

DISTRICT NOTES

DISTRICT WATER NOTES

1. The installation of all water lines and appurtenances shall comply with *Highlands Ranch Water and Sewer Standard Specifications* manual (*HRWSSS* manual).
2. Existing utilities are to be field verified prior to beginning construction impacting District Utilities and all existing District utilities shall be protected throughout construction. Notify the District a minimum of 48 hours prior to construction.
3. Water line shall be DR 14 Class 200 PVC unless noted otherwise.
4. All fire hydrant leads and fire service lines shall be Class 50 ductile iron pipe.
5. Water line depressions shall be a minimum of C-900 Class 200 PVC
6. No vertical and/or horizontal bends are allowed in fire hydrant leads and fire lines without approval of the District Engineer.
7. No fittings are allowed on domestic service lines between the main and the curb stop.
8. Cover over water lines shall be a minimum of 4.5 feet under pavement and 6 feet in open space; maximum allowable cover is 10 feet.
9. All water line crossings shall comply with Section 4.03-M of the *HRWSSS* manual.
10. Water lines shall be mechanically restrained and bedded in accordance with Chapter 4 of the *HRWSSS* manual.

DISTRICT SEWER NOTES

1. The installation of all sewer lines and appurtenances shall comply with the *Highlands Ranch Water and Sewer Standard Specifications* manual (*HRWSSS* manual).
2. Existing utilities are to be field verified prior to beginning construction on District utilities.
3. Sewer lines shall be SDR-35 PVC unless otherwise noted.
4. Match pipe crowns at manholes where there is a change in pipe diameter.
5. Cover over sewer lines shall be a minimum of 4.5 feet.
6. In non-paved areas, manhole rims shall be set 4" above finished grade with a 6" minimum concrete collar around the ring and cover.
7. All sewer line crossings shall comply with Section 5.01-C of the *HRWSSS* manual.
8. Sewer lines shall be bedded in accordance with Chapter 5 of the *HRWSSS* manual.

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WATER SERVICE DETAILS

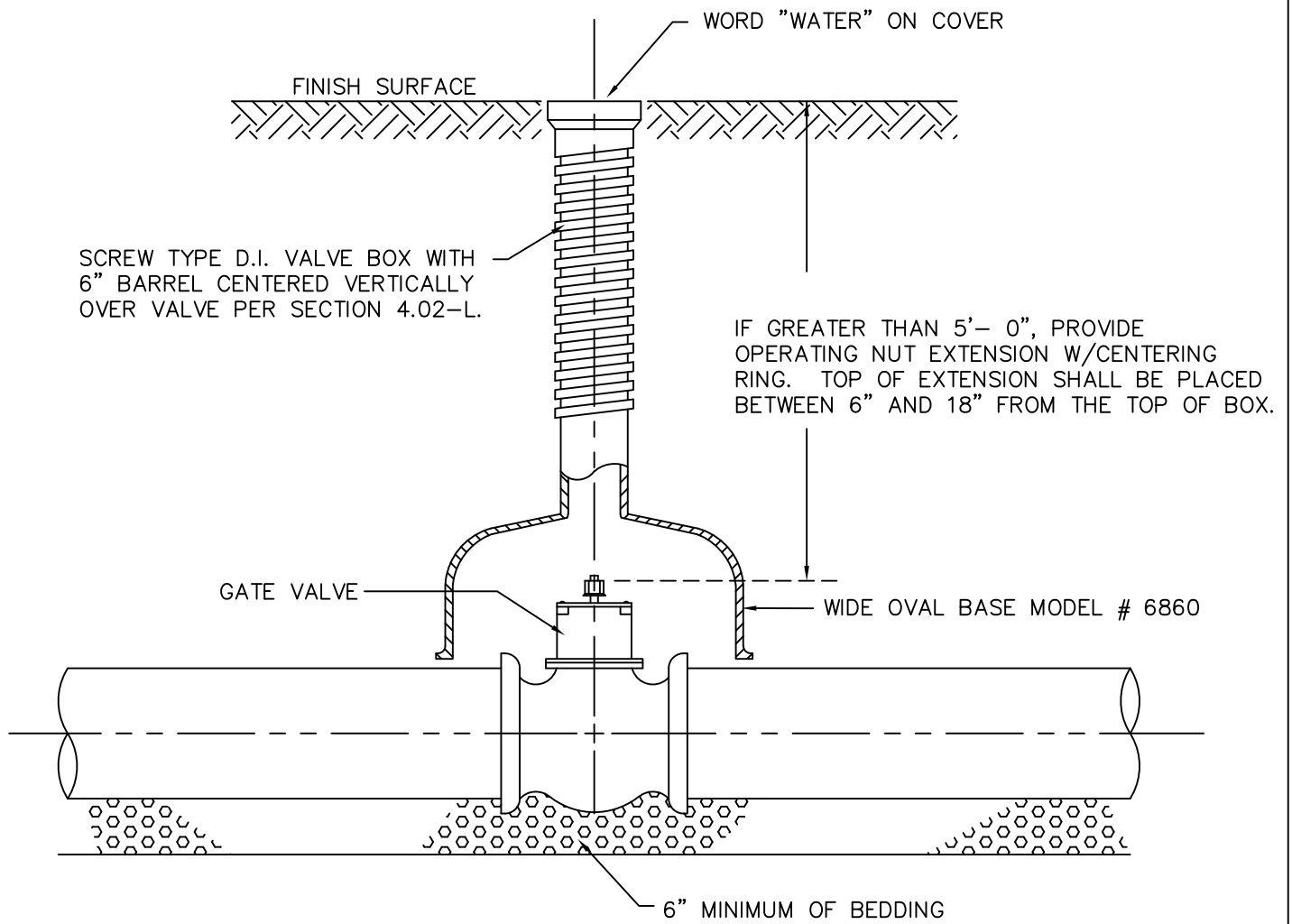
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SEWER SERVICE DETAILS

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NOTE:

