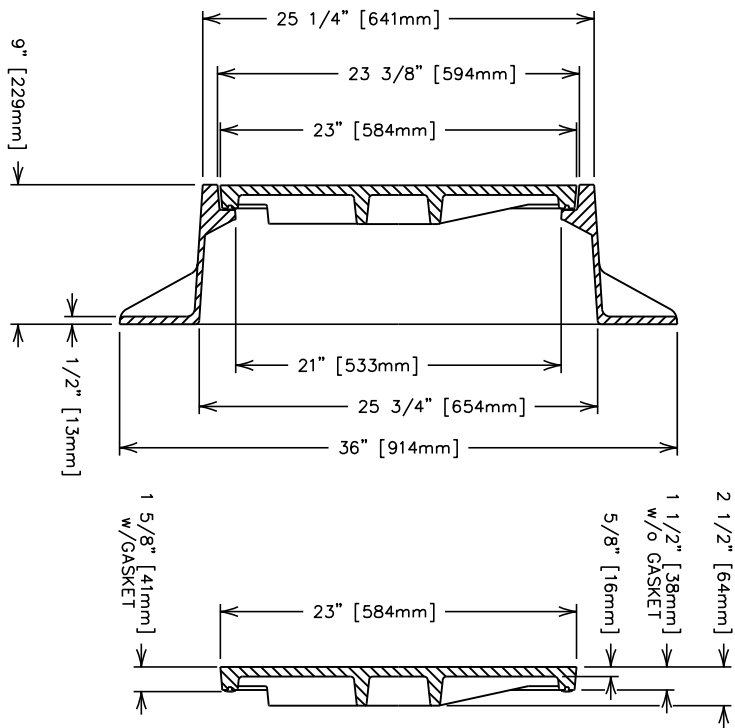
**\*\* NOTE:** HDPE ADJUSTMENT RINGS (LADTECH OR APPROVED EQUAL) MEETING AASHTO HS25 SPECS, ASTM D-1248 INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS WILL BE CONSIDERED AN ACCEPTABLE ALTERNATE TO PRECAST RINGS, CRETEX PRO RING WILL BE CONSIDERED AN ACCEPTED ALTERNATE FOR TOP 3" ADJUSTMENT OVER PRECAST RINGS. RING JOINT SEALANT SHALL BE ASTM C990 AND AASHTO M-198 (TROWABLE EZ-STICK #3 OR EQUAL)

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CITY OF MADISON ENGINEERING DIVISION
SAS CHIMNEY AND CASTING
STANDARD DETAIL DRAWING 5.7.15

(4) - 1" [25mm] DIA. ANCHOR HOLES ON A 30" [762mm] DIA. B.C.



LOGO DETAIL



NEENAH R-1916C LOGO

1. FRAME AND COVER SHALL BE MACHINED AND FITTED SO THAT ROCKING AND CHATTERING WILL BE ELIMINATED.
2. ALL LIDS SHALL BE SELF-SEALING EXCEPT FOR STORM SEWERS
3. ALL LIDS SHALL HAVE CITY OF MADISON LOGO AS SHOWN IN DETAIL

LID NOTES: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC]  
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B

2016

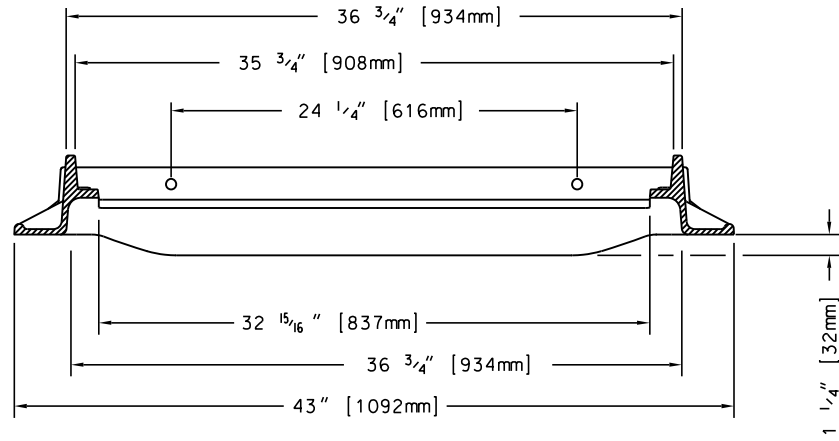
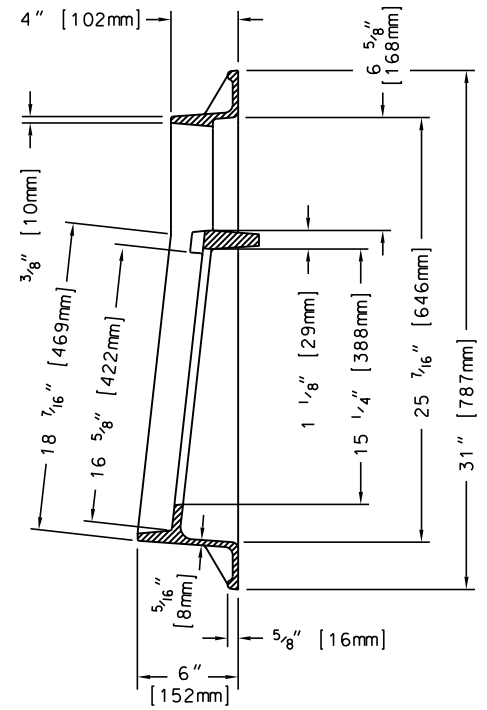
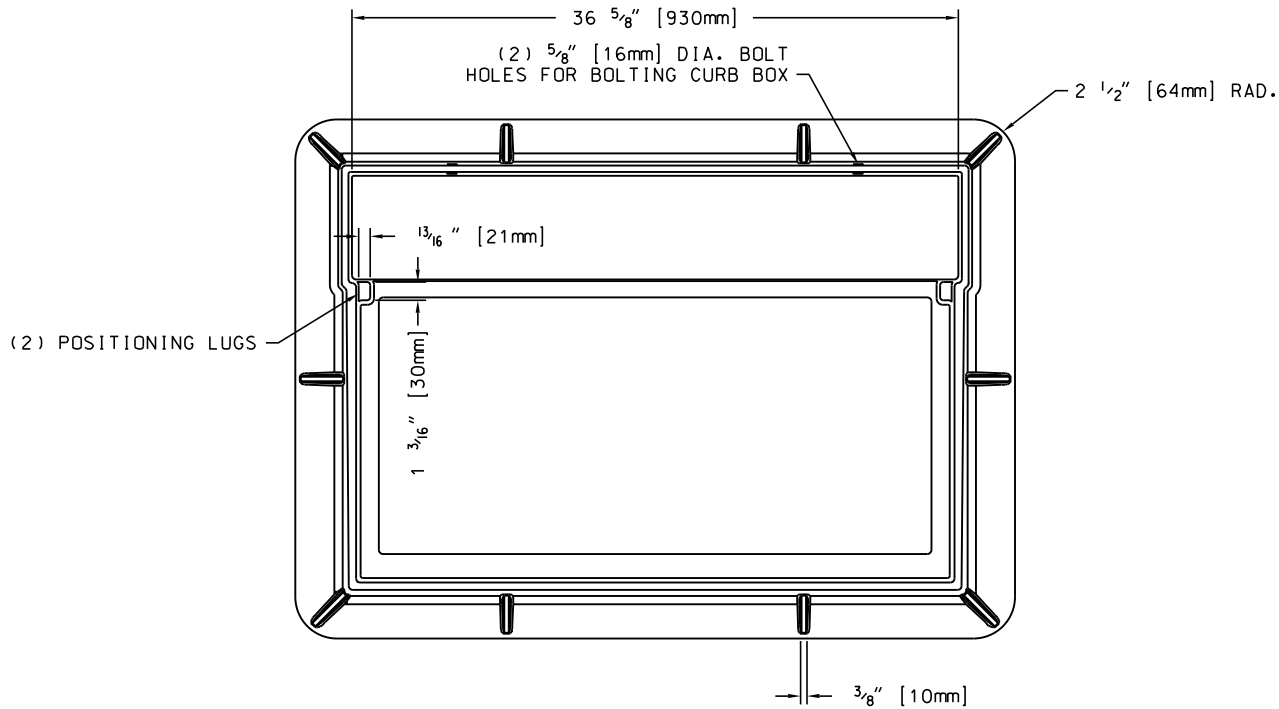
CITY OF MADISON  
 ENGINEERING DIVISION

SAS LOCKING  
 FRAME & LOGO COVER

STANDARD DETAIL DRAWING 5.7.16A

5.7.16A

5.7.18



NOTES: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].  
 ALL DRAFT ANGLES ARE 5° UNLESS OTHERWISE SHOWN.  
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B  
 FINISH: NOT PAINTED  
 WEIGHT: APPROX. 155#

NEENAH FOUNDRY CASTINGS

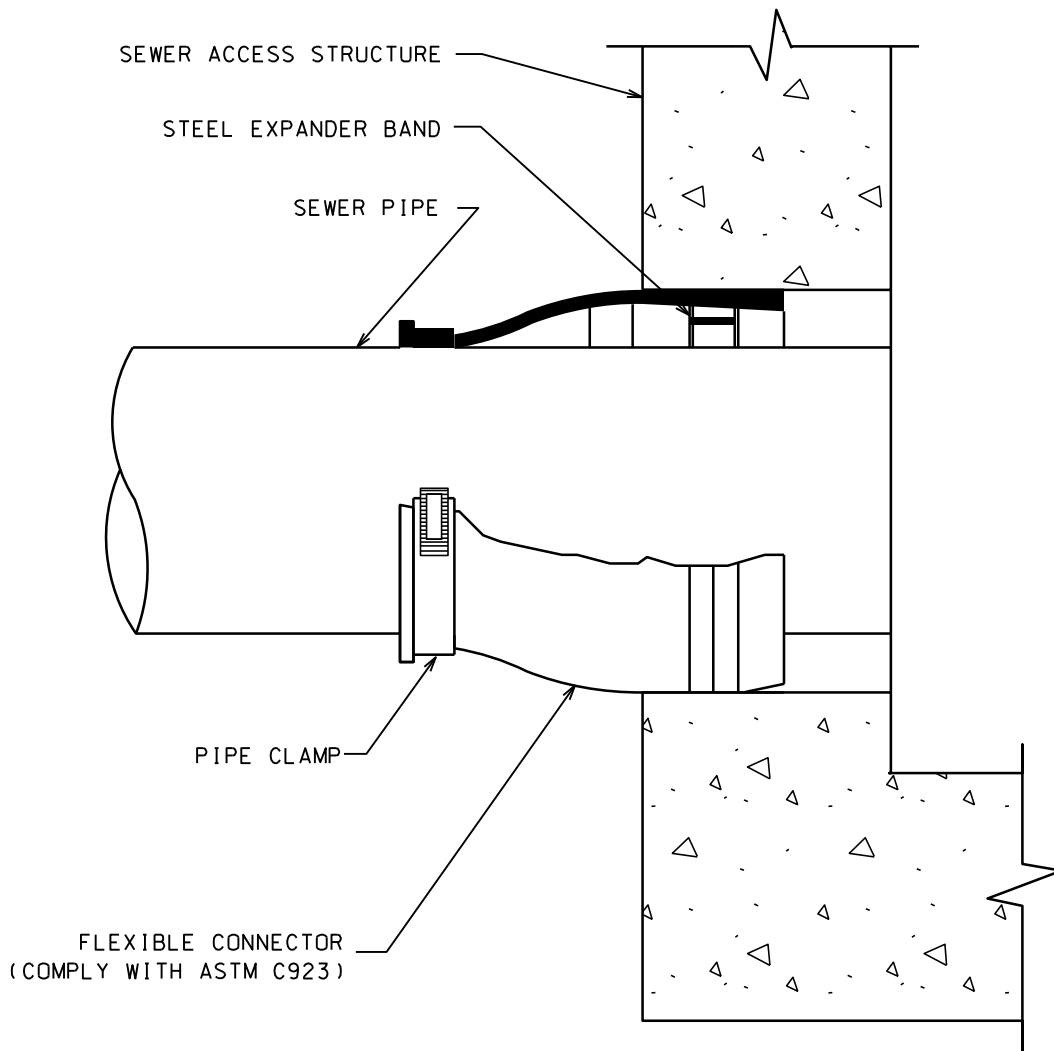
1. R-3067 CURB INLET FRAME WITH DIAGONAL GRATE (TYPE R) SHALL BE USED FOR TYPE "H" INLETS AT ALL LOW POINTS AND WHERE LONGITUDINAL ROAD SLOPE IS LESS THAN 1%. GRATE PER STANDARD DETAIL DRAWING 5.7.20
2. R-3067-V CURB INLET FRAME WITH VANE GRATE (TYPE V) SHALL BE USED FOR "H" INLETS AT ALL LOCATIONS HAVING A LONGITUDINAL ROAD SLOPE EQUAL TO OR GREATER THAN 1%. GRATE PER STANDARD DETAIL DRAWING 5.7.21

NOTE: ALL DIMENSIONS ARE SHOWN IN ENGLISH AND [METRIC].

GENERAL NOTES:

1. DETAILS OF CONSTRUCTION, MATERIALS, AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.
2. DETAIL DRAWINGS FOR PROPOSED ALTERNATE DESIGNS FOR INLET COVERS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PROVIDING THAT SUCH ALTERNATE DESIGNS MAKE PROVISION FOR EQUIVALENT CAPACITY AND STRENGTH.
3. ROUND FRAMES AND COVERS SHALL HAVE CONTINUOUSLY MACHINED BALL BEARING SURFACES TO PREVENT ROCKING AND RATTLING.
4. ACTUAL WEIGHT OF COVERS MAY VARY WITHIN 5 PERCENT (PLUS OR MINUS) OF THE APPROXIMATE WEIGHT.
5. INLETS SHALL BE DEPRESSED IN THE CURB FLOW LINE, SEE MADISON STANDARD DETAIL DRAWING 5.7.7

CITY OF MADISON ENGINEERING DIVISION
<h1>R-3067 FRAME</h1>
STANDARD DETAIL DRAWING 5.7.18

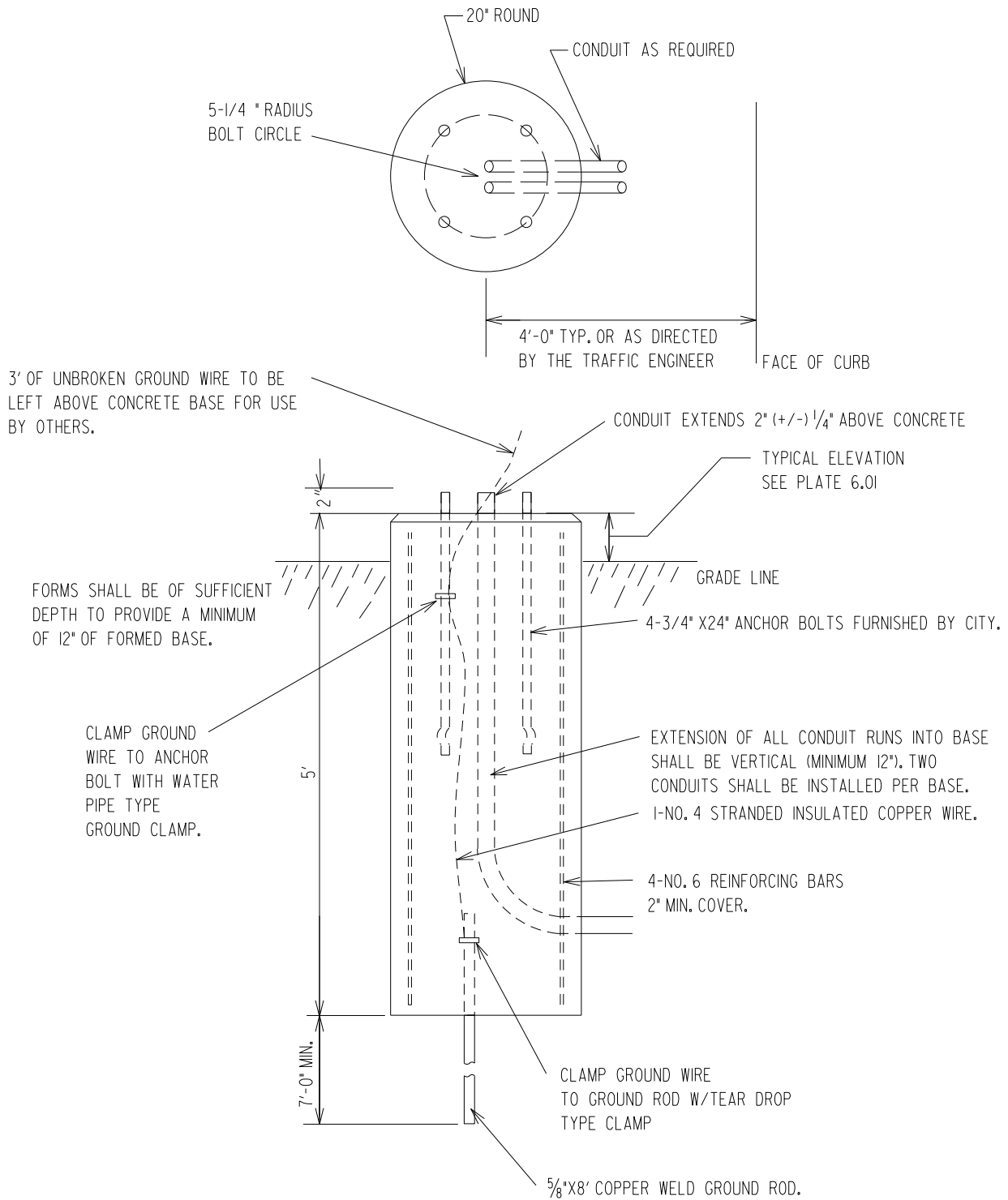


NOTES:

1. S.A.S. CONNECTIONS FOR SEWER MAINS SHALL BE MADE USING FLEXIBLE, WATERTIGHT CONNECTIONS SUCH AS KOR-N-SEAL I OR APPROVED EQUAL, UNLESS DIRECTED OTHERWISE BY ENGINEER.
2. ALL STAINLESS STEEL ELEMENTS OF CONNECTOR SHALL BE TOTALLY NON-MAGNETIC SERIES 304 STAINLESS, EXCLUDING THE WORM SCREW FOR TIGHTENING THE STEEL BAND AROUND THE PIPE WHICH SHALL BE SERIES 305 STAINLESS. THE WORM SCREW FOR TIGHTENING THE STEEL BAND SHALL BE TORQUED BY A BREAK-AWAY TORQUE WRENCH AVAILABLE FOR THE PRECAST S.A.S SUPPLIER AND SET FOR 60 - 70 INCH/LBS.
3. THE CONNECTOR SHALL BE INSTALLED IN THE S.A.S. WALL BY ACTIVATING THE EXPANDING MECHANISM IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE CONNECTOR MANUFACTURER.
4. THE CONNECTOR SHALL BE OF A SIZE SPECIFICALLY DESIGNED FOR THE PIPE MATERIAL AND SIZE BEING UTILIZED ON THE PROJECT.
5. ALL COSTS SHALL BE CONSIDERED INCIDENTAL TO THE S.A.S. AND/OR PIPE. THE ENGINEER RESERVES THE RIGHT TO REQUIRE A "CONCRETE ENCASEMENT" CONNECTION AT NO ADDITIONAL EXPENSE IN THE EVENT OF DESIGN CHANGE.
6. FLEXIBLE, WATERTIGHT CONNECTIONS SHALL ALSO BE USED AS REQUIRED FOR STORM SEWER CONNECTIONS.