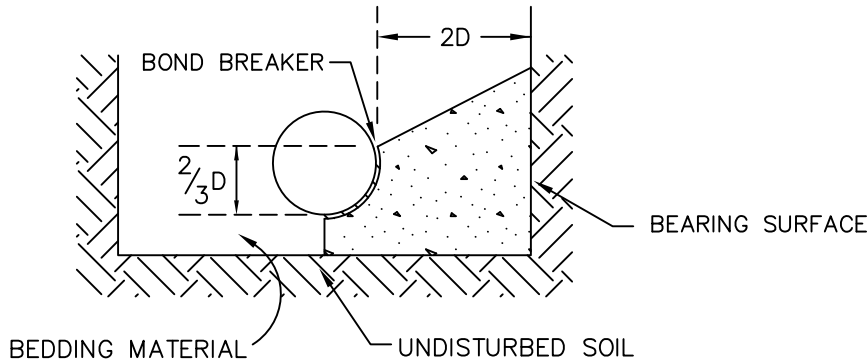
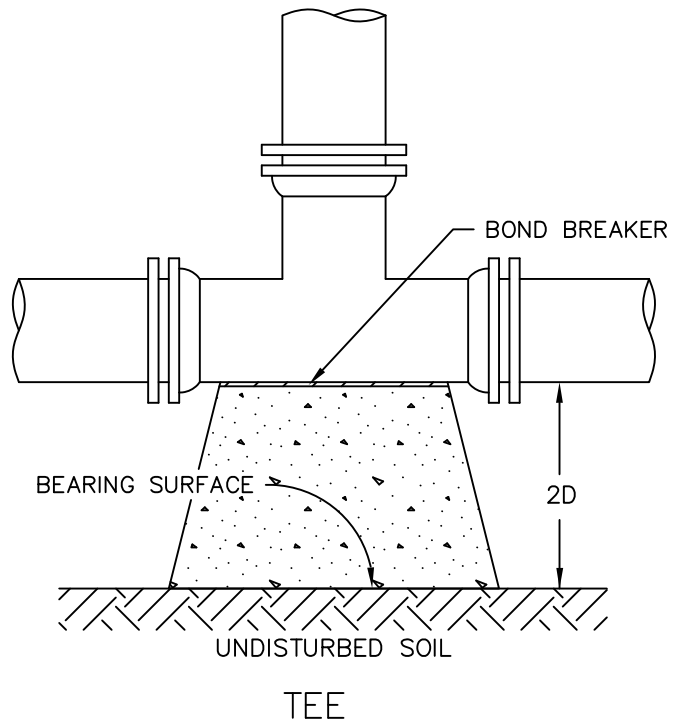
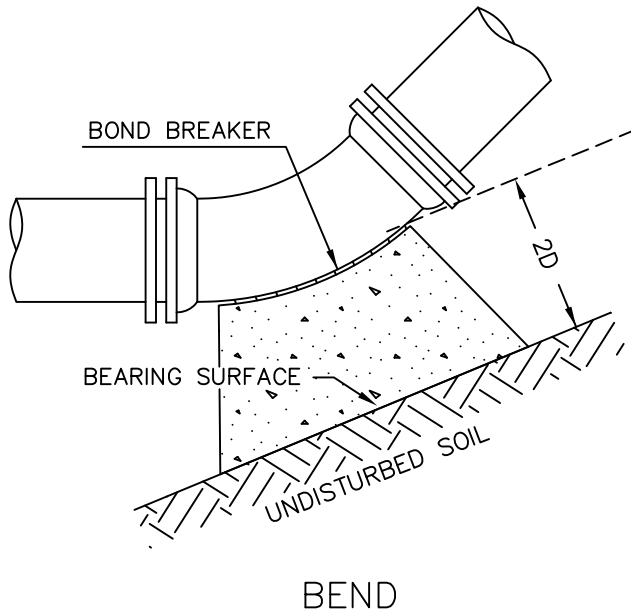
1. FITTINGS SHALL BE WRAPPED WITH 8 MIL MINIMUM THICKNESS POLYETHYLENE.

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DOUGLAS COUNTY, COLORADO

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VALVE BOX DETAIL

WM-1



MINIMUM BEARING SURFACE AREA
(IN SQUARE FEET)

PIPE SIZE	BENDS				TEE	DEAD END
	11¼°	22½°	45°	90°		
6"	0.6	1.3	2.5	4.6	2.3	3.1
8"	1.1	2.2	4.3	7.9	4.0	5.4
12"	2.4	4.6	9.1	16.8	8.6	11.4
16"	3.9	7.7	15.2	28.0	14.9	20.0
24"	8.5	17.0	61.7			43.6
36"	18.9	37.5	73.5	135.0	72.0	96.0

NOTES:

1. D = PIPE DIAMETER.
2. ALL FITTINGS ARE TO BE POLY WRAPPED.
3. NO BAG MIX CONCRETE ALLOWED

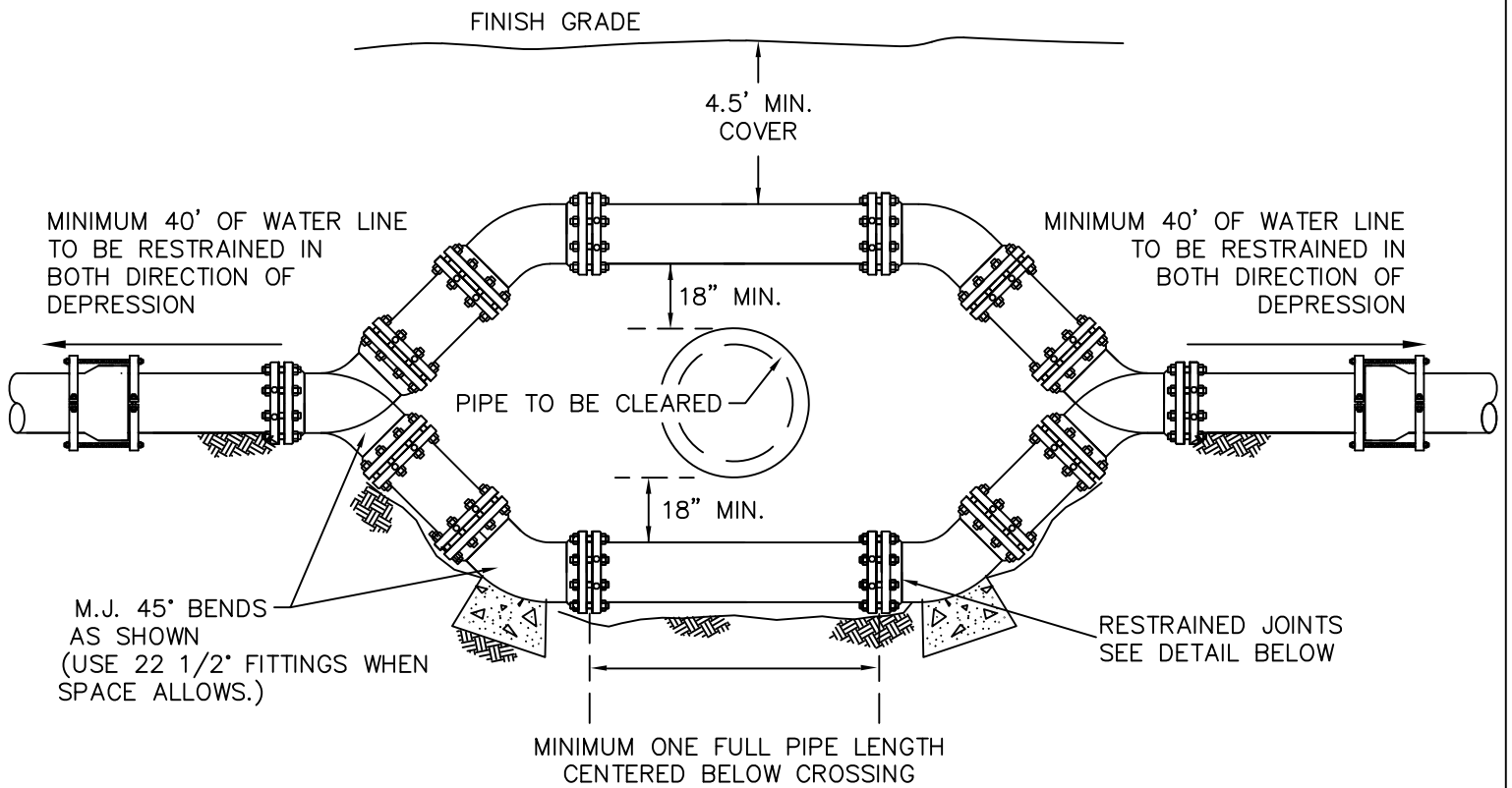
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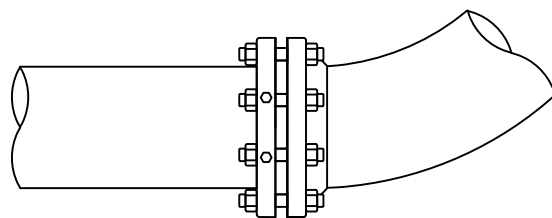
THRUST BLOCK DETAIL

WM-2



TYPICAL DETAIL FOR WATER LINE DEPRESSION

4", 6", 8", 10" & 12" DIAMETERS



TYPICAL RESTRAINED JOINTS

MEG-A-LUG TYPE RESTRAINT OR APPROVED EQUAL

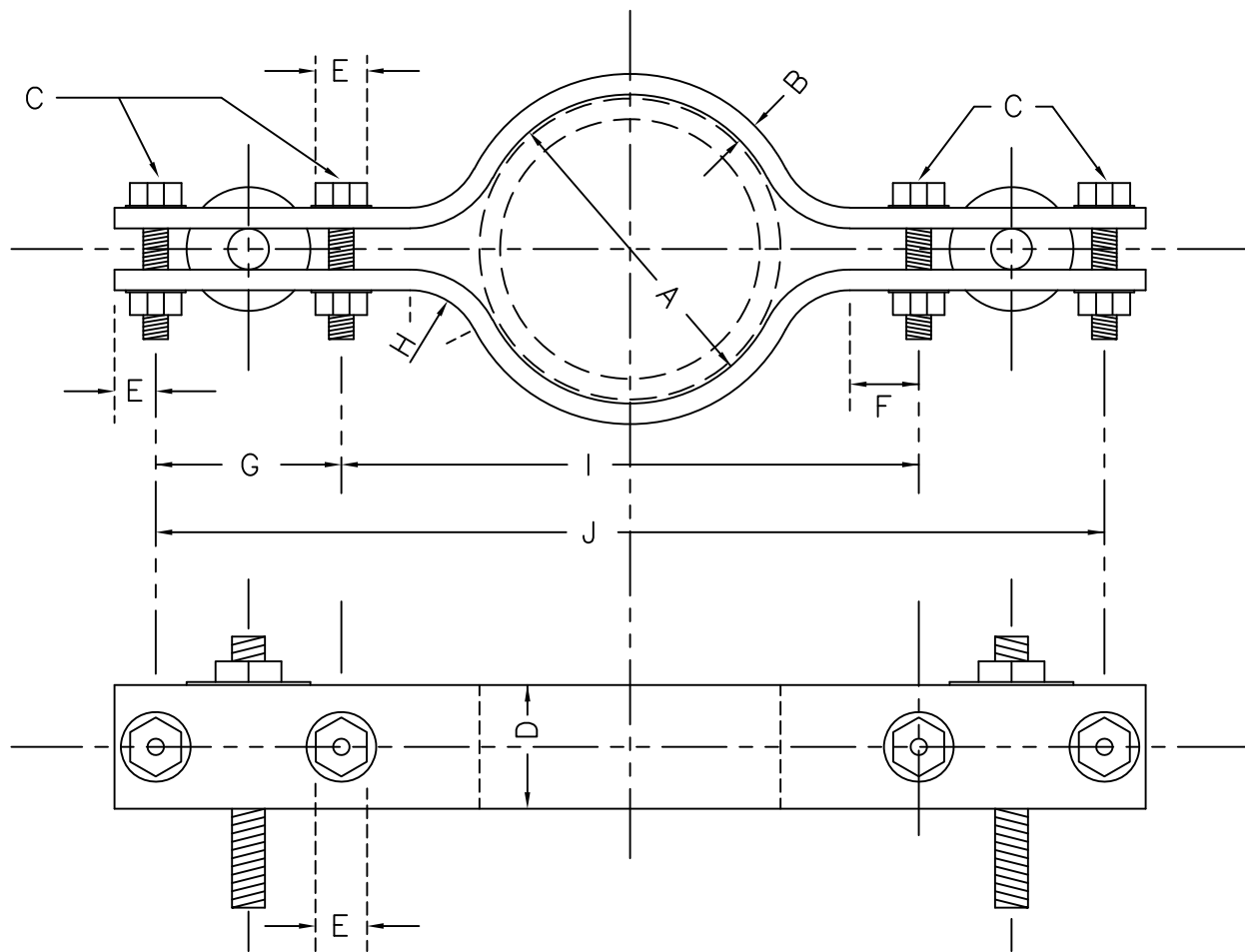
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RESTRAINED JOINTS AT
VERTICAL BENDS

WM-3



DIMENSIONS - INCHES

PIPE SIZE	ROD DIA.	A	B	C	D	E	F	G	H	I	J
4	3/4	5	1/2 x 3 1/2	1/2	2	3/4	0.660	3.10	1.13	8.58	16.28
6	3/4	7 1/16	1/2 x 3 1/2	1/2	2	3/4	0.660	3.10	1.13	10.64	18.34
8	3/4	9 3/16	1/2 x 3 1/2	1/2	2	3/4	0.660	3.10	1.13	12.78	20.48
10	3/4	11 3/8	1/2 x 3 1/2	1/2	2	3/4	0.660	3.10	1.13	14.96	22.66
12	3/4	13 1/2	1/2 x 3 1/2	1/2	2	3/4	0.660	3.10	1.13	17.08	24.78
14	1	15 3/4	5/8 x 4 1/2	3/4	3	15/16	0.780	4.14	1.69	20.70	30.86
16	1	17 7/8	5/8 x 4 1/2	3/4	4	15/16	0.780	4.14	1.69	22.80	32.96
18	1	20	3/4 x 5	3/4	4	1 1/8	0.950	4.14	1.69	25.28	35.81
20	1	22 1/8	3/4 x 5	3/4	4	1 1/8	0.950	4.14	1.69	27.40	37.93
24	1 1/4	26 3/8	3/4 x 5 1/2	3/4	5	1 1/8	0.950	5.18	1.69	31.66	42.19

NOTES:

1. DIMENSIONS ARE BASED ON BOX END WRENCH CLEARANCES.
2. DIMENSION "G" HAS BEEN SIZED TO ACCOMMODATE TWO (2) RODS IF NEEDED.
3. STEEL PLATE OR WASHERS ARE TO BE USED TO SECURE TIE-ROD.
4. CLAMPS SHALL BE EPOXY COATED.