2016

CITY OF MADISON ENGINEERING DIVISION
<b>FLEXIBLE PIPE TO S.A.S. CONNECTOR</b>
STANDARD DETAIL DRAWING 5.7.31



2015

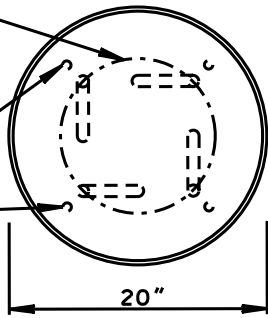
CITY OF MADISON  
TRAFFIC ENGINEERING DIVISION

**LB-1  
BASE DETAIL**

STANDARD DETAIL DRAWING 6.12

10" DIAMETER  
BOLT CIRCLE

4-NO 6 REBARS  
2" MIN COVER



3' OF UNBROKEN GROUND  
WIRE TO BE LEFT ABOVE  
CONCRETE BASE FOR USE  
BY OTHERS

EXISTING TERRACE

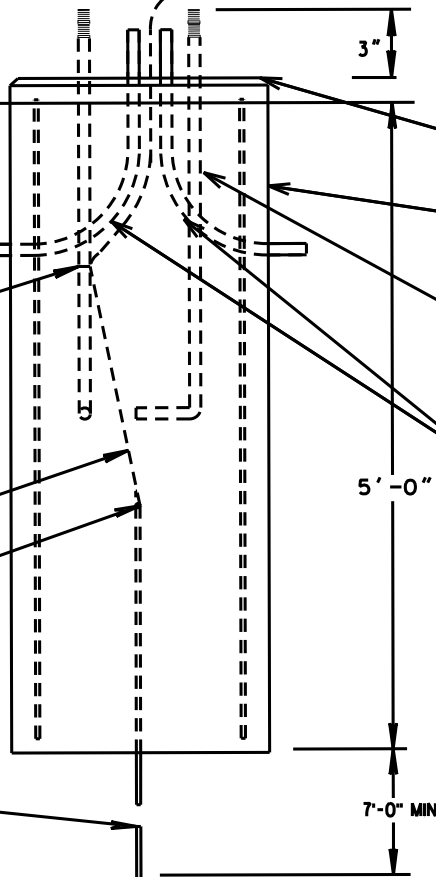
CONDUIT MUST BE  
30" BELOW TOP OF  
BASE

CLAMP GROUND WIRE TO  
ANCHOR BOLT W/WATER  
PIPE TYPE GROUND CLAMP

1-NO 4 STRANDED  
INSULATED COPPER WIRE

CLAMP GROUND WIRE TO  
GROUND ROD W/TEAR  
DROP TYPE CLAMP

5/8" X 8' COPPER WELD  
GROUND ROD



3/4" - 45° BEVEL

FORMS SHALL BE OF SUFFICIENT DEPTH  
TO PROVIDE A MINIMUM OF 12" OF FORMED  
BASE BELOW GRADE ON LOW SIDE.

3/4" X 24" ANCHOR BOLTS WITH 3"  
OF THREAD AT TOP AND 4" L-BEND  
AT BOTTOM.

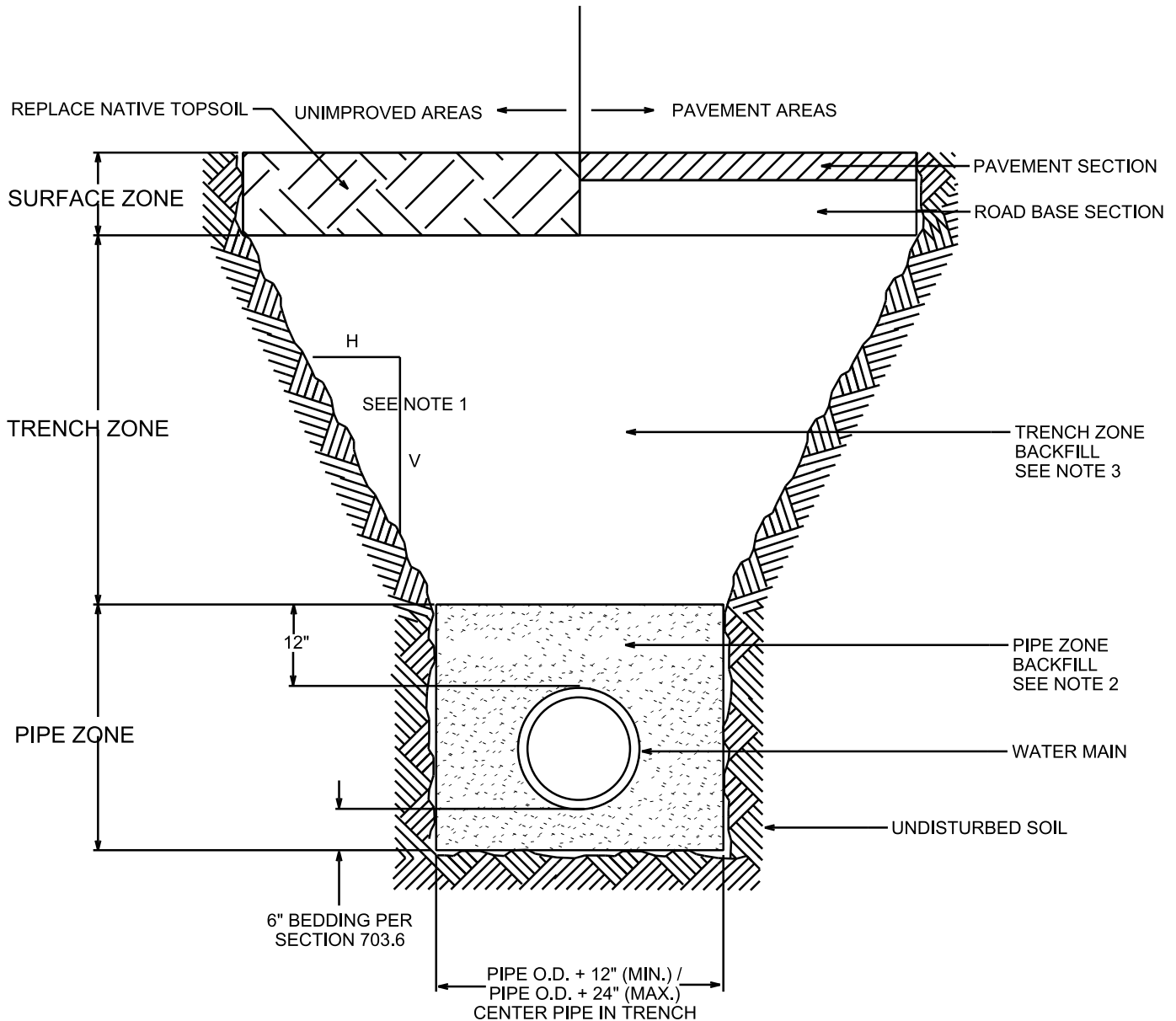
INSTALL PVC ELBOWS OUT OF  
EACH SIDE OF THE BASE AS NEEDED

2015

CITY OF MADISON  
TRAFFIC ENGINEERING DIVISION

LB-9  
BASE DETAIL

STANDARD DETAIL DRAWING 6.45



**NOTES:**

- 1) ALL EXCAVATION SHALL BE IN ACCORDANCE WITH THE WISCONSIN ADMINISTRATIVE CODE FOR "TRENCH EXCAVATION AND TUNNEL CONSTRUCTION" AND ANY ADDITIONAL REQUIREMENTS INCLUDING IN THE CONTRACT DOCUMENTS.
- 2) BACKFILL OPERATIONS SHALL COMPLY WITH SECTIONS 703.6 AND 202.2(B) OF THE STANDARD SPECIFICATIONS.
- 3) THE PIPE ZONE BEDDING MATERIAL SHALL CONSIST OF SELECT FILL SAND, LIMESTONE SCREENINGS, CLEAR STONE, OR WASHED GRAVEL.
- 4) SEE SECTION 703.6.1 FOR BACKFILL/COMPACTION REQUIREMENTS OF BEDDING/COVER MATERIAL IN THE PIPE ZONE.
- 5) TRENCH ZONE COMPACTION REQUIREMENTS:
  - ALL COMPACTION OPERATIONS SHALL COMPLY WITH SECTION 703.6.3
  - DENSITY REQUIREMENTS:
    1. FROM 2-FEET OVER THE PIPE TO WITHIN 3-FEET OF THE SUBGRADE:  
A MINIMUM OF 90% OF MAXIMUM DENSITY.
    2. WITHIN 3-FEET OF THE BOTTOM OF SUBGRADE:  
A MINIMUM OF 95% OF MAXIMUM DENSITY.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

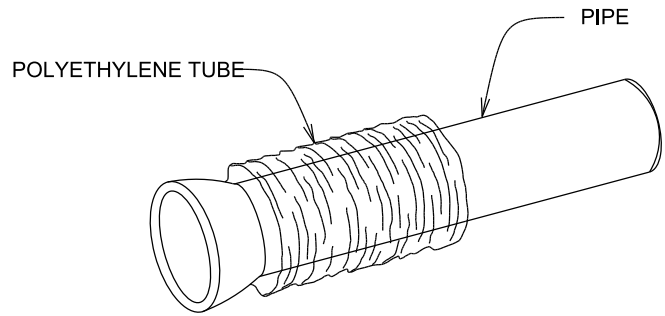
TYPICAL WATER PIPE TRENCH



**FIELD INSTALLATION-POLYETHYLENE WRAP**

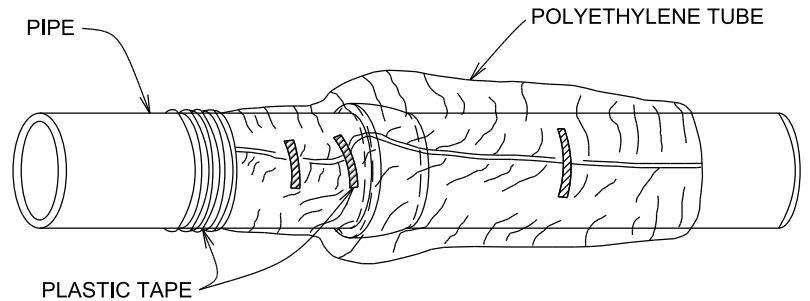
**STEP-1**

CLEAN SURFACE OF PIPE. CUT POLYETHYLENE TWO FEET LONGER THAN THE PIPE (8 MIL MIN.). PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH. DIG BELL HOLES AT JOINTS, LOWER PIPE.



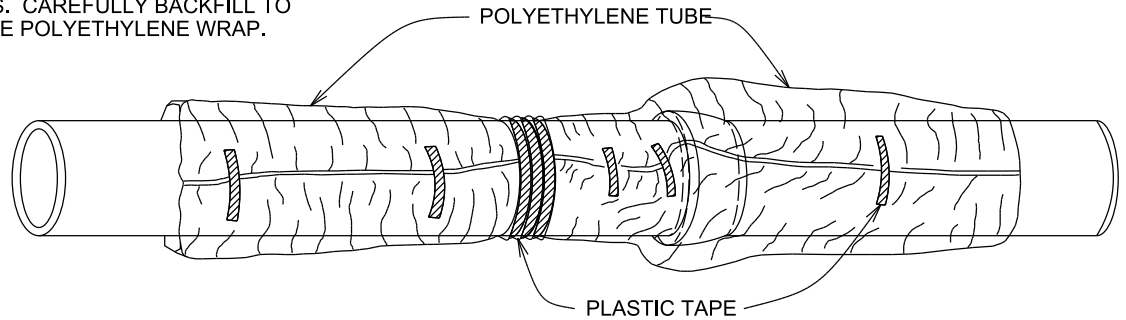
**STEP-2**

LIFT ENOUGH TO PULL THE TUBE OVER THE PIPE. TAPE TUBE TO PIPE AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH THREE CIRCUMFERENTIAL TURNS OF TWO-INCH WIDE PLASTIC TAPE TO HOLD PLASTIC TUBE AROUND SPIGOT END.



**STEP-3**

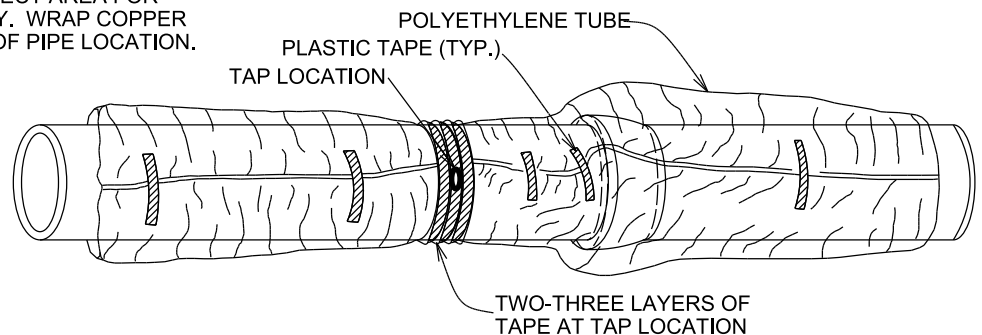
ADJACENT TUBE OVERLAPS FIRST TUBE AND IS SECURED WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE WILL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED INTO AN OVERLAP ON TOP OF THE PIPE AND HELD IN PLACE BY MEANS OF PIECES OF THE PLASTIC TAPE AT APPROX. THREE FOOT INTERVALS. REPAIR ANY TEARS WITH TAPE OR SECURED POLYWRAP PATCHES. CAREFULLY BACKFILL TO AVOID DAMAGING THE POLYETHYLENE WRAP.

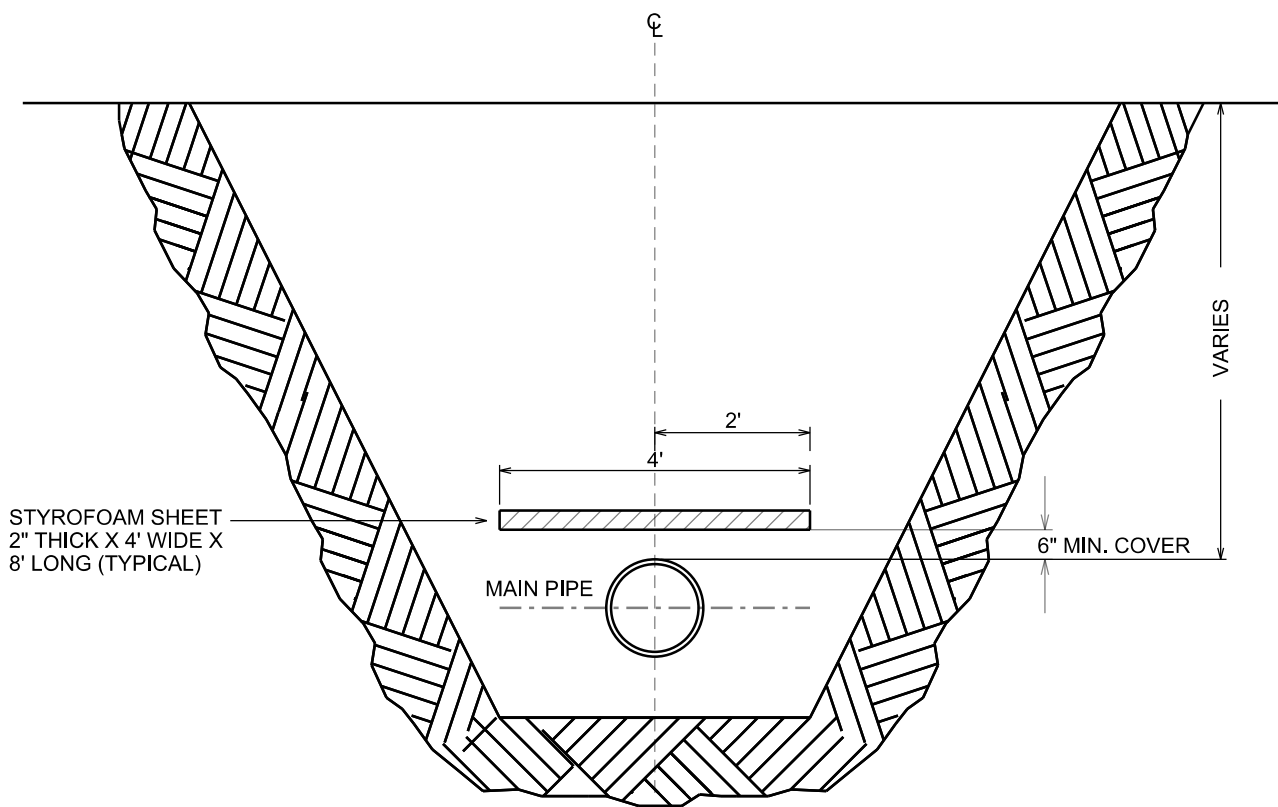


**TAPPING POLYETHYLENE WRAP**

**STEP-1**

WRAP TWO OR THREE LAYERS OF TAPE COMPLETELY AROUND PIPE WHERE TAPPING MACHINE WILL BE PLACED. MOUNT TAPPING MACHINE ON TAPED AREA AND TAP DIRECTLY THROUGH THE TAPE AND POLYETHYLENE WRAP. INSTALL CORPORATION STOP. INSPECT AREA FOR DAMAGE AND REPAIR IF NECESSARY. WRAP COPPER SERVICE LINE WITHIN THREE FEET OF PIPE LOCATION.