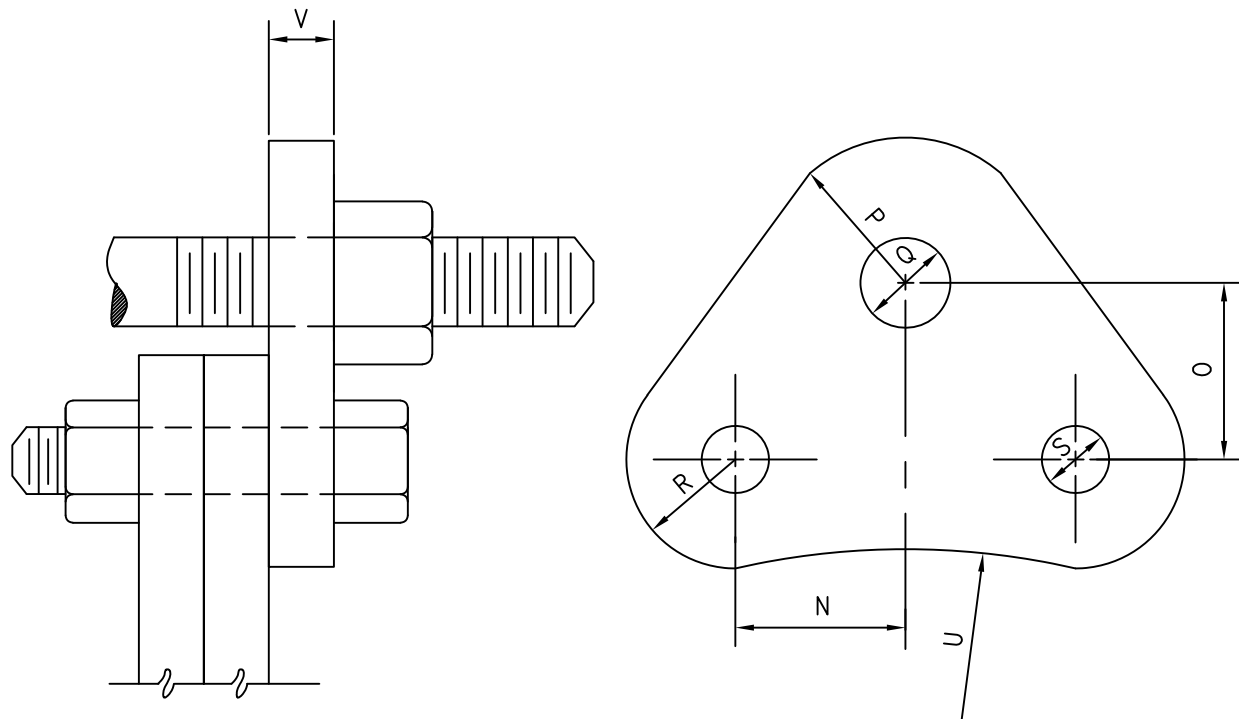
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DOUGLAS COUNTY, COLORADO

TIE-ROD RETAINING CLAMP

WM-4



PIPE DIA.	N	O	H.S. RODS			M.S. RODS			R	S	U	V	PIPE DIA.
			P	Q	ROD ϕ	P	Q	ROD ϕ					
6	1-13/16	2-1/4	1	7/8	3/4	1	7/8	3/4	7/8	7/8	3-3/4	3/4	6
8	2-1/4	2-3/4	1	7/8	3/4	1	7/8	3/4	1	7/8	4-7/8	3/4	8
12	2-3/16	2-3/4	1-1/8	7/8	3/4	1-1/4	1-1/8	3/4	1-1/8	1	7-1/4	7/8	12
16	2-1/16	2-3/4	1-1/8	7/8	3/4	1-1/2	1-3/8	3/4	1-1/4	1-1/8	9-3/8	1-1/8	16
20	1-31/32	2-3/4	1-1/4	1-1/8	1	-	-	-	1-7/16	1-1/4	11-1/16	1-1/4	20

INCHES

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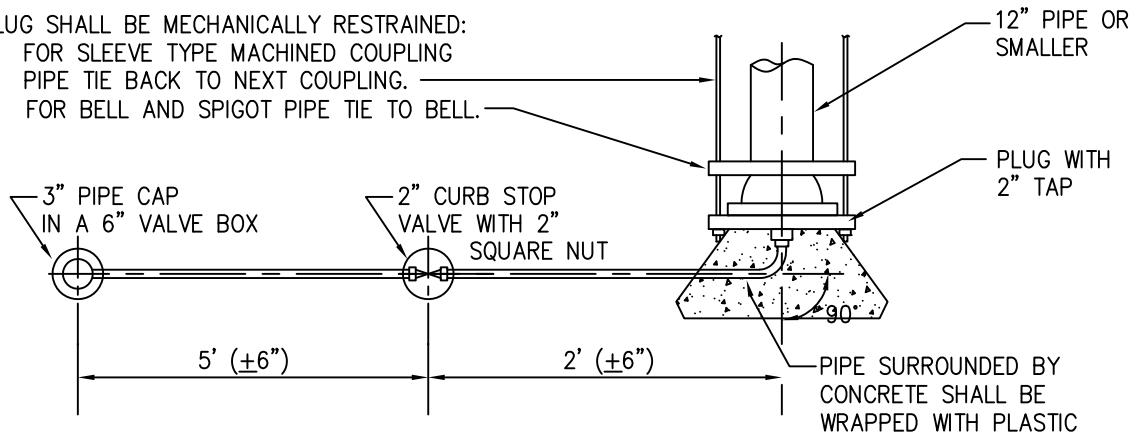
FLANGE LUG DETAIL

WM-5

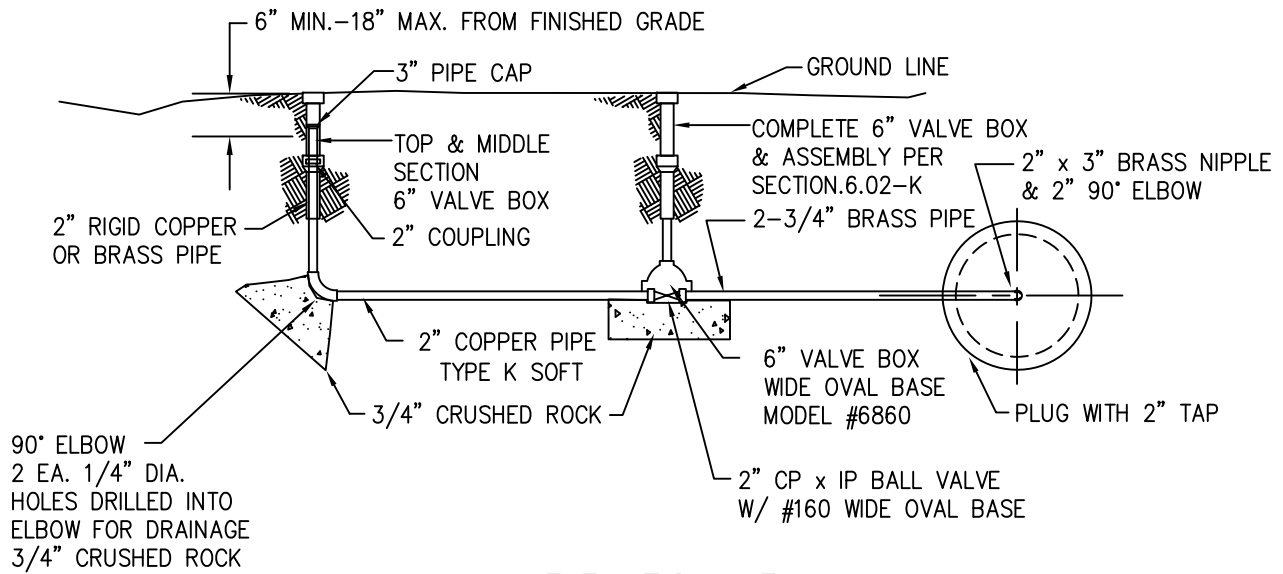
NOTE:

1. PLUG SHALL BE MECHANICALLY RESTRAINED:

- A. FOR SLEEVE TYPE MACHINED COUPLING
PIPE TIE BACK TO NEXT COUPLING.
- B. FOR BELL AND SPIGOT PIPE TIE TO BELL.



PLAN VIEW



ELEVATION VIEW

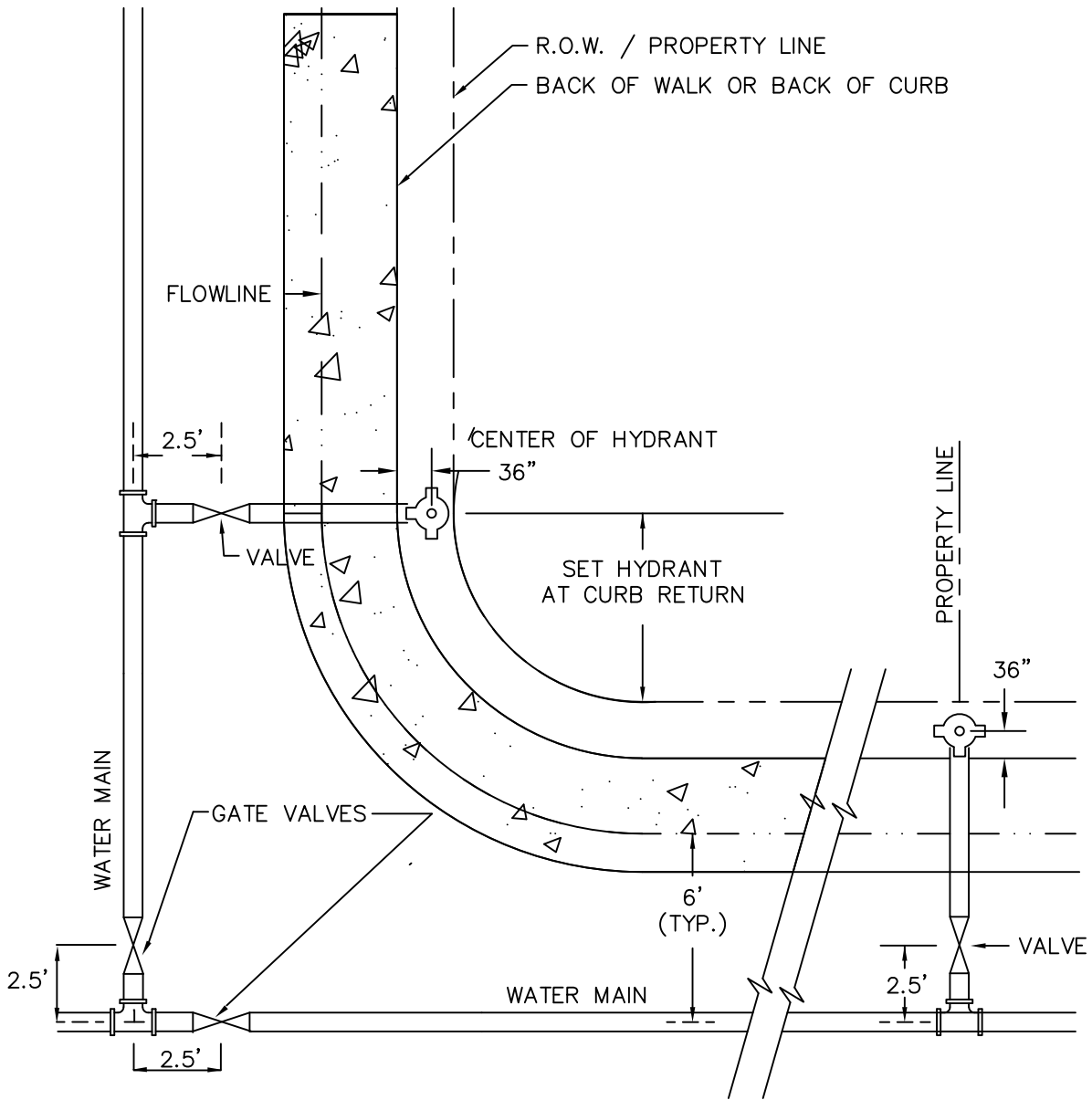
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HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

STANDARD BLOW-OFF VALVE INSTALLATION

WM-6



NOTES:

1. FIRE HYDRANTS SHALL BE PLACED 36" FROM THE CENTER OF THE HYDRANT TO EITHER THE BACK-OF-CURB OR BACK-OF-WALK.
2. AT INTERSECTIONS, VALVES SHALL BE LOCATED 2.5 FEET FROM THE CENTER OF THE TEE OR CROSS TO THE CENTER OF THE VALVE. WITH DISTRICT APPROVAL, VALVE MAY BE LOCATED UP TO 20 FEET FROM CENTER OF TEE OR CROSS, WITH NO JOINTS ALLOWED BETWEEN VALVE AND TEE OR CROSS.
3. VALVES SHALL BE LOCATED WITHIN PAVED AREAS AT A MINIMUM OF 12 INCHES FROM THE LIP OF THE CURB AND GUTTER OR THE EDGE OF PAN ON THE STREET SIDE.

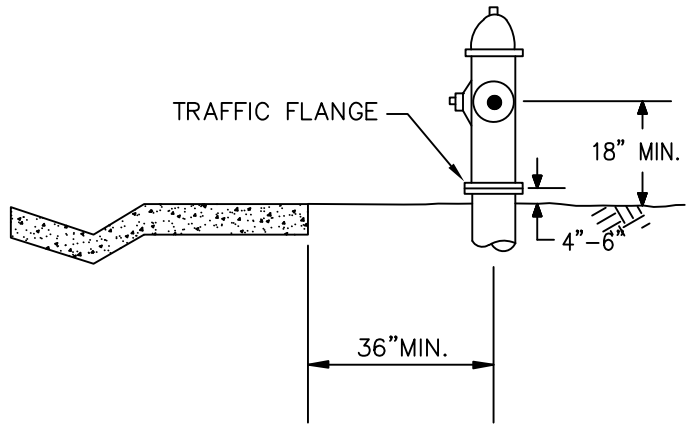
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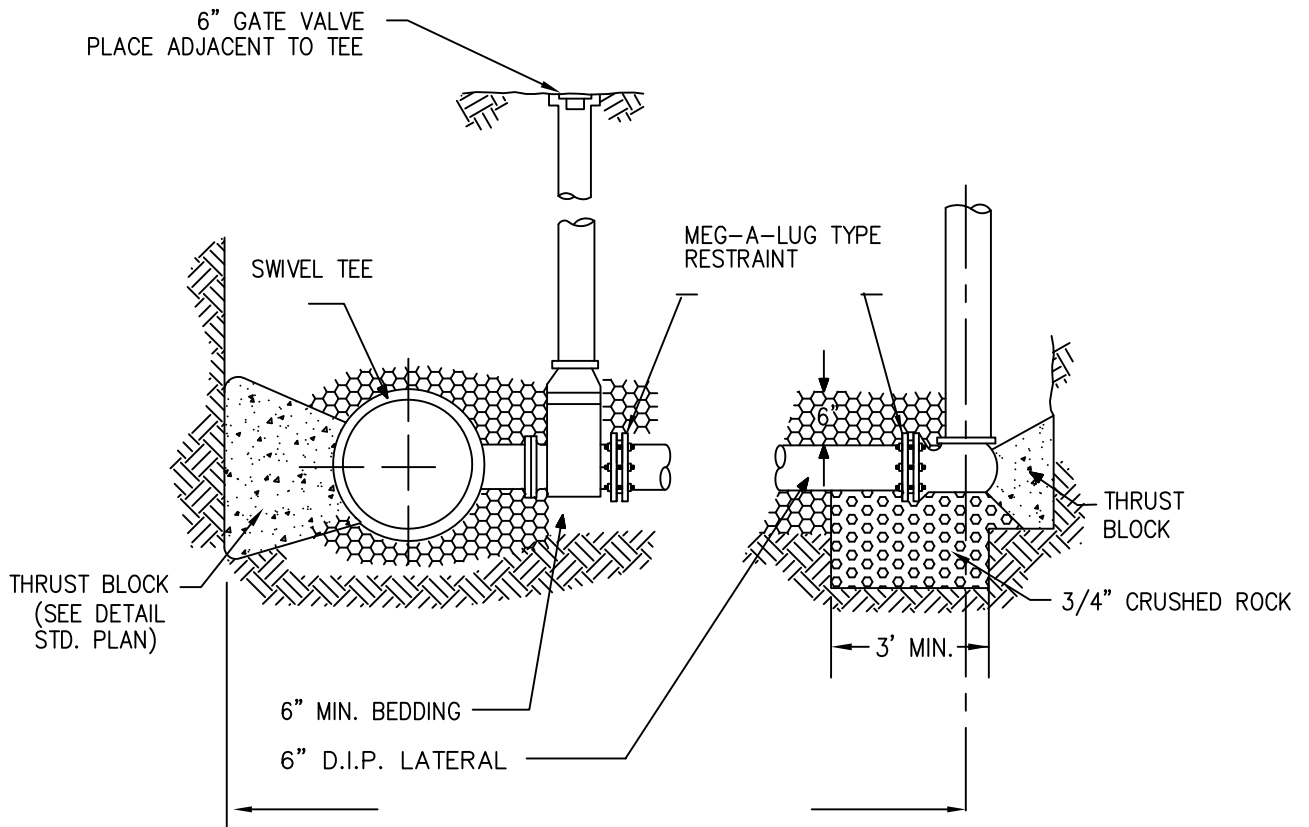
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