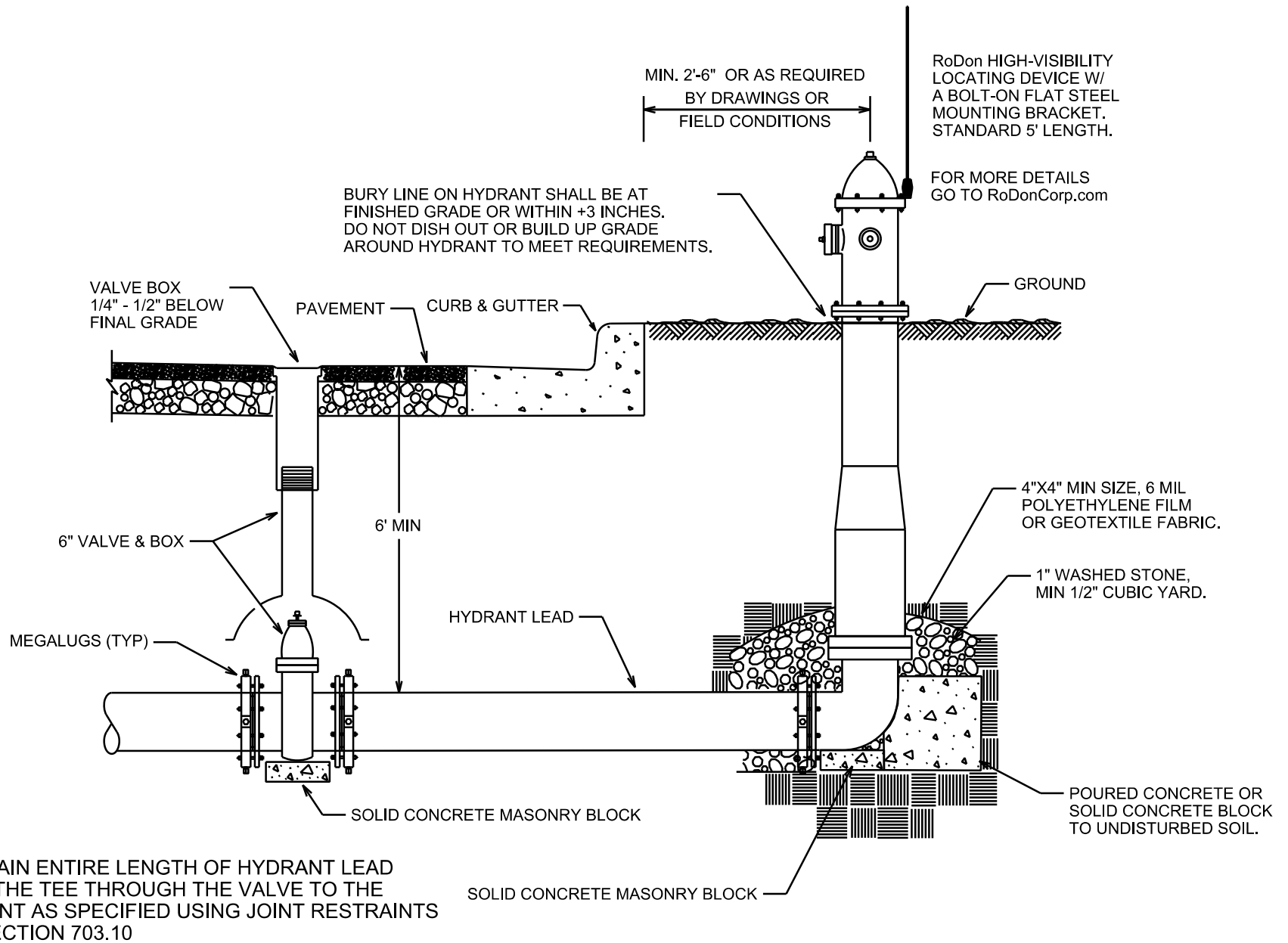


NOTE: ALL STYROFOAM TO BE 2" THICK  
HIGH DENSITY POLYSTYRENE BOARD

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

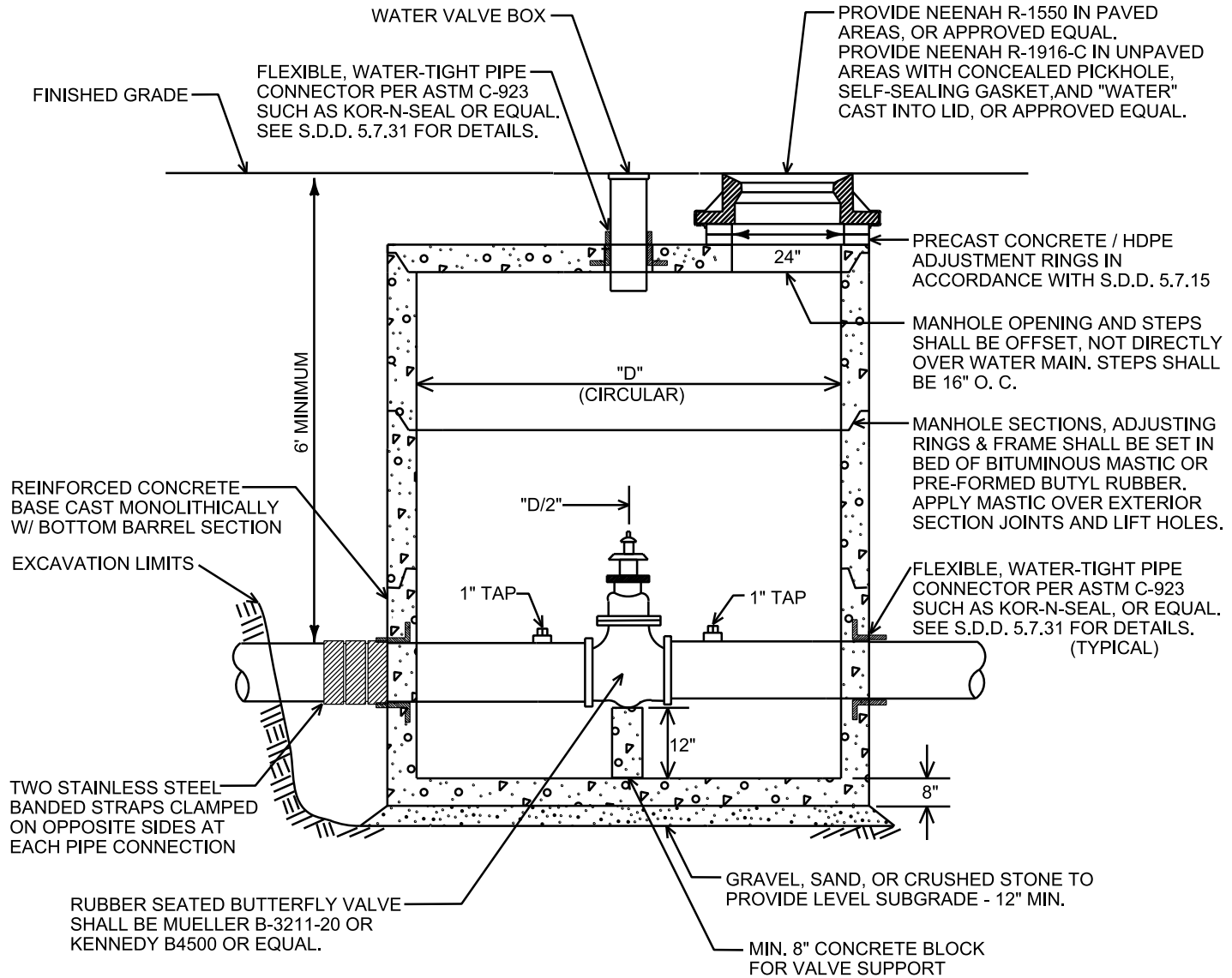
TYPICAL STYROFOAM  
INSTALLATION



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WATER UTILITY

NOT TO SCALE

TYPICAL HYDRANT INSTALLATION



WATER VALVE MANHOLE

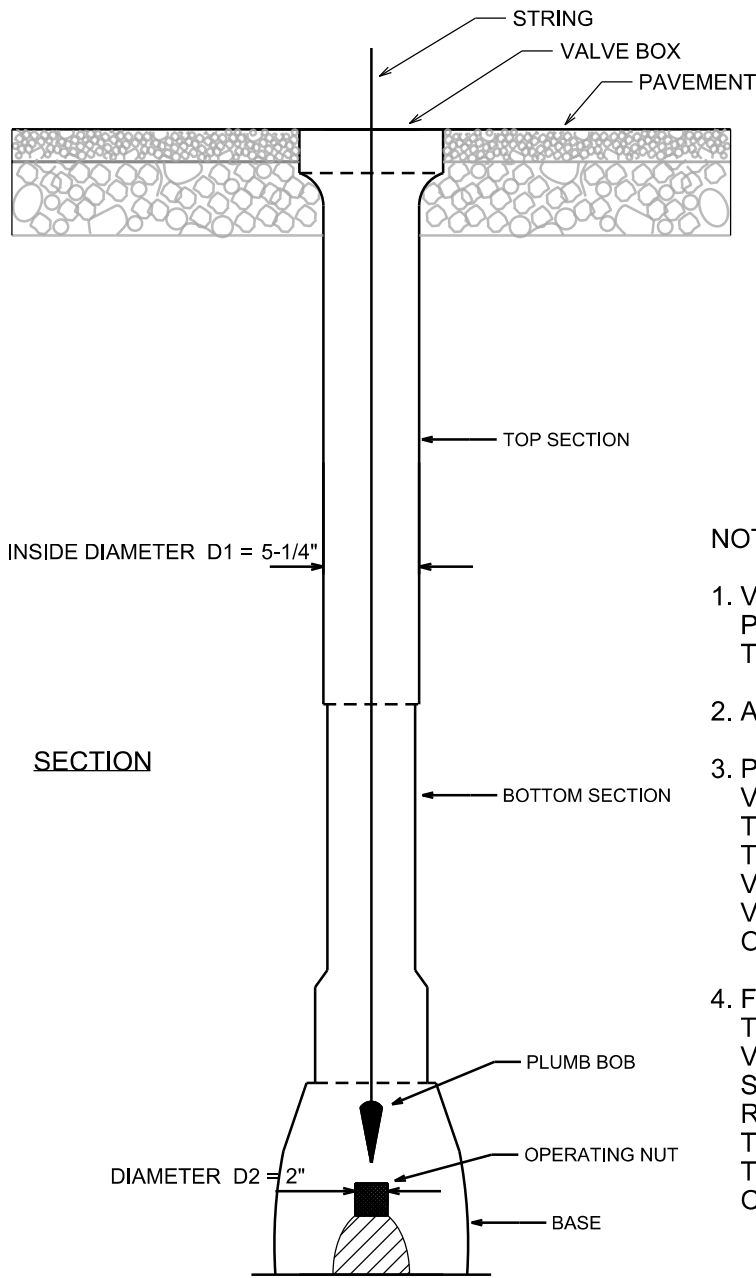
**NOTES:**

1. DIMENSION "D" SHALL BE 48" WHEN WATERMAIN IS LESS THAN 10" IN DIAMETER, 60" WHEN DIAMETER OF MAIN IS 10" OR 12", 72" WHEN DIAMETER OF MAIN IS 14" OR 16", AND 84" WHEN DIAMETER OF MAIN IS 18" OR LARGER.
2. THE CONTRACT UNIT PRICE FOR "WATER VALVE MANHOLE" SHALL INCLUDE THE COST OF FURNISHING AND PLACING 6" LEVELING BASE AS SPECIFIED, AND THE COST OF FURNISHING AND PLACING THE SPECIFIED FRAME AND COVER.
3. VALVE BOX SHALL BE ALIGNED OVER OPERATING NUT SO THAT VALVE CAN BE KEYPED WITHOUT TWIST OR TORQUE.
4. MANHOLE SHALL BE WATER TIGHT.

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WATER UTILITY

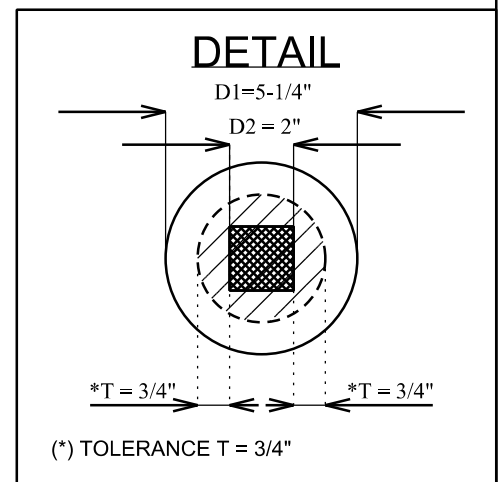
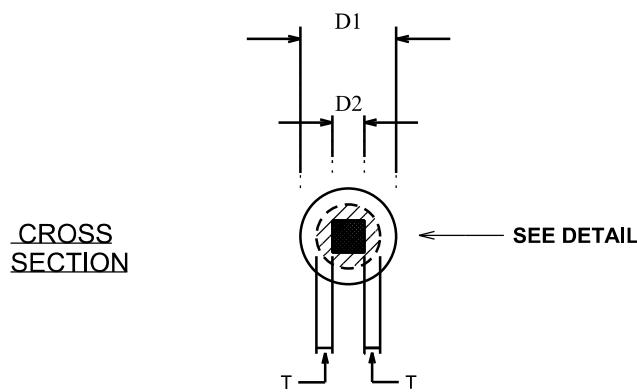
NOT TO SCALE

WATER MAIN VALVE  
ACCESS STRUCTURE



NOTES:

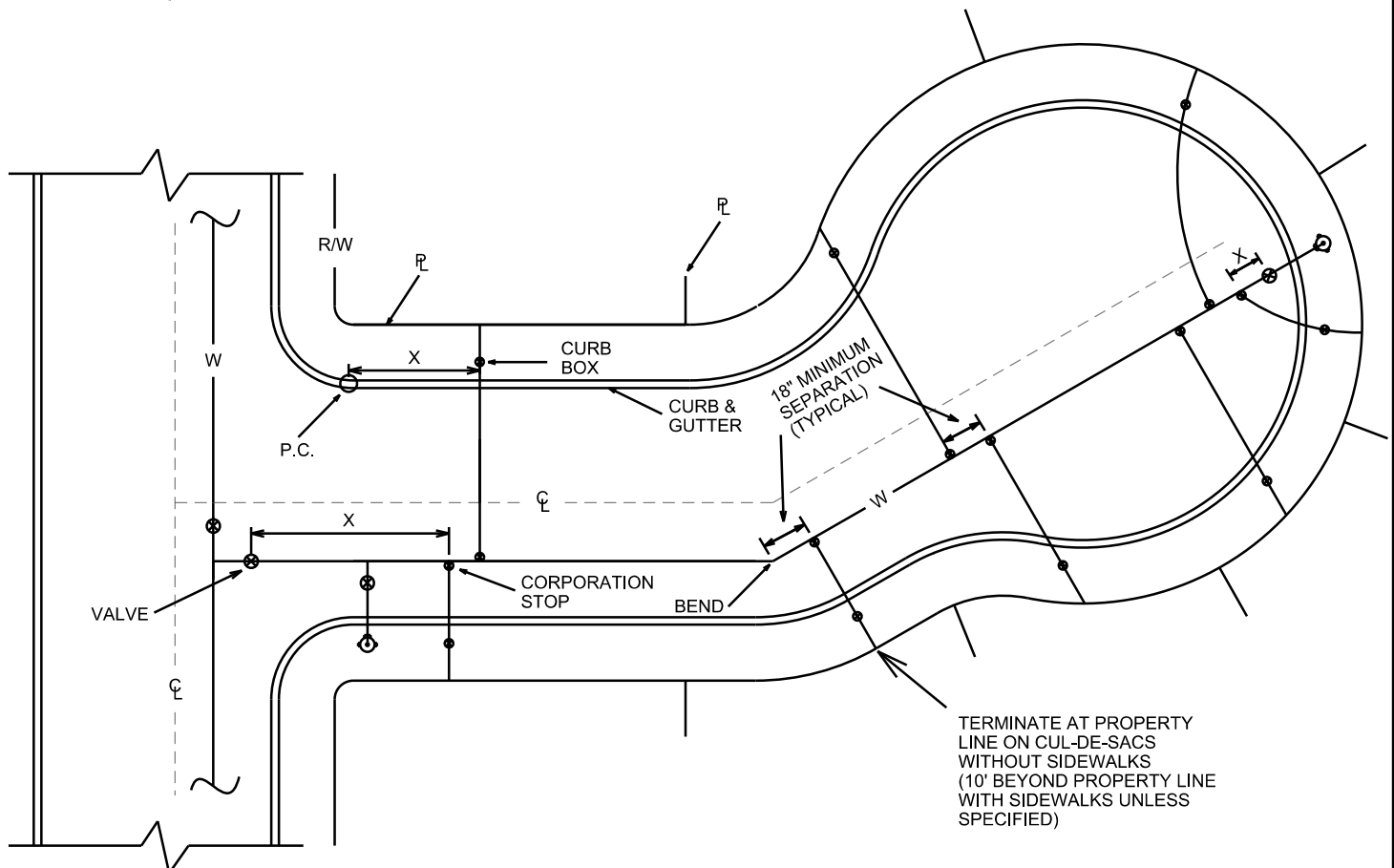
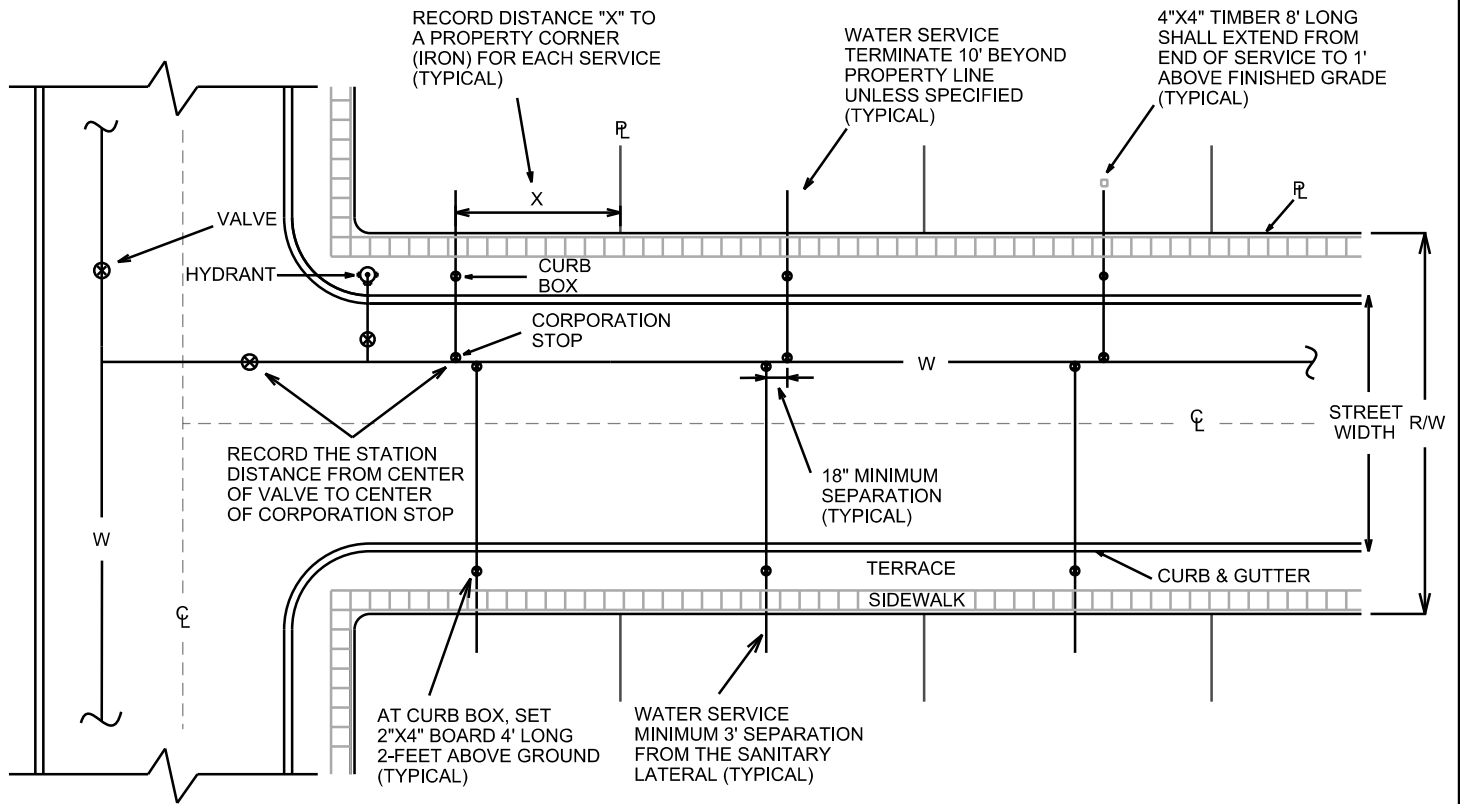
1. VALVE BOX SHALL BE LOCATED PLUMB AND CENTERED WITH RESPECT TO THE VALVE OPERATING NUT.
2. ALLOWABLE TOLERANCE SHALL BE 3/4"
3. PLUMBNESS AND ALIGNMENT SHALL BE VERIFIED WITH A PLUMB BOB, LOCATING THE VALVE NUT WITHIN THE ALLOWABLE TOLERANCE, AND CONFIRMING THAT THE VALVE IS OPERATIONAL WITHOUT THE VALVE KEY TOUCHING THE INSIDE EDGE OF THE VALVE BOX.
4. FOR STREETS WITH SLOPE GREATER THAN 3% THAT DOES NOT ALLOW EASY PLUMBNESS VERIFICATION, THE VALVE BOX STRAIGHTNESS SHALL BE VISUALLY ASSESSED VERIFYING ITS RELATIVE CENTERED POSITION, CONFIRMING THAT THE VALVE IS OPERATIONAL WITHOUT THE VALVE KEY TOUCHING THE INSIDE EDGE OF THE VALVE BOX AND RESTRICTING ITS USE.