VALVE AND FIRE HYDRANT
LOCATION DETAIL

WM-7



HYDRANT & LATERAL
RESTRAINED & WRAPPED



OTHER THAN FLANGED JOINTS, ALL PIPE MUST BE RESTRAINED WITH RODS OR MECHANICAL JOINT RESTRAINING GLANDS.

NOTES:

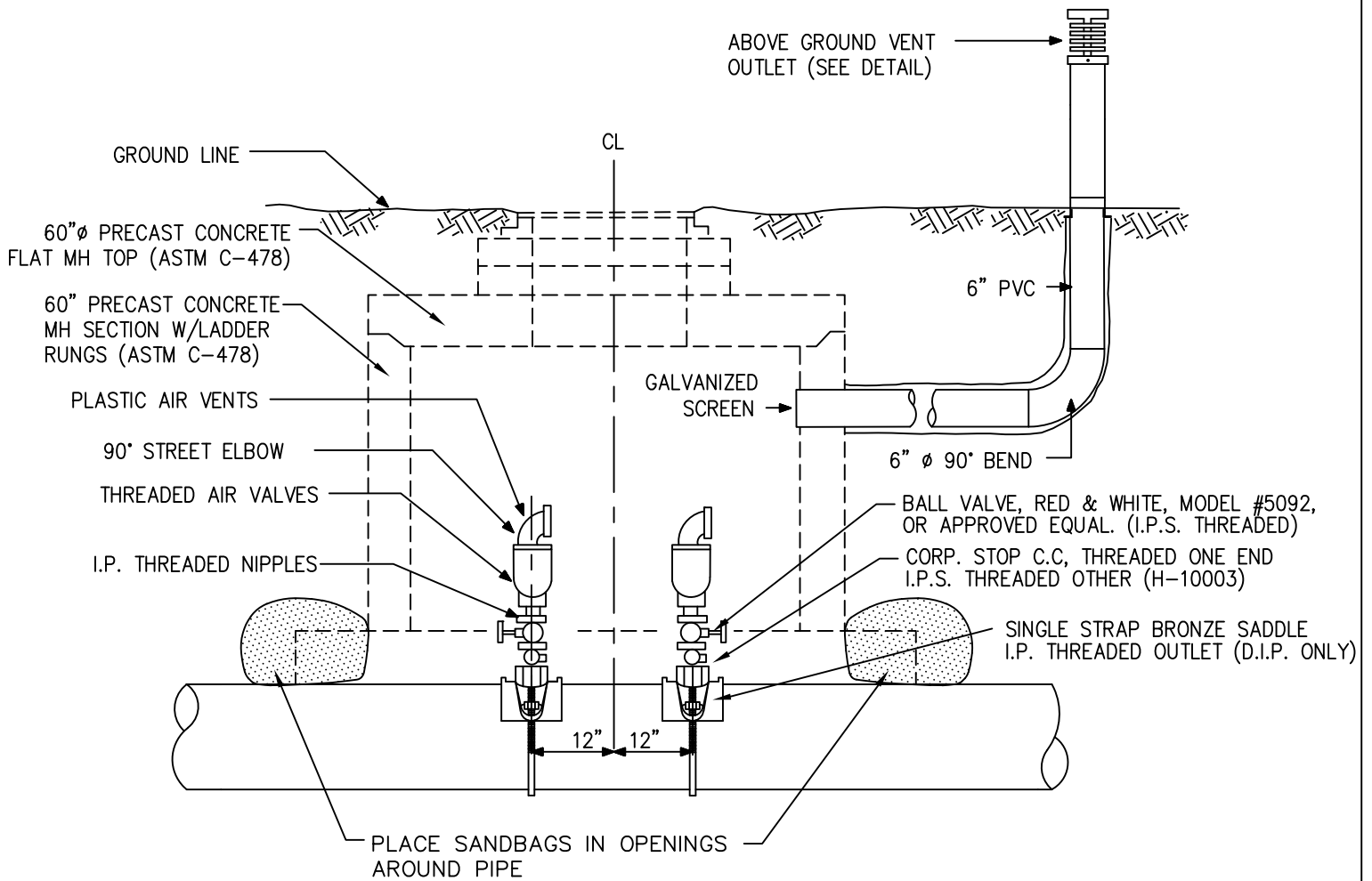
1. HYDRANT PIT SHALL CONTAIN A MINIMUM OF 1 CY OF 3/4" CRUSHED ROCK.
2. REFERENCE SECTION 4.03-J FOR DISTANCE FROM BACK-OF-WALK.

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HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

TYPICAL FIRE HYDRANT
AND ASSEMBLY

WM-8



NOTES:

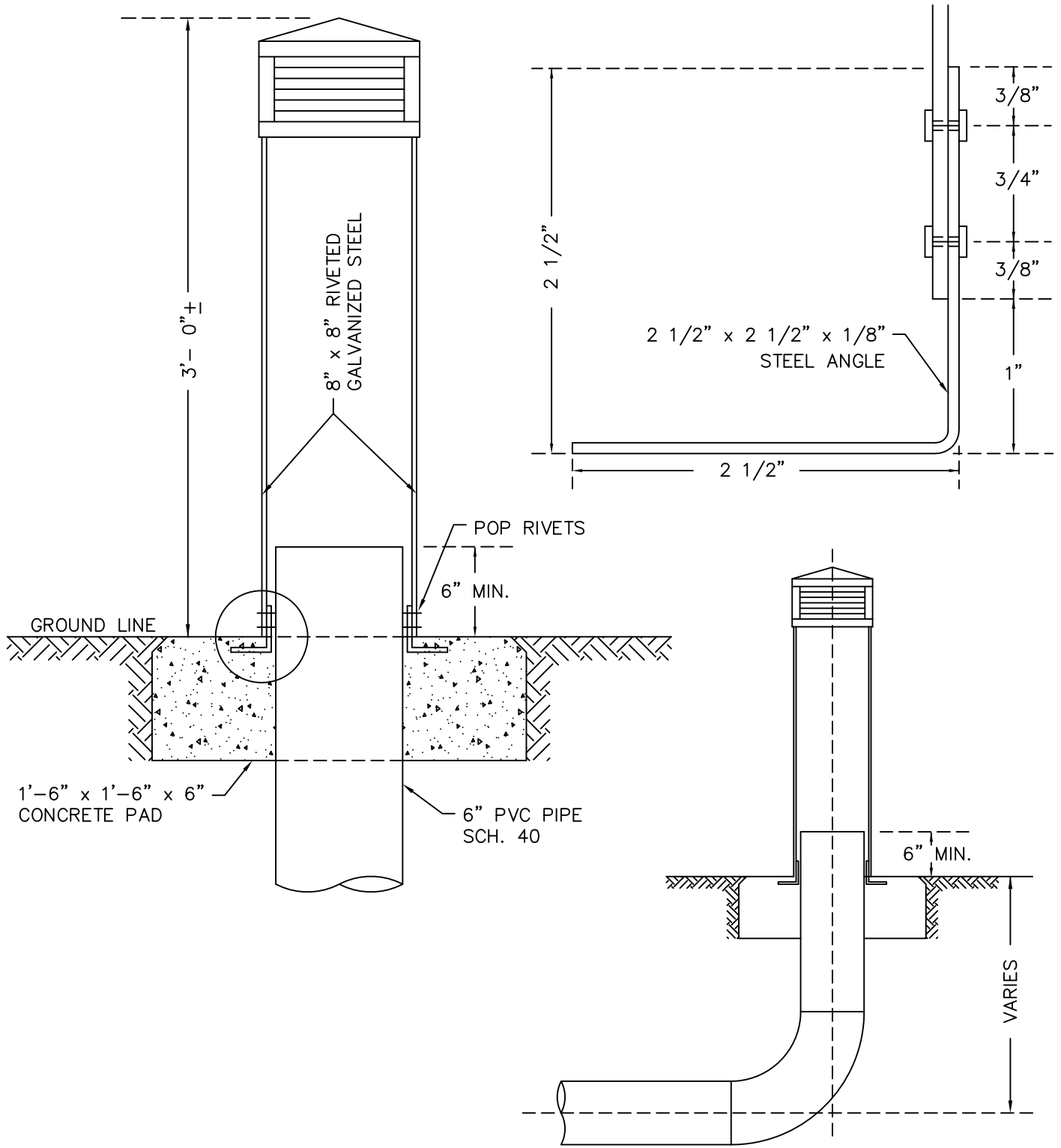
1. 1½" ROCK SHALL BE PLACED IN BOTTOM OF MANHOLE TO CROWN OF PIPE ONLY.
2. ALL PIPE AND FITTINGS SHALL BE BRASS.
3. LINES 12" DIAMETER AND LARGER SHALL EACH HAVE TWO 2" COMBINATION AIR VALVES.

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HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

AIR VALVE ASSEMBLY

WM-9

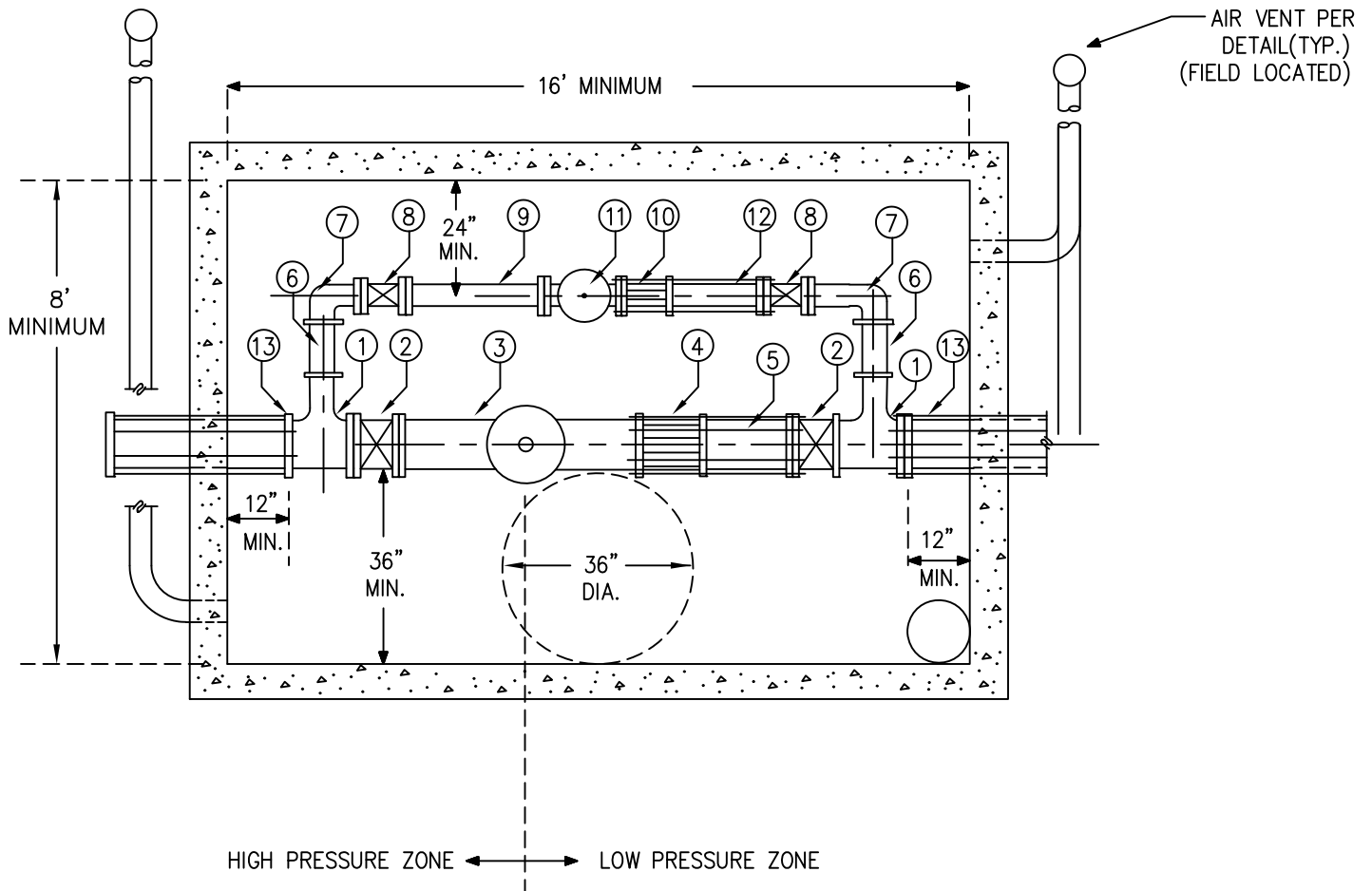


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DOUGLAS COUNTY, COLORADO

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AIR VENT DETAIL

WM-10



PIPING SCHEDULE

- ① *" x 8" TEE (FL x FL x FL)
- ② 8" GATE VALVE (FL x FL)
- ③ *" PRESSURE REDUCING/SUSTAINING VALVE; CLA-VAL SERIES 92G-01
- ④ *" DRESSER COUPLING
- ⑤ *" SPOOL (FL x PE)
- ⑥ 8" x 4" REDUCER (FL x FL)
- ⑦ 4" 90° BEND (FL x FL)
- ⑧ 4" GATE VALVE (FL x FL)
- ⑨ 4" SPOOL (FL x FL)
- ⑩ 4" DRESSER COUPLING
- ⑪ 4" PRESSURE REDUCING/SUSTAINING VALVE; CLA-VAL SERIES 92G-01
- ⑫ 4" SPOOL (FL x PE)
- ⑬ ADAPTOR (FL x MJ)
- ⑭ ALL FITTINGS AND PIPING WILL BE PAINTED "PRECAUTION BLUE" ENAMEL