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WATER UTILITY

NOT TO SCALE

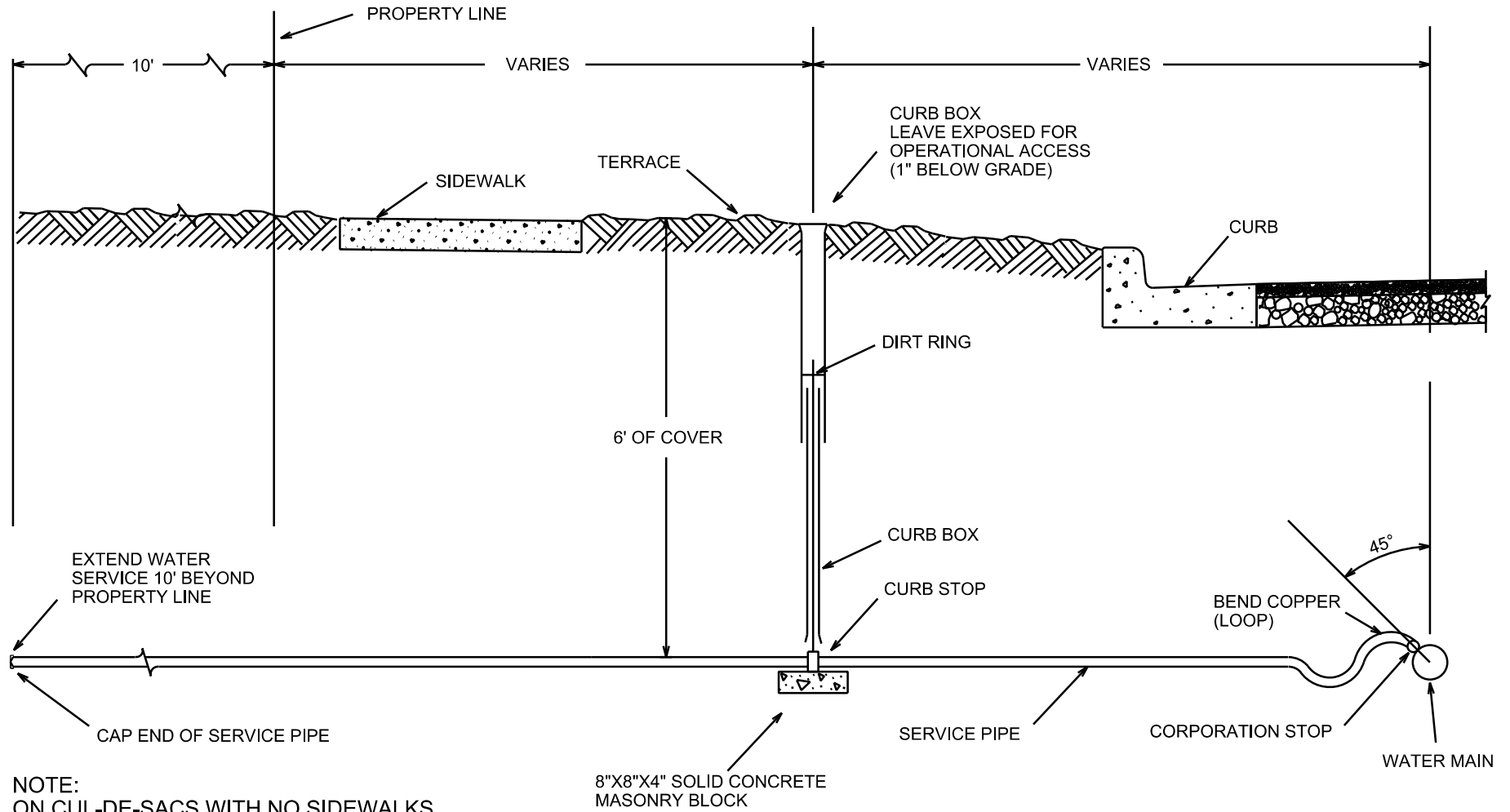
WATER VALVE BOX ALIGNMENT



CITY OF MADISON  
WATER UTILITY

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LOCATION OF WATER SERVICES

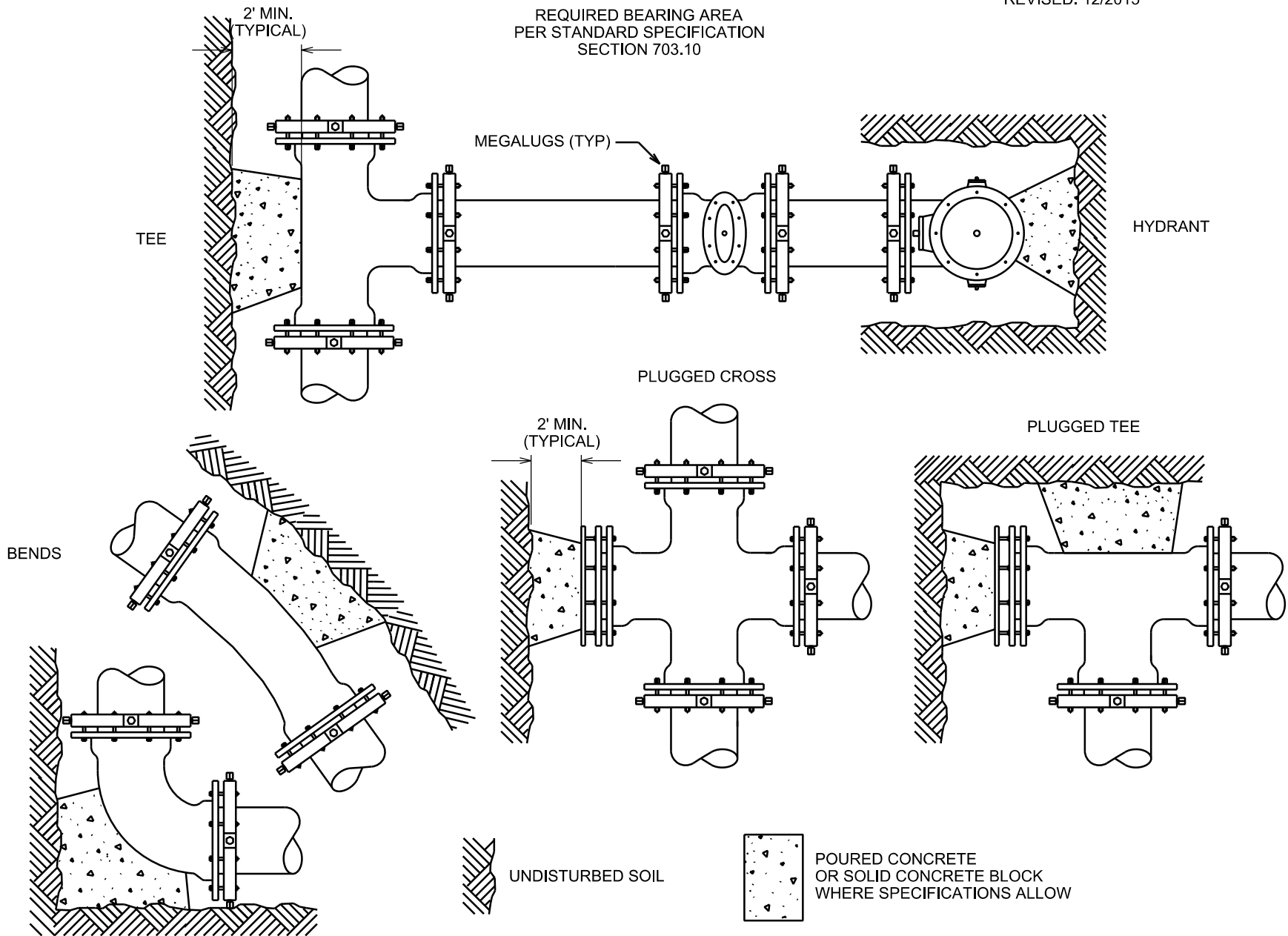


NOTE:  
ON CUL-DE-SACS WITH NO SIDEWALKS,  
WATER SERVICE PIPE TO END AT  
PROPERTY LINE.

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WATER UTILITY

NOT TO SCALE

SERVICE INSTALLATION -  
PRIVATE CONTRACT



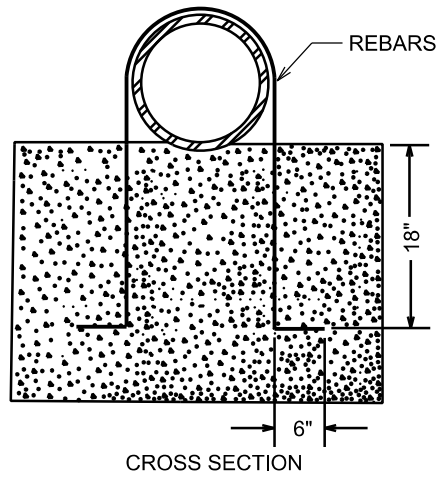
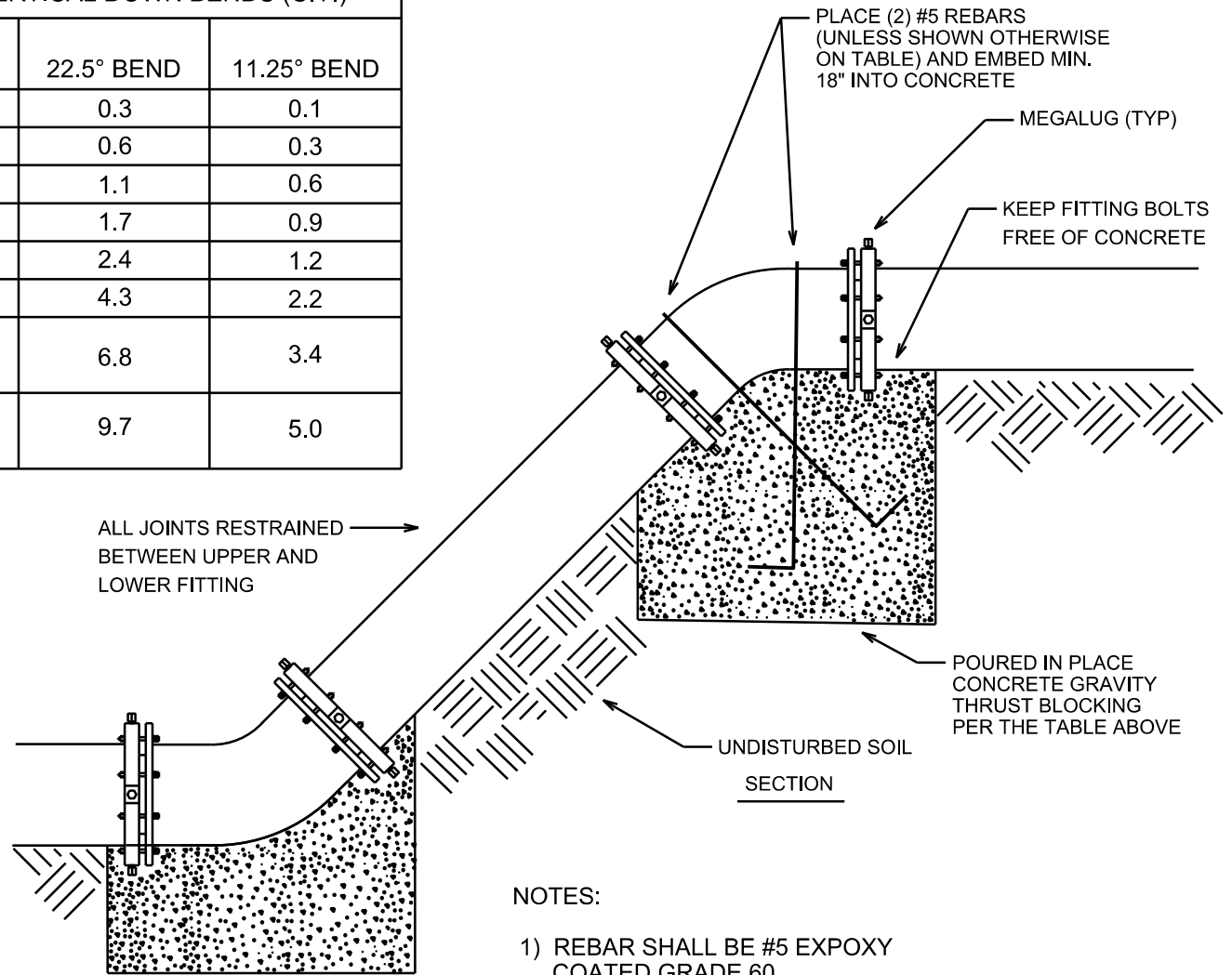
CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

STANDARD CONCRETE BLOCK  
THRUST RESTRAINT



VOLUME REQUIREMENT FOR VERTICAL DOWN BENDS (C.Y.)				
FITTING SIZE (IN)	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4	0.7	0.5	0.3	0.1
6	1.6	1.1	0.6	0.3
8	2.8	2.0	1.1	0.6
10	4.4	3.1	1.7	0.9
12	6.4	4.5	2.4	1.2
16	11.3	8.0	4.3	2.2
20	17.7 3 BARS	12.5 3 BARS	6.8	3.4
24	25.4 6 BARS	18.0 4 BARS	9.7	5.0



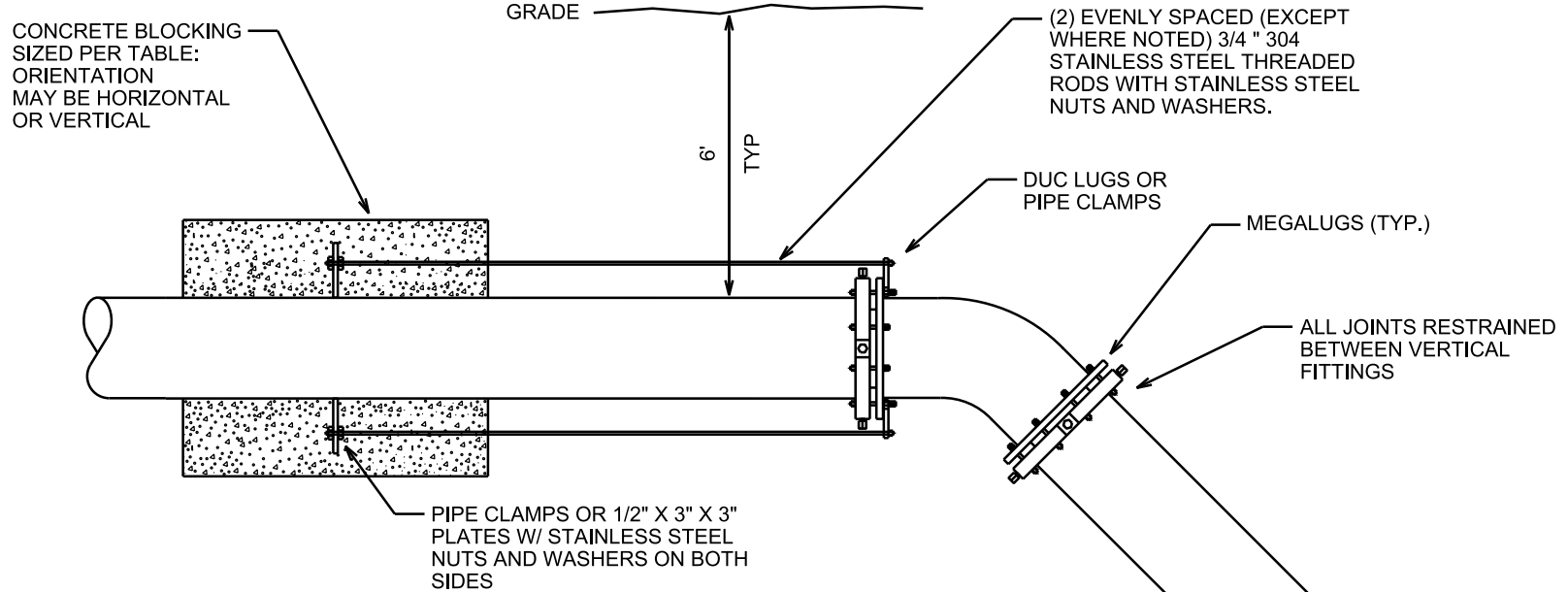
NOTES:

- 1) REBAR SHALL BE #5 EXPOXY COATED GRADE 60
- 2) CONCRETE SHALL BE MIN. 3,000 PSI COMPRESSIVE STRENGTH
- 3) ABOVE VALUES ARE BASED ON 150 PSI TEST PRESSURE FOR OTHER TEST PRESSURES PROPORTION AS FOLLOWS:  
BLOCK VOLUME=TEST PRESSURE/150 X TABLE VALUE

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

GRAVITY BLOCK THRUST RESTRAINT  
FOR VERTICAL BENDS



VOLUME OF POURED CONCRETE BLOCKING (C.Y.) *				
FITTING SIZE (IN)	90° BEND	45° BEND	22.5° BEND	11.25° BEND
4	0.1	0.1	0.1	0.1
6	0.3	0.2	0.1	0.1
8	0.7	0.4	0.2	0.1
10	1.3	0.8	0.3	0.1
12	2.1	1.3	0.6	0.2
16	4.6	2.9	1.3	0.5
20	8.2 4 RODS	5.4 3 RODS	2.3	0.9
24	13.0 5 RODS	8.4 4 RODS	3.8	1.5

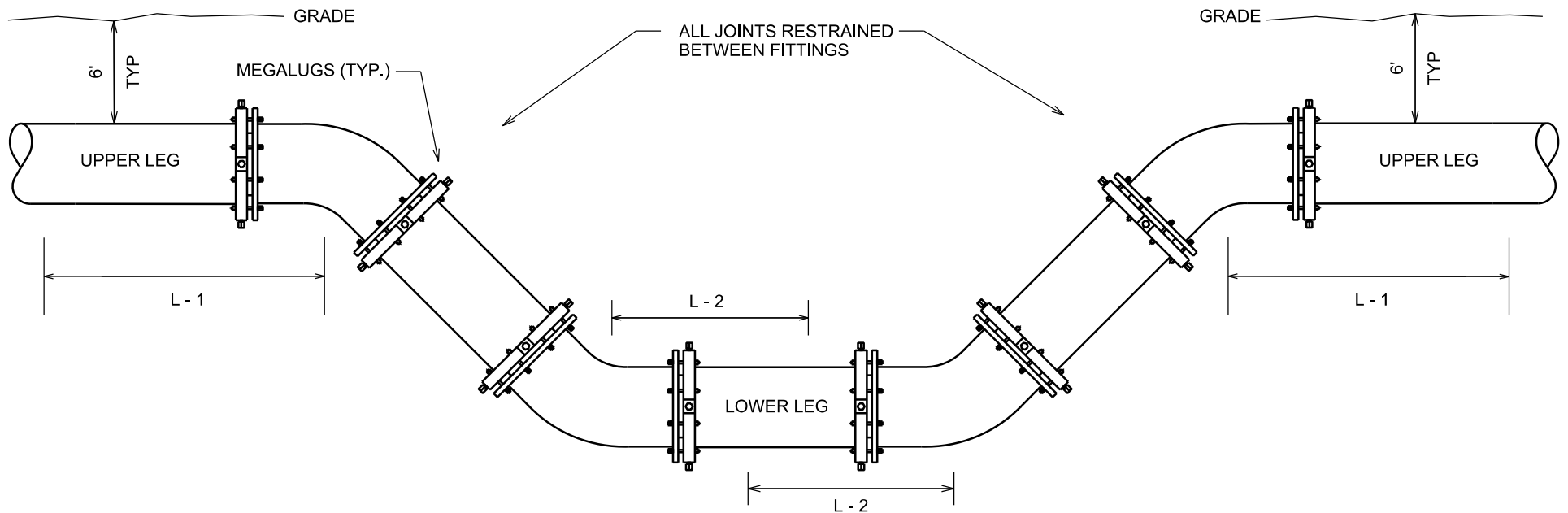
\* CONCRETE SHALL BE A MIN. 3000 PSI COMPRESSIVE STRENGTH

NOTE:  
THIS METHOD MAY ONLY BE USED WHERE SPECIFIED OR WITH ENGINEER'S APPROVAL

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

ROD & CONCRETE BLOCK THRUST RESTRAINT  
FOR VERTICAL BENDS



L - 1: RESTRAINED JOINT LENGTH  
UPPER LEG OF VERTICAL BEND

L - 2: RESTRAINED JOINT LENGTH  
LOWER LEG OF VERTICAL BEND

FITTING SIZE (IN)	90° BEND		45° BEND		22.5° BEND		11.25° BEND	
	L - 1 (FT)	L - 2 (FT)	L - 1 (FT)	L - 2 (FT)	L - 1 (FT)	L - 2 (FT)	L - 1 (FT)	L - 2 (FT)
4	34	30	16	3	8	2	4	1
6	47	43	21	4	11	2	6	1
8	60	56	27	5	13	3	7	2
10	72	68	31	6	16	3	8	2
12	84	80	37	7	18	4	9	2
16	108	104	46	10	23	5	12	3
20	132	128	56	12	28	6	14	3
24	154	150	66	13	32	7	16	4

NOTES:

SOURCE: Adapted from the EBAA Iron Restraint Length Calculator, Version 6.3  
 Materials = Poly Wrapped Ductile Iron Pipe  
 Soil Type = GM (Silty Gravels, Gravel-Sand-Silt Mixtures)  
 Test Pressure = 150 PSI

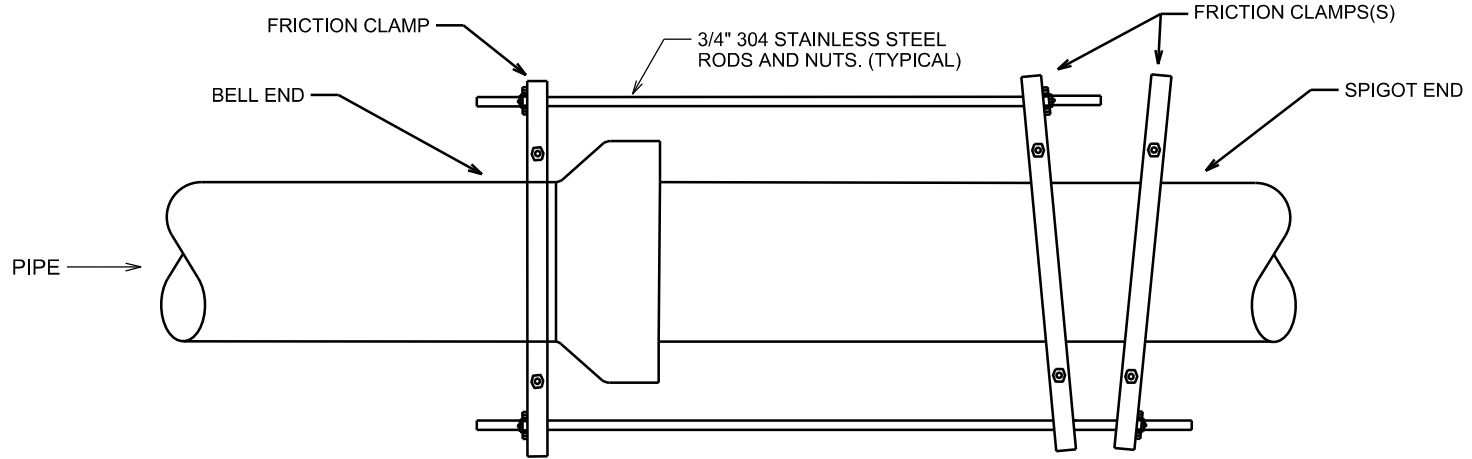
Safety Factor = 1.5  
 Trench Type = 4  
 High Side Depth = 6'  
 Low Side Depth = 8'

CITY OF MADISON  
WATER UTILITY

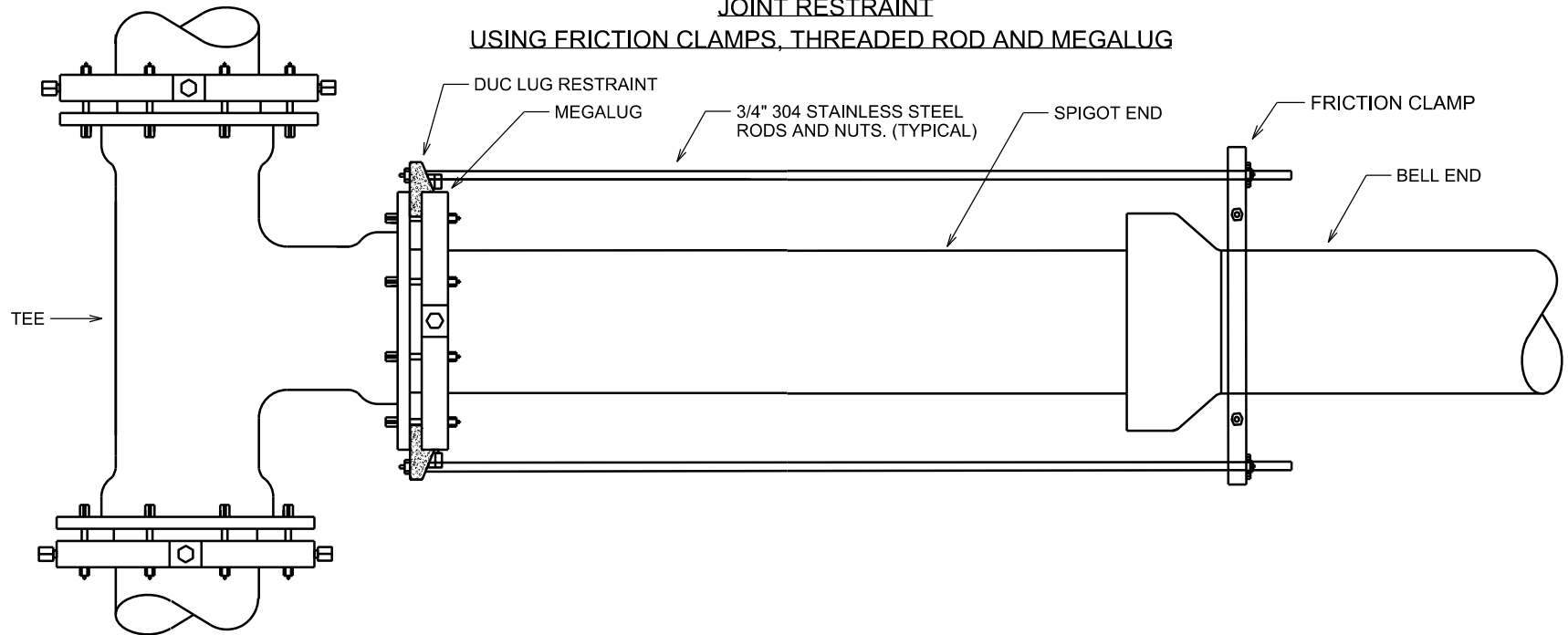
NOT TO SCALE

JOINT RESTRAINT LENGTHS  
FOR VERTICAL BENDS

**JOINT RESTRAINT  
USING FRICTION CLAMPS AND THREADED ROD**



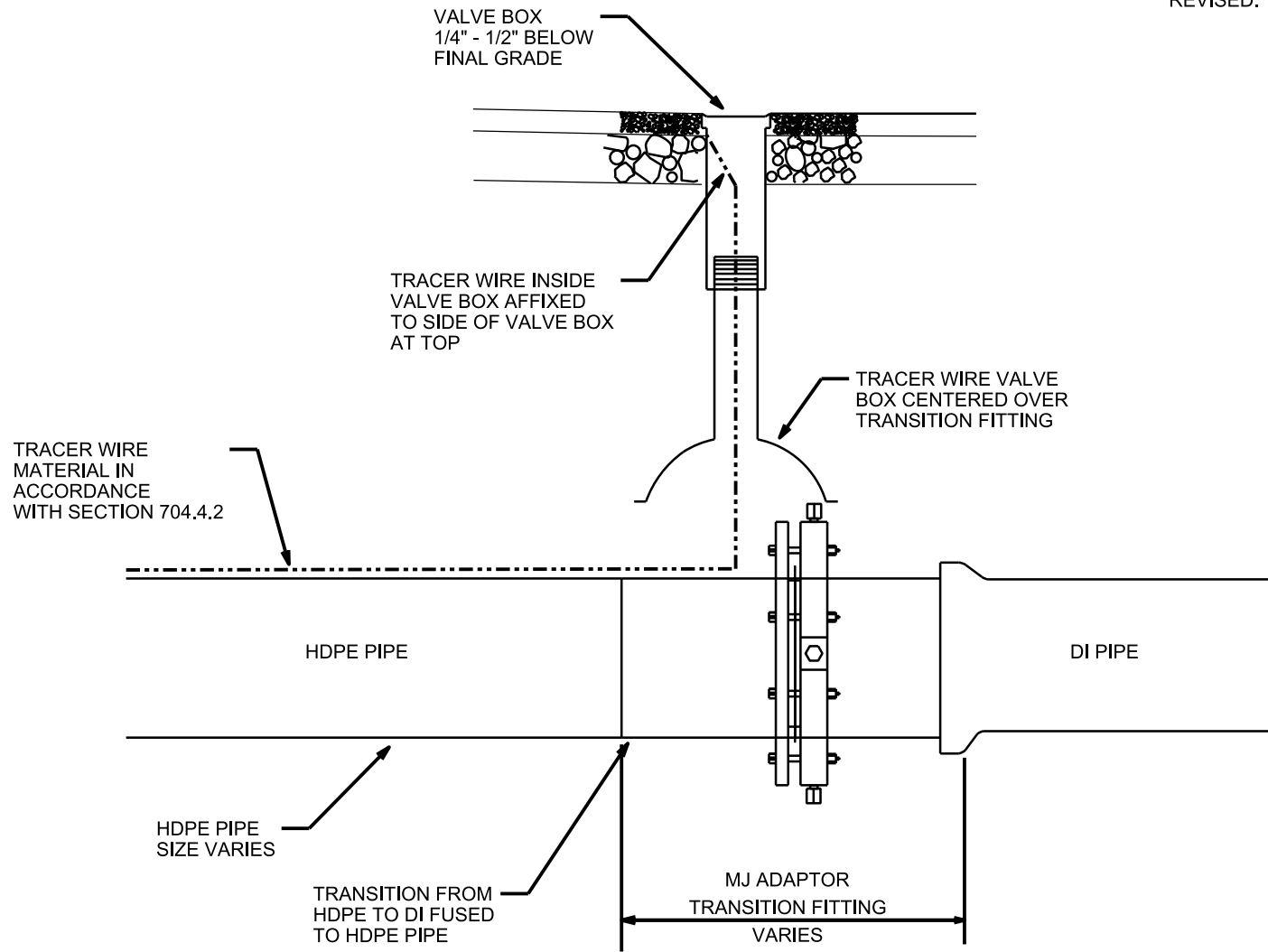
**JOINT RESTRAINT  
USING FRICTION CLAMPS, THREADED ROD AND MEGALUG**



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WATER UTILITY

NOT TO SCALE

THREADED ROD - JOINT RESTRAINT



NOTE:

SEE PIPE MANUFACTURES STANDARDS  
FOR ADDITIONAL INFORMATION. ENGINEER  
MUST APPROVE VARIANCES.

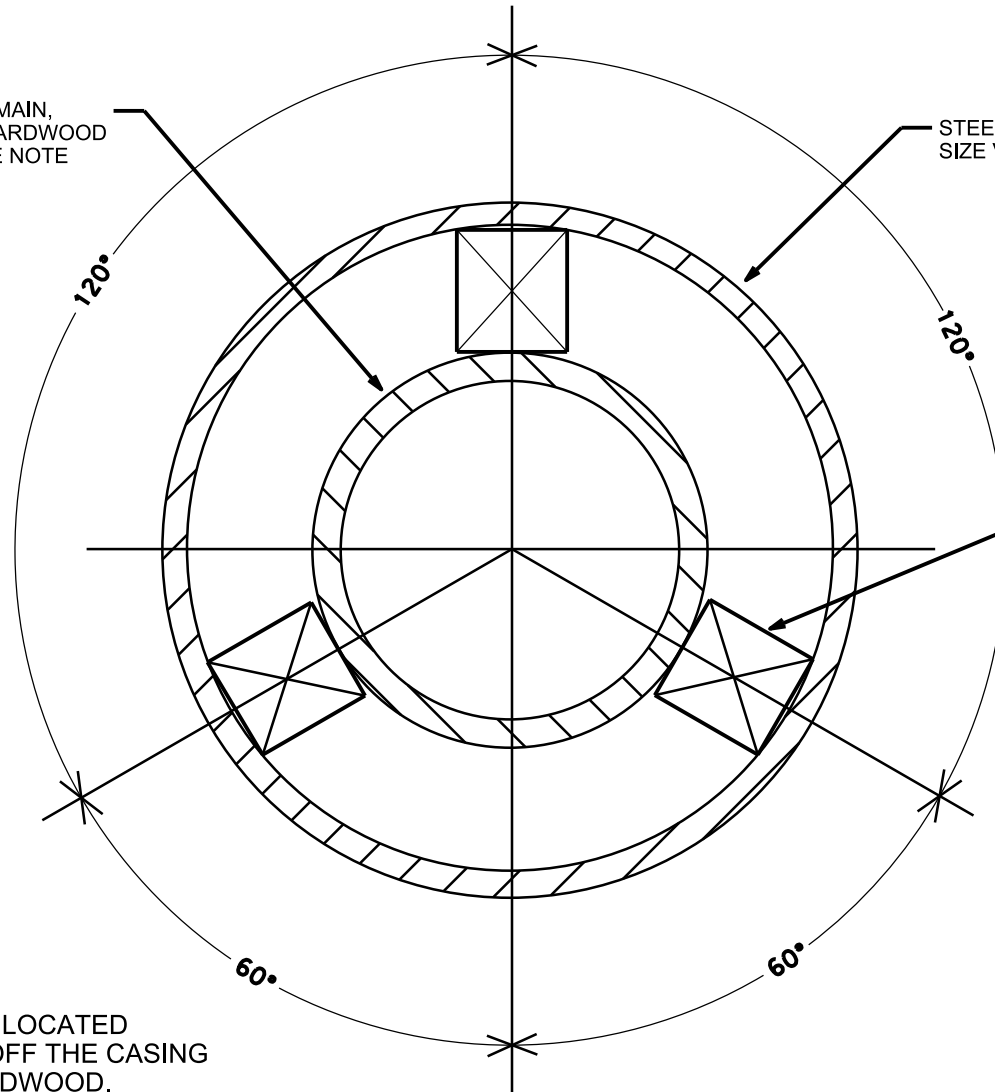
CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

STANDARD HDPE TRACER WIRE VALVE BOX

DUCTILE IRON WATER MAIN,  
12" PIPE MAX. USING HARDWOOD  
TIMBER SPACERS. SEE NOTE  
BELOW

STEEL CASING  
SIZE VARIIES



4" X 4" HARDWOOD SPACERS,  
MIN. 4' LONG STRAPPED  
TO THE PIPE.  
MIN. 3 STRAPS PER  
LOCATION

NOTES:

-TIMBER SPACERS SHALL BE LOCATED  
NEAR THE BELL TO KEEP IT OFF THE CASING  
AND SHALL BE MADE OF HARDWOOD.

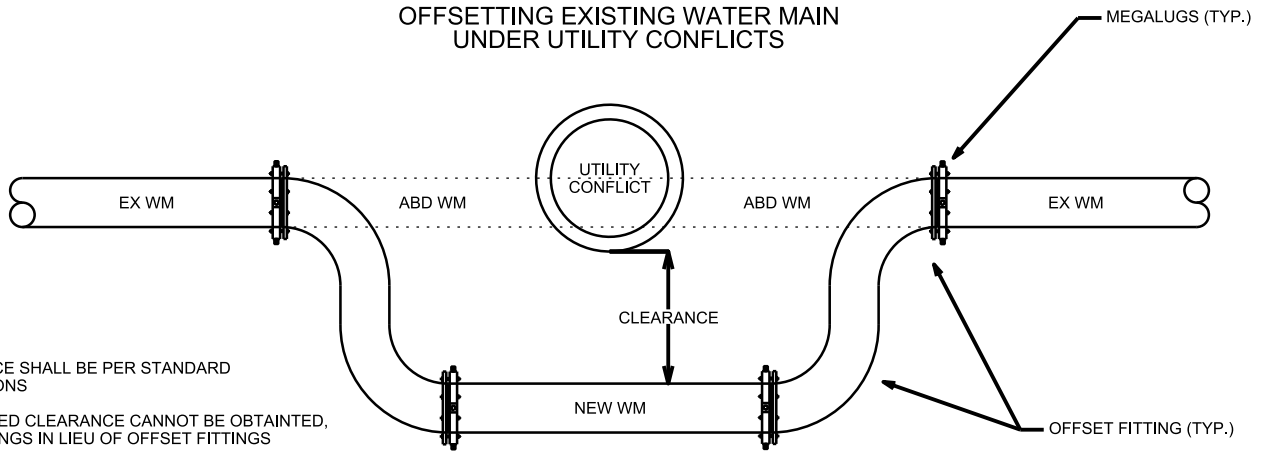
-TIMBER SPACERS SHOULD ONLY BE  
USED FOR CASINGS UP TO 60' LONG.  
FOR LONGER LENGTHS AND BIGGER PIPE,  
APPROVED MANUFACTURED CASING SPACERS  
WILL BE REQUIRED.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

CASING SPACERS

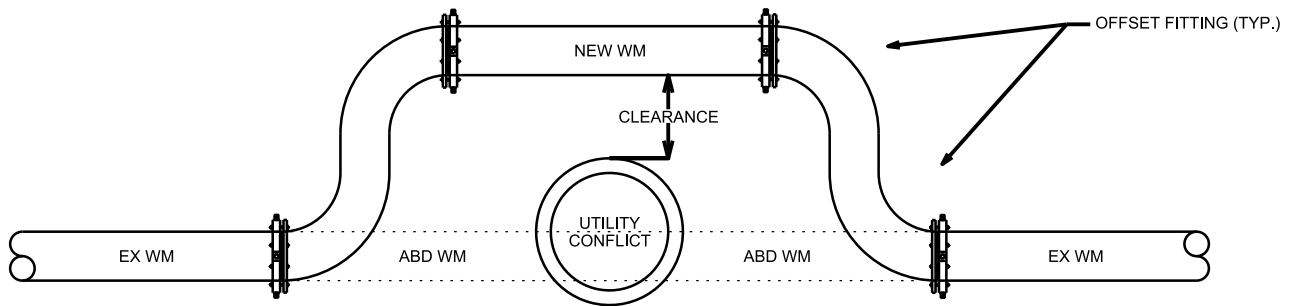
OFFSETTING EXISTING WATER MAIN UNDER UTILITY CONFLICTS



NOTES:

- 1) CLEARANCE SHALL BE PER STANDARD SPECIFICATIONS
- 2) IF REQUIRED CLEARANCE CANNOT BE OBTAINED, USE 45° FITTINGS IN LIEU OF OFFSET FITTINGS
- 3) 11.25°, 22.5°, OR 90° FITTINGS NOT ALLOWED WITHOUT APPROVAL
- 4) INSULATE AS REQUIRED PER STANDARD SPECIFICATIONS
- 5) FITTINGS CONNECTED TO EX WM WITH CUT-IN CONNECTIONS PER STANDARD SPECIFICATIONS
- 6) NEW PIPE SHALL HAVE NO JOINTS BETWEEN FITTINGS

OFFSETTING EXISTING WATER MAIN OVER UTILITY CONFLICTS



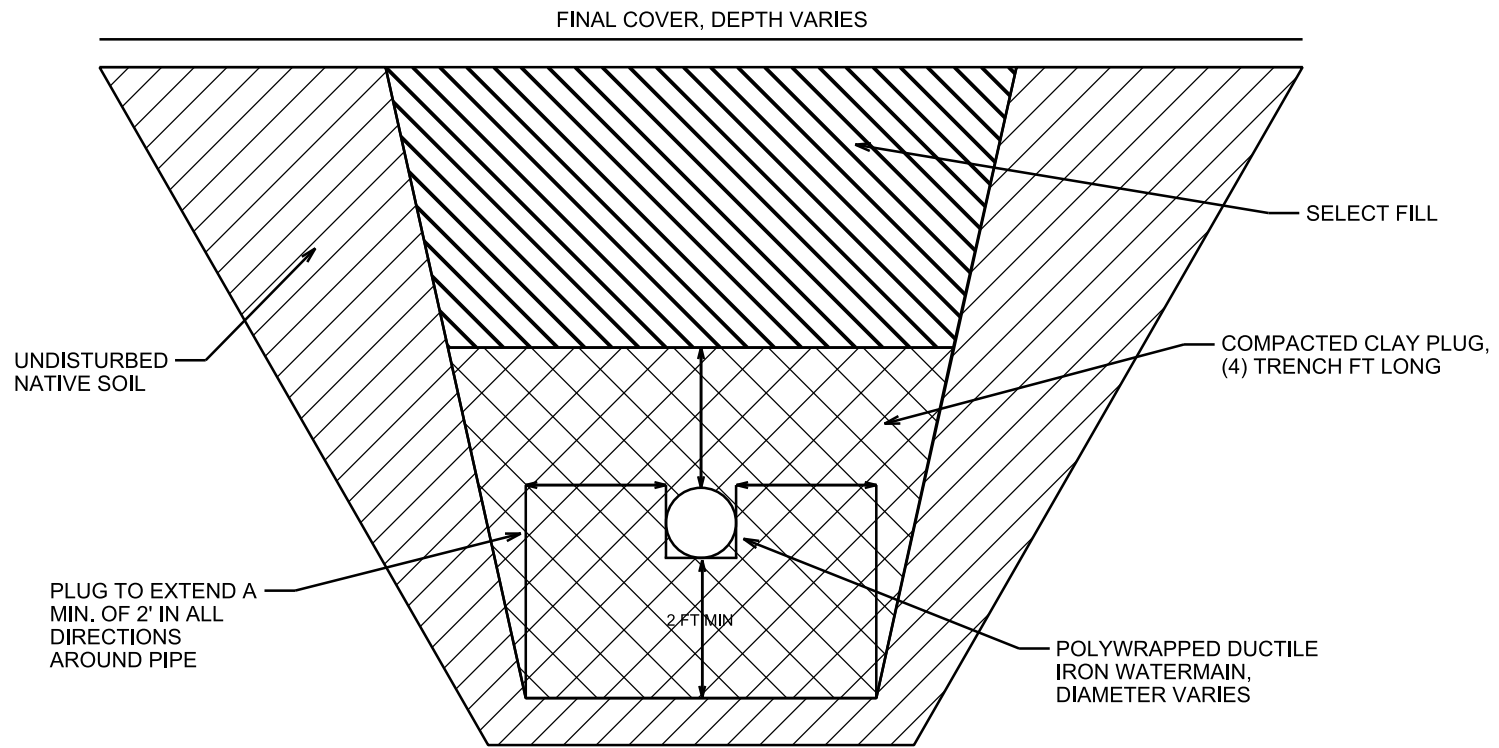
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CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

OFFSETTING EXISTING WATER MAIN  
UNDER UTILITY CONFLICTS



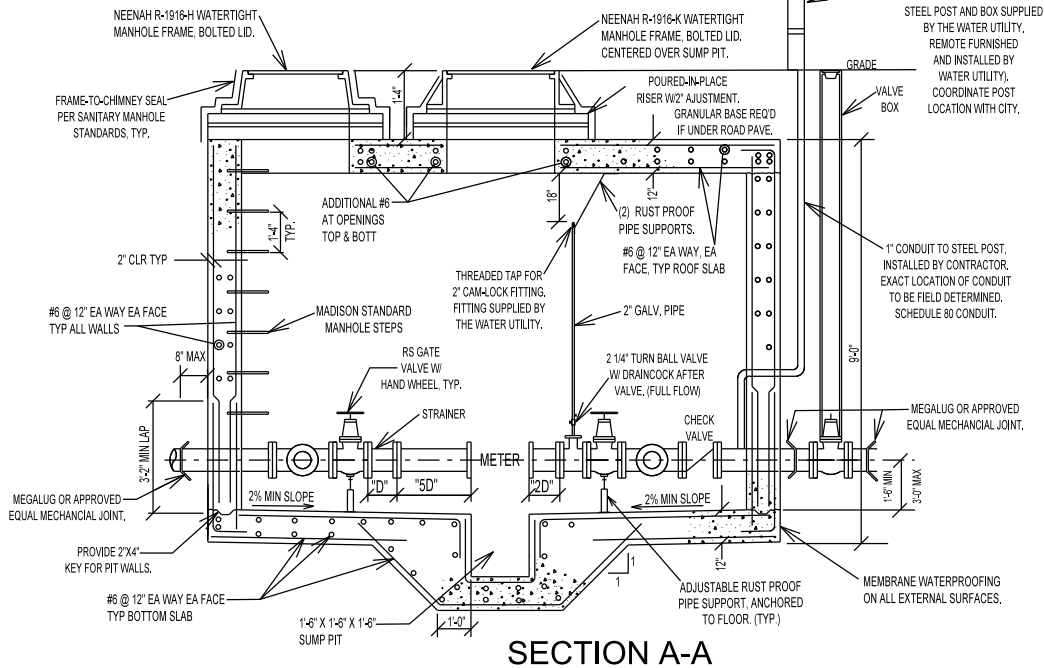
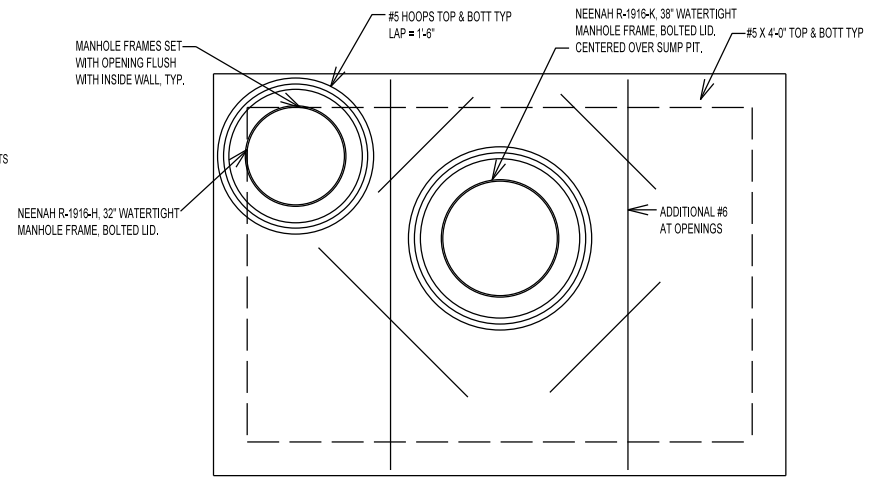
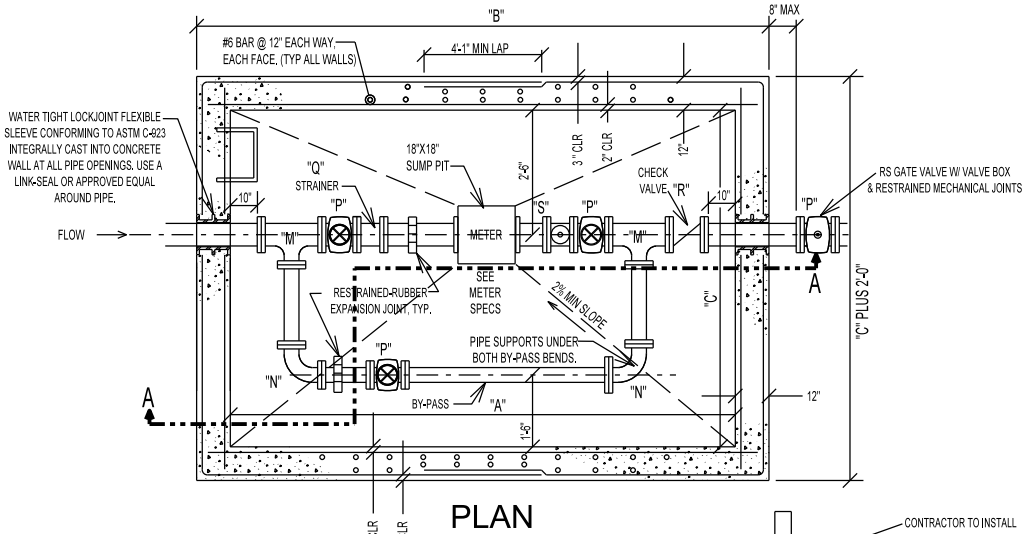
CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

CLAY TRENCH PLUG



REVISED: 12/2015



METER PIT LIGHT DETAIL

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

WATER METER PIT CONSTRUCTION

**METER PIT FITTING SPECS**

FITTING	I. D.	SIZE	RADIUS	RUN
90 BEND	"N"	2"	3"	4.5"
90 BEND	"N"	3"	4"	5.5"
90 BEND	"N"	4"	4.5"	6.5"
90 BEND	"N"	6"	6"	8"
90 BEND	"N"	8"	7"	9"
90 BEND	"N"	10"	9"	11"
90 BEND	"N"	12"	10"	12"
90 BEND	"N"	14"	11.5"	14"
90 BEND	"N"	16"	12.5"	15"
	I. D.	SIZE	BRANCH	RUN
TEE	"M"	"2"	4.5"	4.5"
TEE	"M"	"3"	5.5"	5.5"
TEE	"M"	"4"	6.5"	6.5"
TEE	"M"	"6"	8"	8"
TEE	"M"	"8"	9"	9"
TEE	"M"	"10"	11"	11"
TEE	"M"	"12"		
TEE	"M"	"14"	14"	14"
TEE	"M"	"16"	15"	15"
	I.D.	SIZE	TYPE	RUN
VALVE	"P"	2"	RS GATE	7"
VALVE	"P"	3"	RS GATE	8"
VALVE	"P"	4"	RS GATE	9"
VALVE	"P"	6"	RS GATE	10.5"
VALVE	"P"	8"	RS GATE	11.5"
VALVE	"P"	10"	RS GATE	13"
VALVE	"P"	12"	RS GATE	14"
VALVE	"P"	14"	RS GATE	15"
VALVE	"P"	16"	RS GATE	20.25"
	I.D.	SIZE		RUN
STRAINER	"S"	3"		7"
STRAINER	"S"	4"		9"
STRAINER	"S"	6"		9"
STRAINER	"S"	8"		14"
STRAINER	"S"	10"		16"
STRAINER	"S"	12"		19"

**COMPOUND METER SPECS (BADGER)**

Meter Size	Meter Weight	Meter Lay Length	Strainer Lay Length	Flow Rate
3"	71.5 lbs	17"	7"	0.5- 450 GPM
4"	85 lbs	20"	9"	0.75- 1000 GPM
6"	152 lbs	24"	9"	0.75- 2000 GPM

**MAG METER SIZES (BADGER)**

Meter Size	3"	4"	6"	8"	10"
"A"	10'-0"	11'-0"	13'-0"	14'-8"	14'-8"
"B"	12'-0"	13'-0"	15'-0"	16'-8"	16'-8"
"C"	7'-0"	7'-0"	9'-0"	9'-0"	9'-0"

**MAG METER SPECS (BADGER)**

Meter Size	Meter Lay Length
2"	8.9"
2.5"	11"
3"	11"
4"	11"
6"	15.8"
8"	15.8"
10"	19.7"
12"	19.7"

**TURBINE METER SPECS (BADGER)**

Meter Size	Meter Lay Length	Strainer Lay Length
2"	10"	7"
3"	12"	7"
4"	14"	9"
6"	18"	9"
8"	20"	14"
10"	26"	16"

CITY OF MADISON  
WATER UTILITY

For more info see:  
[www.badgermeter.com](http://www.badgermeter.com)

WATER METER PIT DIMENSIONS

WATER METER PIT SPECIFICATIONS:

1. DIMENSIONS: See Attached Drawings.
2. COMPOUND METER SPECIFICATIONS: See Attached Drawings.
3. TURBINE METER SPECIFICATIONS: See Attached Drawings.
4. Specifications for new pits: Meter pits shall conform to the attached diagrams and tables.
5. (a) 'Material'. The meter pit shall be constructed of reinforced poured concrete thoroughly puddled in place. The concrete shall conform to Section 611 of Wisconsin standard specifications, as shown on the plans and as specified.
- (b) 'Waterproof Juncture'. The junctions of the floors, walls and roof shall be made waterproof by the use of water stops or keyed joints. Conduit or similar connections within the pit shall be waterproof. Meter pit shall be 100% water proof. Rubberized membrane shall be required on the entire exterior of the structure. Refer to Section 516 of the Wisconsin standard specs.
- (c) 'Reinforcement'. The deck or pit roof shall be reinforced with steel bars to insure strength and durability.
- (d) 'Manhole and Catch Basin'. To be located as shown on attached drawing.
- (e) 'Manhole Covers'. An approved watertight cast iron manhole frame and bolt down cover with a gasket.
- (f) If a sump pump is required, the contractor will install electric and provide sump pump and drainage.
- (g) Armored and explosion proof light switches and lights shall be installed.

METER INSTALLATION

1. A Strainer is REQUIRED to insure optimum flow conditioning and protection for the Badger Series meter-measuring element, supplied by the Madison Water Utility.
2. Badger meters, with a strainer, REQUIRE a minimum of five (5) pipe diameters of straight pipe up stream of meter.
3. ONLY full-open gate valves should be used immediately upstream of the meter, and valves SHALL be located at least five (5) pipe diameters or more upstream of meter. Full open gate valves or butterfly valves (16" or larger) may be used downstream.
4. DO NOT install pressure-reducing valves downstream of the meter.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, as necessary.
6. Weighted check valves SHALL be located at least three (3) pipe diameters downstream of the meter.
7. Pressure reducing devices and externally weighted check valves SHALL be located at least five (5) pipe diameters downstream of meter.
8. All nuts and bolts shall be 304 stainless steel.

METER PIT MAINTENANCE:

1. The water CUSTOMER shall be responsible for the maintenance and upkeep of the meter pit.
2. All pits shall be maintained in a clean, dry and safe condition.
3. If the pit has water problems the owner shall cause a sump pump to be installed, if power is not available a sump pit shall be constructed with a standpipe.
4. All pipes and plumbing shall be maintained in a safe functional condition.
5. Steps must be maintained so as to provide safe access.
6. Owner shall be responsible for entire cost to pump out flooded pit.

NOTES:

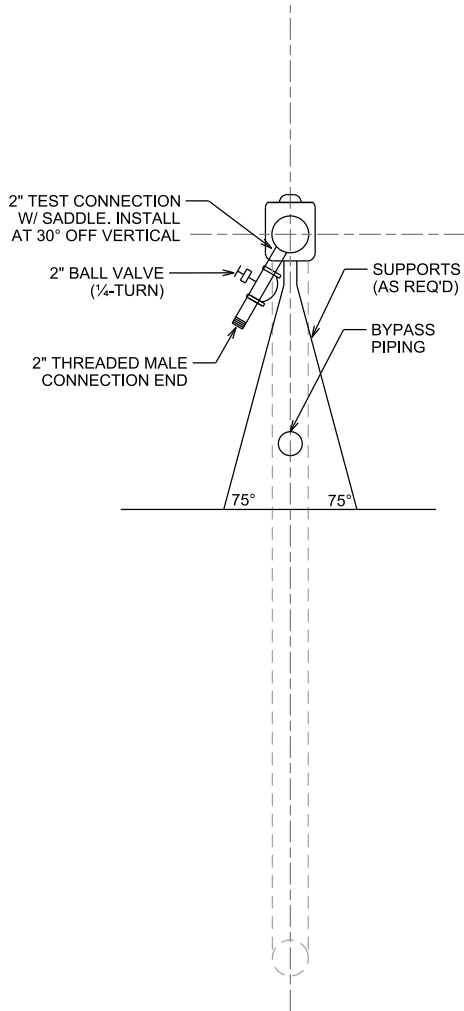
1. A bypass is required, may be one size smaller than meter.
2. Standard companion valves and flanges shall be used.
3. No insulation or covering on meters and valves.
4. No PVC piping allowed.
5. Waterproofing shall be required on exterior of structure, including all penetrations into the vault.
6. All piping shall be supported from the floor or walls as necessary with rust proof metal. No brick, wood or concrete blocking will be allowed.
7. Water meter pit is the responsibility of the customer.
8. Meter and strainer shall be installed per manufacturer's instructions. Refer to meter detail sheets for additional information. Meter and strainer to be provided by the Madison Water Utility and installed by the contractor.
9. Size of valves shall not be smaller than the size of the meter.
10. When a check valve is installed proper expansion protection shall be installed.
11. Backfill structure evenly on all sides with suitable material approved by the Engineer.

CITY OF MADISON  
WATER UTILITY

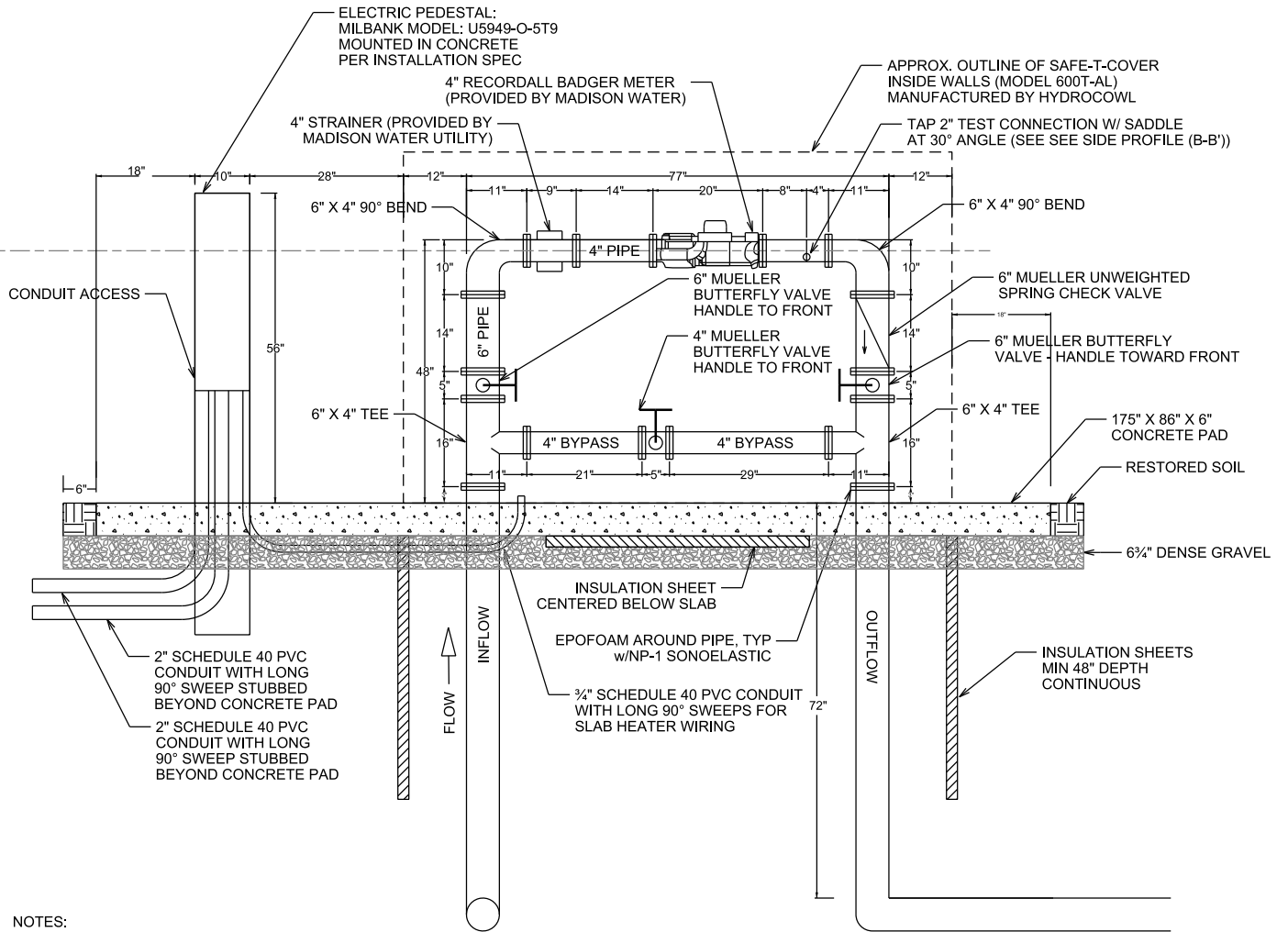
For more info see:  
[www.badgermeter.com](http://www.badgermeter.com)

WATER METER PIT CONSTRUCTION NOTES

SIDE PROFILE  
(PIPE ONLY)



FRONT PROFILE



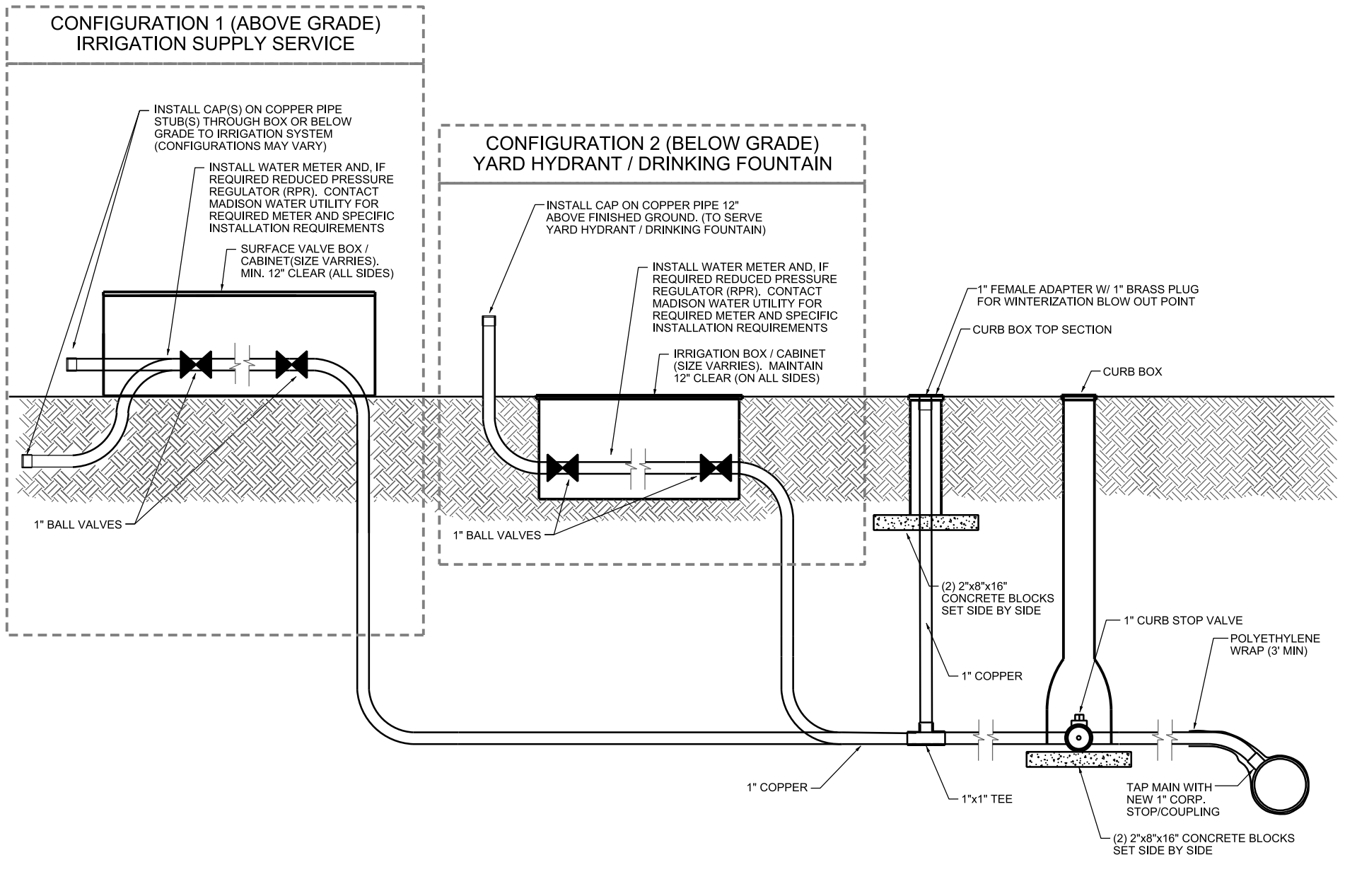
NOTES:

- ALL DIMENSIONS AND PIPING CORRESPOND TO 4" METER SIZE ONLY. VERIFY ALL DIMENSIONS AND PIPING CONFIGURATION WITH MADISON WATER UTILITY PRIOR TO BEGINING WORK.
- ALL ABOVE-GROUND PIPE AND FITTINGS SHALL BE FLANGED JOINT AS FOLLOWS:
- PIPE: COMPLY WITH ANSI A21.51, THICKNESS CLASS 53 WITH PIPE FLANGES FACED AND DRILLED TO ANSI CLASS 125 STANDARD TEMPLATE UNLESS OTHERWISE DESIGNATED ON THE DRAWINGS.
  - FITTINGS: COMPLY WITH ANSI A21.10 OR ANSI B16.1.
  - FLANGE GASKETS: 1/16-INCH THICK SHEET RUBBER, FULL FACE TYPE OR 1/8-INCH THICK FULL FACED AMERICAN TORUSEAL FLANGE GASKET.
  - FLANGE BOLTS, STUDS, AND NUTS: ZINC PLATED TYPE COMPLYING WITH ANSI B16.1.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

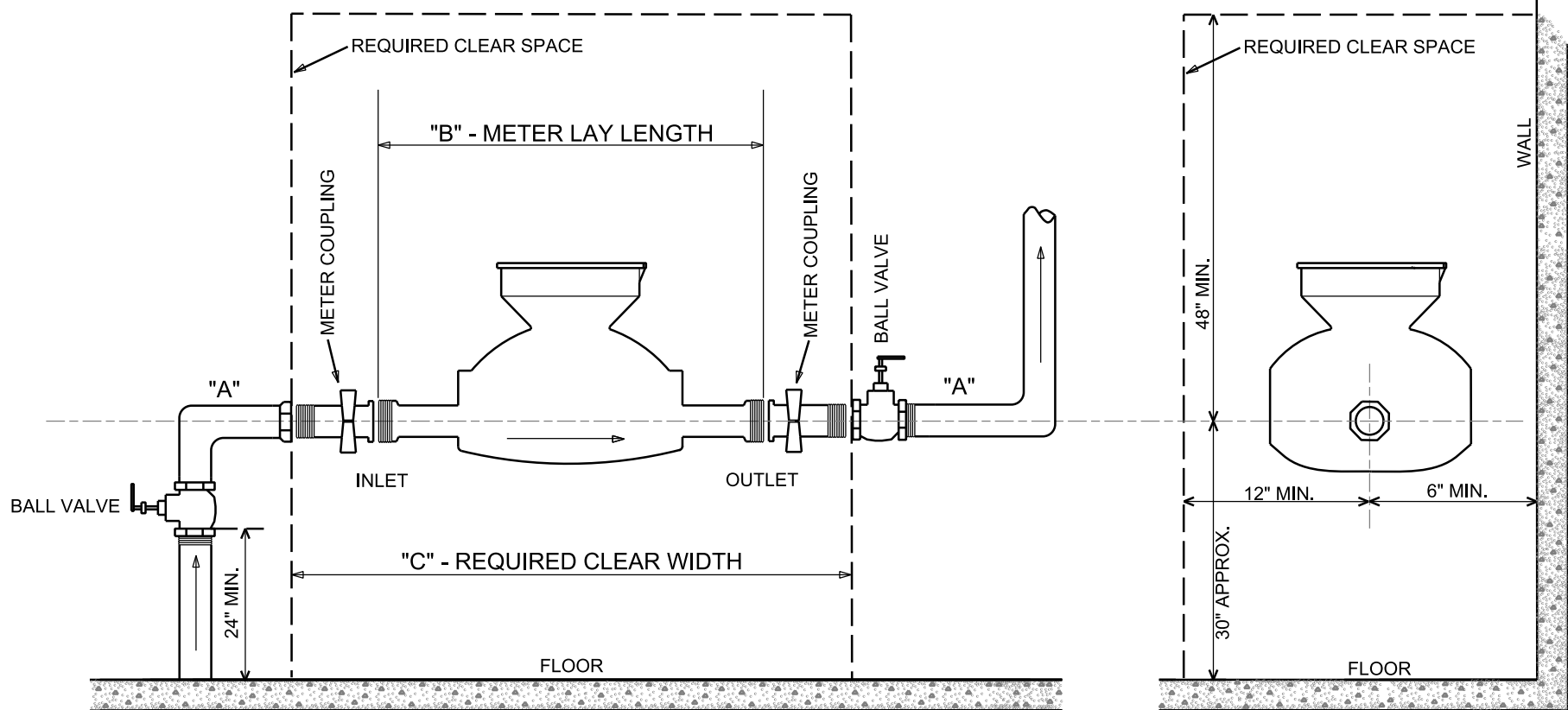
WATER METER ENCLOSURE  
(DIMENSIONS/PIPING SHOWN FOR 4" METER ONLY)



CITY OF MADISON  
WATER UTILITY

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YARD HYDRANT / DRINKING FOUNTAIN  
STANDARD INSTALLATION



"A" - ELECTRICAL BONDING: CONNECT OUTSIDE THE METER COUPLINGS  
 - METER BYPASS PIPING IS NOT PERMITTED

"B" - METER LAY LENGTH (BY METER SIZE):  
 (DOES NOT INCLUDE GASKET OR COUPLING)

$\frac{5}{8}$ "	=	7 $\frac{1}{2}$ "
$\frac{3}{4}$ "	=	9"
1"	=	10 $\frac{3}{4}$ "

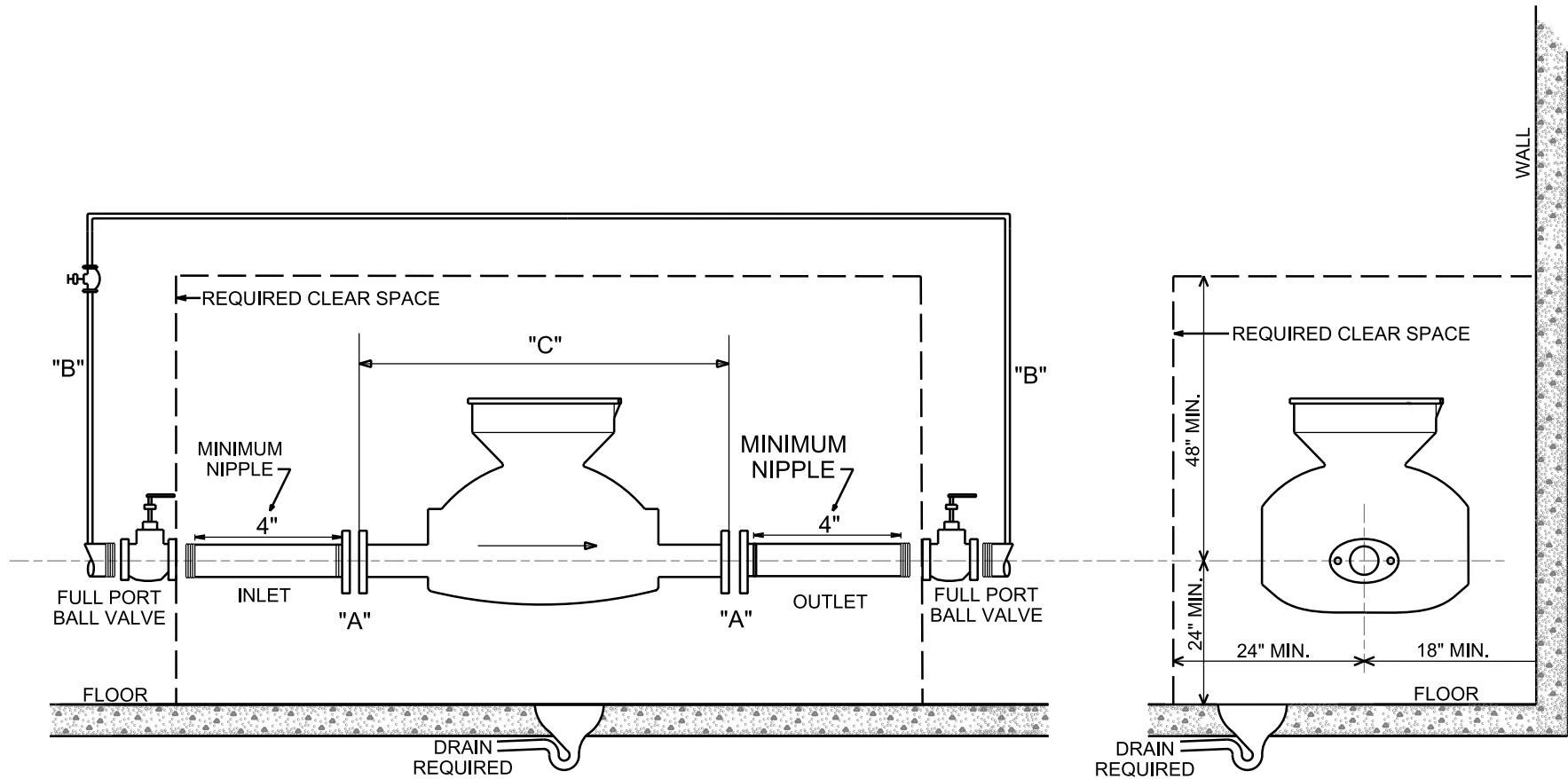
"C" - REQUIRED CLEAR WIDTH:

$\frac{5}{8}$ "	=	12 $\frac{1}{4}$ "
$\frac{3}{4}$ "	=	14"
1"	=	16"

CITY OF MADISON  
 WATER UTILITY

NOT TO SCALE

STANDARD 5/8", 3/4", 1" METER INSTALLATION

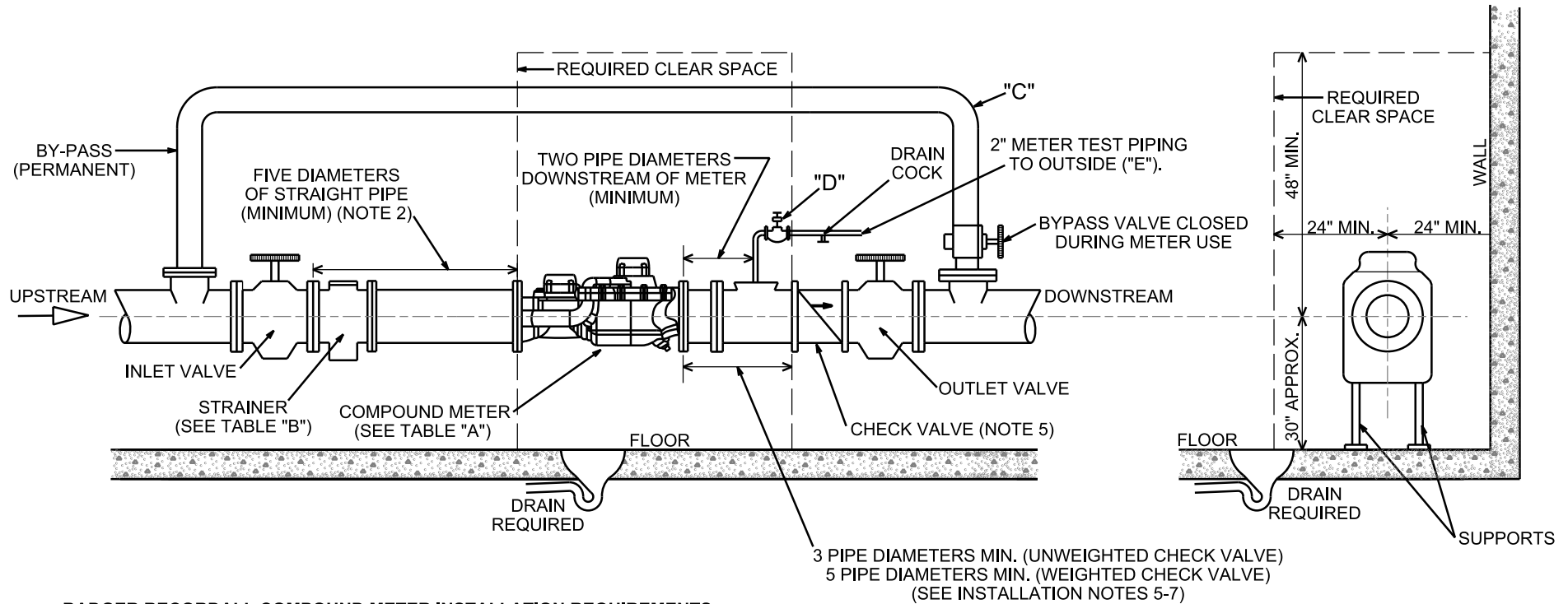


"A" - ELLIPTICAL FLANGES AND GASKETS SUPPLIED BY WATER UTILITY  
 "B" - BYPASS REQUIRED, ONE SIZE SMALLER ALLOWED  
 "C" - METER LAY LENGTH (BY METER SIZE):  $1\frac{1}{2}'' = 13\frac{3}{8}''$   
 $2'' = 17\frac{3}{8}''$

CITY OF MADISON  
 WATER UTILITY

NOT TO SCALE

STANDARD  $1\frac{1}{2}''$  - 2'' METER INSTALLATION



**BADGER RECORDALL COMPOUND METER INSTALLATION REQUIREMENTS:**  
 (For additional installation information see <http://www.badgermeter.com>)

1. A Strainer IS REQUIRED to ensure optimum flow conditioning and protection for the Compound Series meter measuring element.
2. Compound meters, with a strainer, REQUIRE a minimum of five (5) pipe diameters of straight pipe upstream of the meter (including the strainer).
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, if necessary.
6. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
7. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.

Meter Size	Meter Weight	"A"	"B"	Flow Rate
		Meter Lay Length	Strainer Lay Length	
3"	71.5 lbs	17"	7"	¼- 450 GPM
4"	85 lbs	20"	9"	⅜- 1000 GPM
6"	152 lbs	24"	9"	⅝- 2000 GPM

NOTE "C" -----By-pass required, one size smaller allowed.

NOTE "D" -----2" Valve is ¼ turn ball valve w/ drain cock after valve.

NOTE "E" -----NO PVC piping permitted through exterior wall penetration/connection point. Two-inch piping at test connection point must be threaded. Test connection point shall be accessible within 100-feet of test truck.

**ADDITIONAL REQUIREMENTS:**

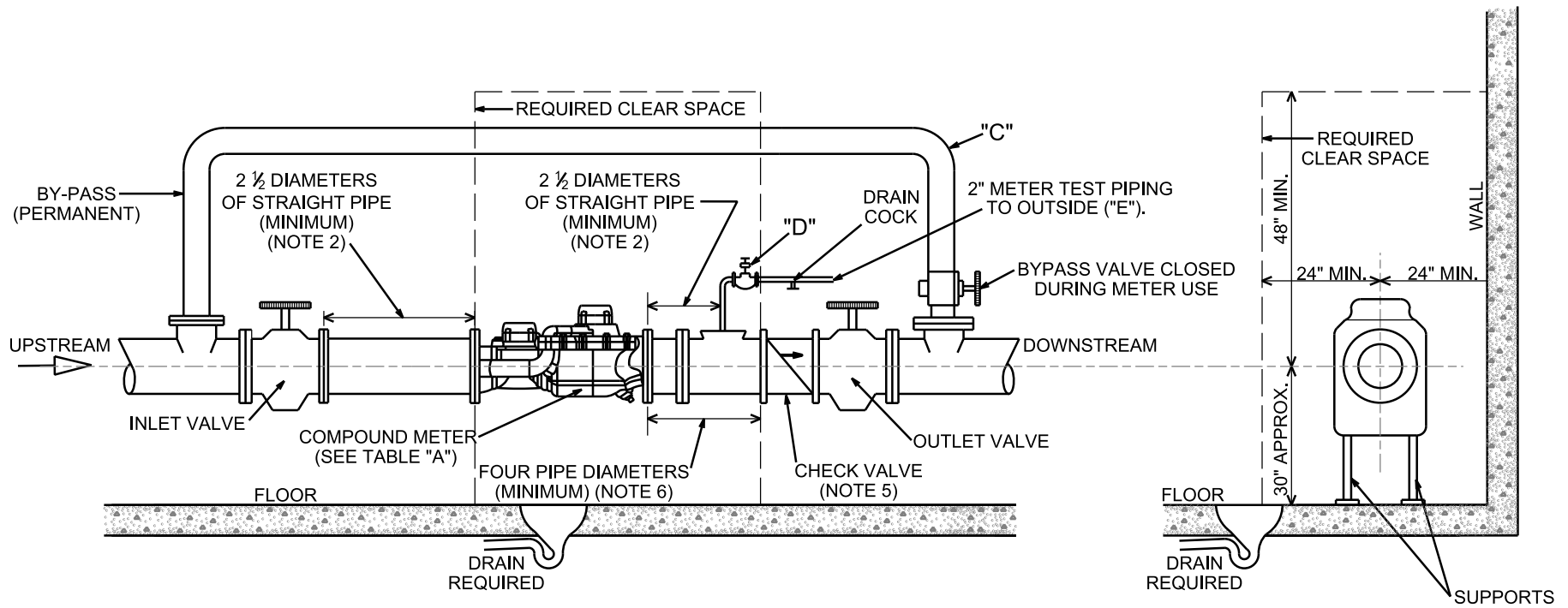
- Use standard companion flanges and valves.
- NO insulation or covering will be permitted on meters or flanges.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

BADGER RECORDALL COMPOUND METER  
STANDARD INSTALLATION





**SENSUS OMNI COMPOUND METER INSTALLATION REQUIREMENTS:**

(For additional installation information see <http://www.sensus.com>)

1. NOTE: the Sensus OMNI Meter includes an integrated Strainer which ensures optimum flow conditioning and protection for the meter measuring element.
2. The compound meter with integrated strainer REQUIRES a minimum of 2 1/2 pipe diameters of straight pipe upstream and downstream of the meter.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, if necessary.
6. Any Unweighted check valves, externally weighted check valves, non-concentric reducers, back-flow preventers, or pressure reducing devices MUST be located at least four (4) pipe diameters downstream of the meter.

**"A"**

Meter Size	Meter Weight	Meter Lay Length	Flow Rate
3"	45 lbs	17"	1/2- 500 GPM
4"	65 lbs	20"	3/4- 1000 GPM
6"	130 lbs	24"	1 1/2- 2000 GPM

NOTE "C" -----By-pass required, one size smaller allowed.

NOTE "D" -----2" Valve is 1/4 turn ball valve w/ drain cock after valve.

NOTE "E" -----NO PVC piping permitted through exterior wall penetration/connection point. Two-inch piping at test connection point must be threaded. Test connection point shall be accessible within 100-feet of test truck.

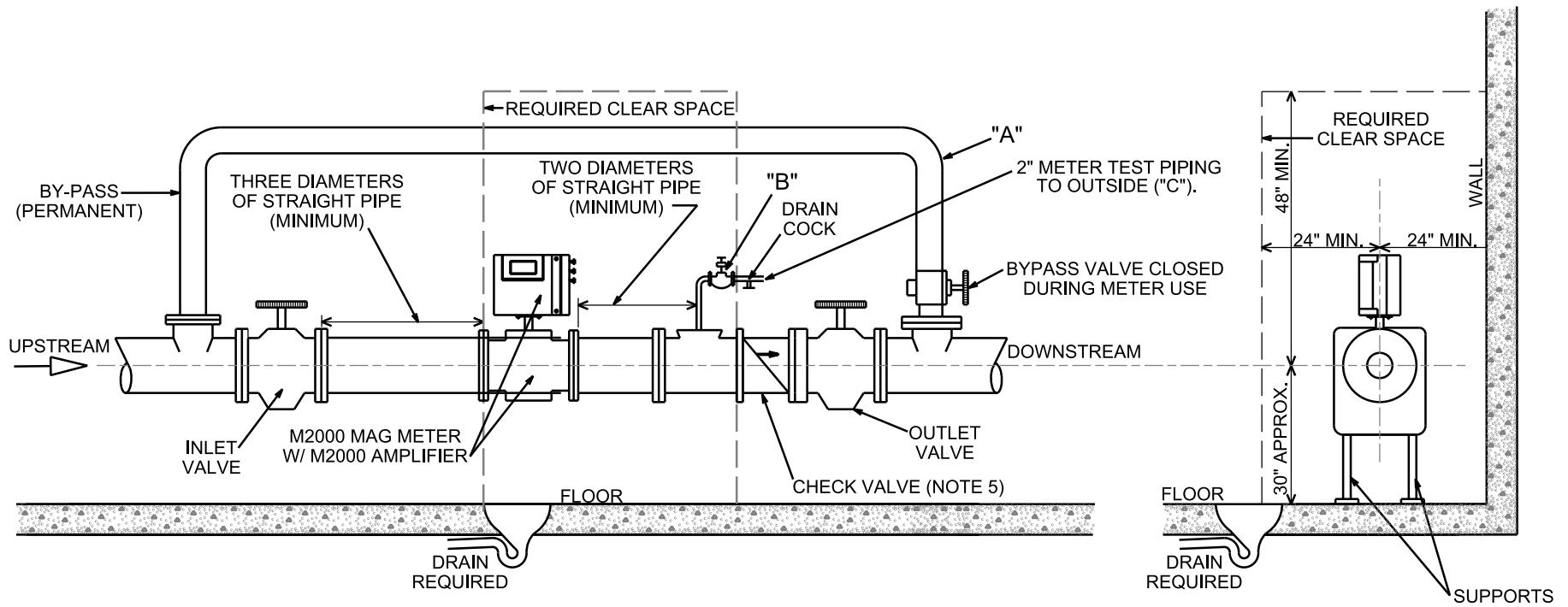
**ADDITIONAL REQUIREMENTS:**

- Use standard companion flanges and valves.
- NO insulation or covering will be permitted on meters or flanges.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

SENSUS OMNI COMPOUND METER  
STANDARD INSTALLATION



**BADGER M-Series M2000 MAG METER INSTALLATION REQUIREMENTS:**

(For additional installation information see <http://www.badgermeter.com>)

1. For optimum accuracy performance it is required to provide sufficient inlet and outlet straight pipe runs. An equivalent to three (3) diameters of straight pipe is required on the inlet side, and two (2) diameters on the outlet side.
2. Only full open gate valves should be used upstream of meter. Any valve can be used downstream.
3. Water line applications with a chemical injection point should be installed downstream of the meter to eliminate any issues with the meter performance.
4. Avoid pipe locations where the flow is pulsating, such as in the outlet side of piston or diaphragm pumps.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, if necessary. See Note 1 for straight pipe run requirements.
6. Mag meter installations MUST be provided with a dedicated, uninterrupted power source.
7. Pipe MUST remain completely full at all times during meter operation.

**MAG METER SPECS:**

Meter Size	Meter Lay Length	Mag Meter-GPM
3"	11"	2.2 - 883
4"	11"	3.3 - 1320
6"	15.8"	7.9 - 3141
8"	15.8"	15.7 - 6278
10"	19.7"	25.1 - 10021

NOTE "A" -----By-pass required, one size smaller allowed.

NOTE "B" -----2" Valve is ¼ turn ball valve w/ drain cock after valve.

NOTE "C" -----NO PVC piping permitted through exterior wall penetration/connection point. Two-inch piping at test connection point must be threaded. Test connection point shall be accessible within 100-feet of test truck.

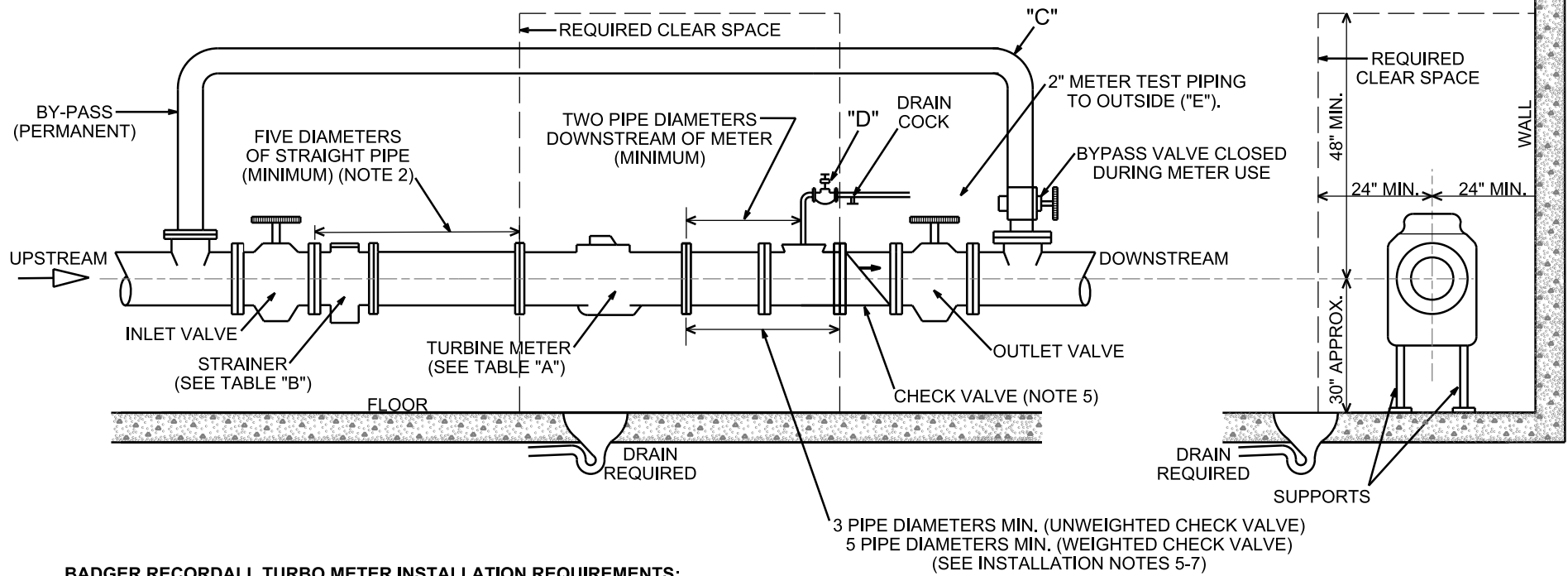
**ADDITIONAL REQUIREMENTS:**

- Use standard companion flanges and valves.
- NO insulation or covering will be permitted on meters or flanges.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

STANDARD MAG METER INSTALLATION  
BADGER M2000 ELECTROMAGNETIC FLOW METER



**BADGER RECORDALL TURBO METER INSTALLATION REQUIREMENTS:**

(For additional installation information see <http://www.badgermeter.com>)

1. A Strainer IS REQUIRED to ensure optimum flow conditioning and protection for the Turbo Series meter measuring element.
2. Turbine meters, with a strainer, REQUIRE a minimum of five (5) pipe diameters of straight pipe upstream of the meter (including the strainer).
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, if necessary.
6. Unweighted check valves MUST be located at least three (3) pipe diameters downstream of the meter.
7. Pressure reducing devices and externally weighted check valves MUST be located at least five (5) pipe diameters downstream of the meter.

"A"				"B"
Meter Size	Meter Lay Length	Turbine Meter-GPM	Max. Cont. Duty	Strainer Lay Length
2"	10"	3 - 250	200 GPM	7"
3"	12"	4 - 550	450 GPM	7"
4"	14"	8 - 1250	1000 GPM	9"
6"	18"	15 - 2500	2000 GPM	9"
8"	20"	20 - 4500	3000 GPM	14"
10"	26"	30 - 7000	5500 GPM	16"

- NOTE "C" -----By-pass required, one size smaller allowed.  
 NOTE "D" -----2" Valve is ¼ turn ball valve w/ drain cock after valve.  
 NOTE "E" -----NO PVC piping permitted through exterior wall penetration/connection point. Two-inch piping at test connection point must be threaded. Test connection point shall be accessible within 100-feet of test truck.

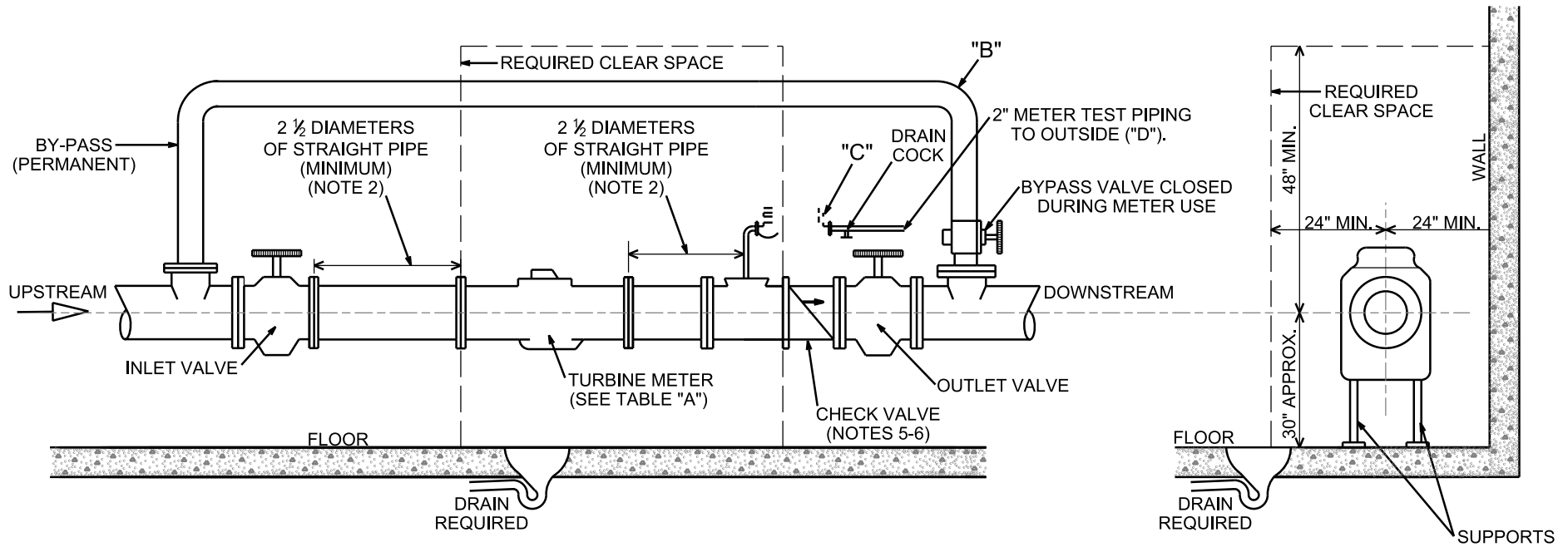
**ADDITIONAL/MISC. REQUIREMENTS:**

- Use standard companion flanges and valves.
- NO insulation or covering will be permitted on meters or flanges.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

BADGER RECORDALL TURBO SERIES METER  
STANDARD INSTALLATION



**SENSUS OMNI T2 TURBINE METER INSTALLATION REQUIREMENTS:**

(For additional installation information see <http://www.sensus.com>)

1. NOTE: the Sensus OMNI T2 turbine meter includes an integrated strainer which ensures optimum flow conditioning and protection for the meter measuring element.
2. The turbine meter with integrated strainer REQUIRES a minimum of 2 1/2 pipe diameters of straight pipe upstream and downstream of the meter.
3. ONLY full-open gate valves should be used immediately upstream of the meter. Butterfly valves MUST be five (5) pipe diameters or more upstream of the meter. Full-open gate or butterfly valves can be used downstream.
4. DO NOT install pressure reducing devices or check valves upstream of the meter.
5. A check valve must be installed downstream of the meter to prevent surging or backflow. A spring or weighted check valve may be used, if necessary.
6. Any Unweighted check valves, externally weighted check valves, non-concentric reducers, back-flow preventers, or pressure reducing devices MUST be located at least four (4) pipe diameters downstream of the meter.

**"A"**

Meter Size	Meter Lay Length	Turbine Meter-GPM	Max. Cont. Duty
2"	17"	1.5 - 250	200 GPM
3"	19"	2.5 - 650	500 GPM
4"	23"	3 - 1250	1000 GPM
6"	27"	4 - 2500	2000 GPM
8"	30.125"	5 - 3500	3500 GPM
10"	41.125"	6 - 5500	5500 GPM

NOTE "B" -----By-pass required, one size smaller allowed.

NOTE "C" -----2" Valve is 1/4 turn ball valve w/ drain cock after valve.

NOTE "D" -----NO PVC piping permitted through exterior wall penetration/connection point. Two-inch piping at test connection point must be threaded. Test connection point shall be accessible within 100-feet of test truck.

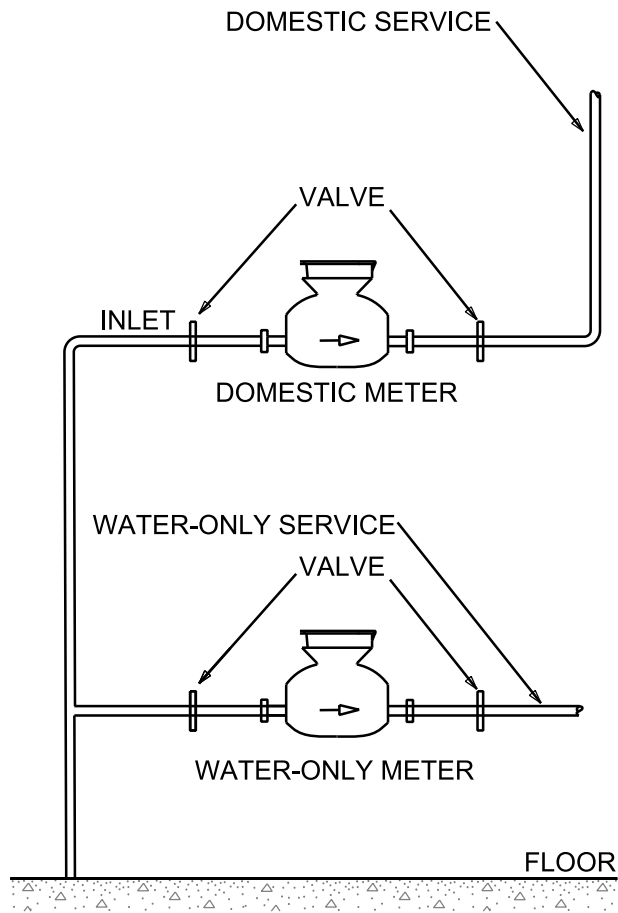
**ADDITIONAL REQUIREMENTS:**

- Use standard companion flanges and valves.
- NO insulation or covering will be permitted on meters or flanges.

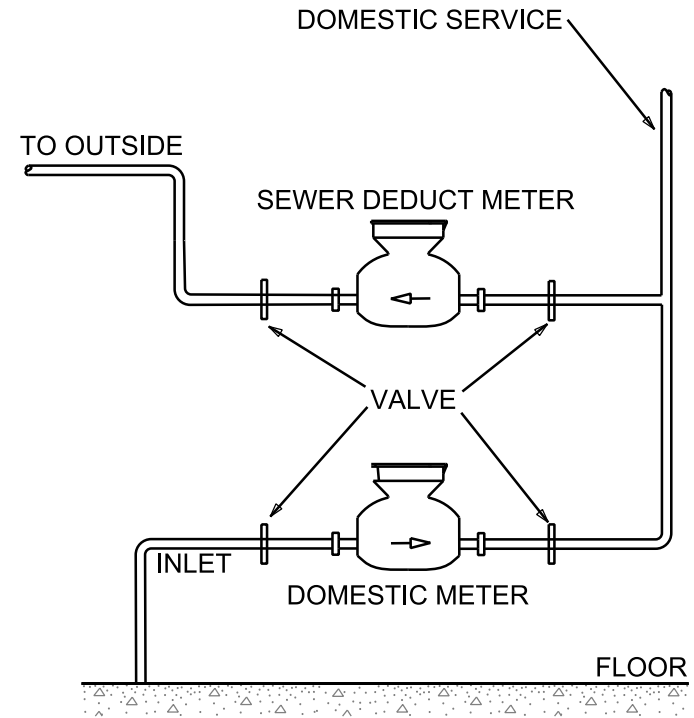
CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

SENSUS OMNI T2 TURBINE METER  
STANDARD INSTALLATION



WATER-ONLY SERVICE - STANDARD INSTALLATION



SEWER DEDUCT METER - STANDARD INSTALLATION

CONTACT MADISON WATER UTILITY TO REQUEST METER INSTALLATIONS AND DETERMINE SPECIFIC CONFIGURATION REQUIREMENTS, AS APPLICABLE.

CITY OF MADISON  
WATER UTILITY

NOT TO SCALE

SEWER DEDUCT METER / WATER ONLY  
STANDARD INSTALLATION