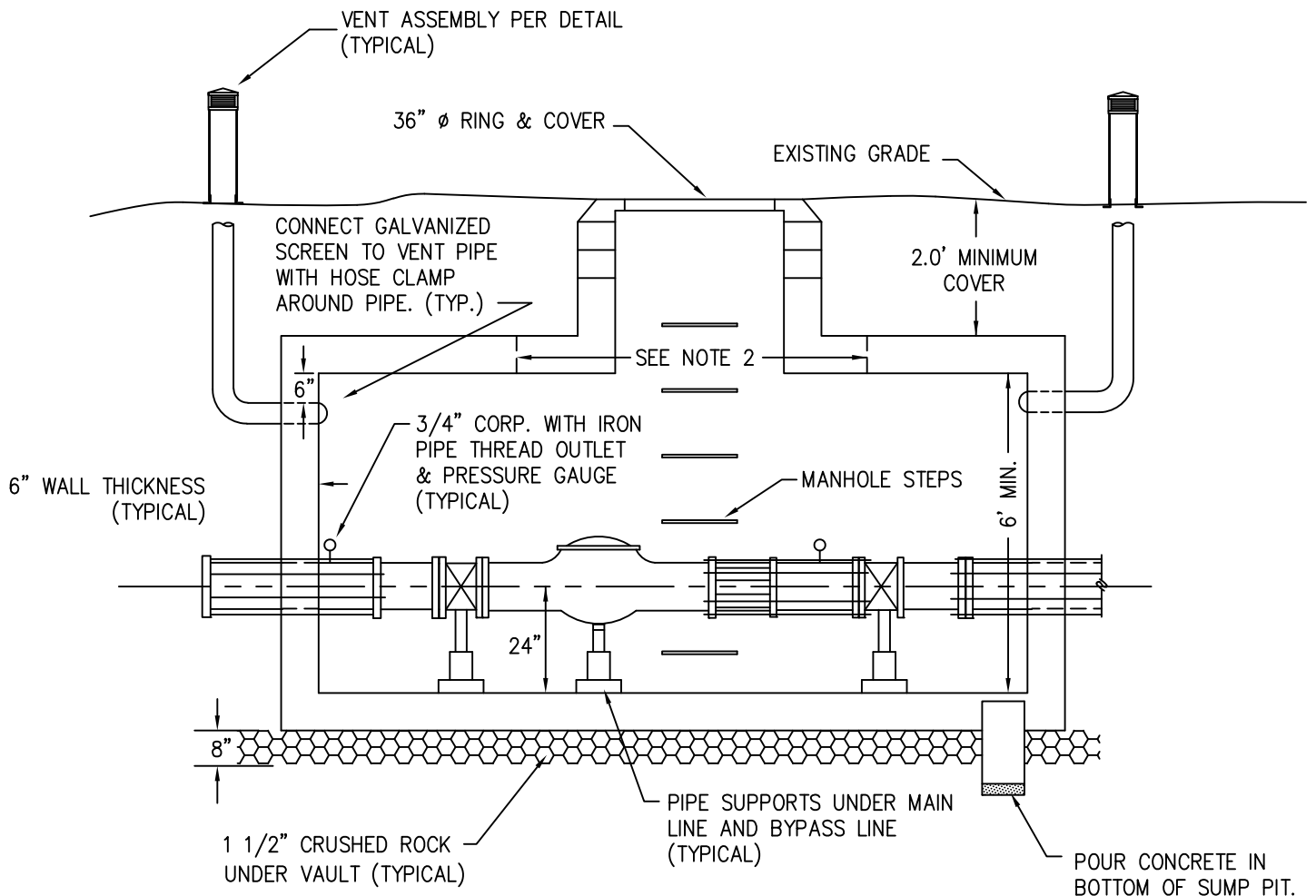
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HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

PRESSURE REDUCING VAULT
(DETAIL 1 OF 2)

WM-11A



NOTES:

1. EXTERIOR CONCRETE SURFACES SHALL BE DAMP-PROOFED IN ACCORDANCE WITH THE SPECIFICATIONS.
2. VAULT LID SHALL HAVE A REMOVABLE SECTION (MINIMUM 6" WIDE) WITH LIFTING RING.

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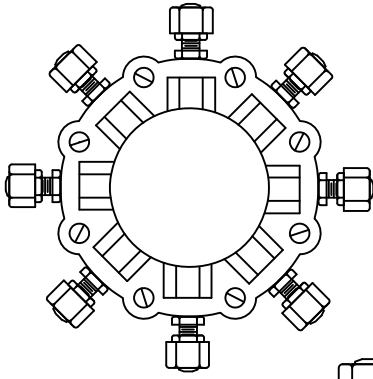
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DOUGLAS COUNTY, COLORADO

PRESSURE REDUCING VAULT
(DETAIL 2 OF 2)

WM-11B

MECHANICAL JOINT RESTRAINING GLANDS FOR P.V.C. OR D.I. PIPE.

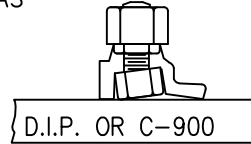
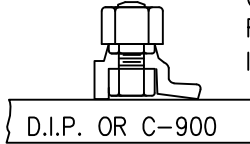


GLANDS SHALL BE COLOR CODED: P.V.C – C 900 RED
DUCTILE IRON BLACK

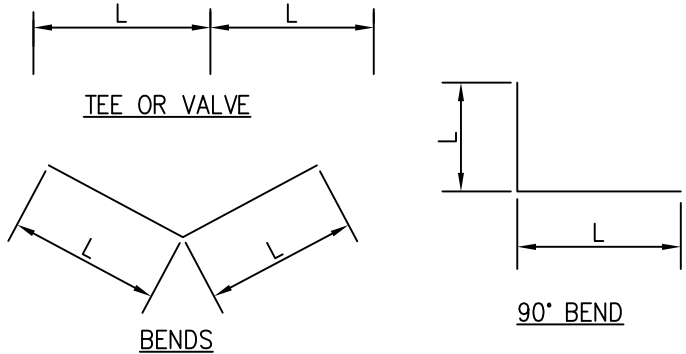
P.V.C. GLANDS 2000 MEG-A-LUG OR 1500 UNI-FLANGE OR APPROVED EQUAL

D.I. GLANDS 1100 MEG-A-LUG OR 1400 UNI-FLANGE OR APPROVED EQUAL

FOR INSTALLATION ON C-900 PVC OR DUCTILE IRON PIPE USE AS RECEIVED AND INSTALL PER INSTRUCTIONS.



NOMINAL PIPE SIZE	SHIPPING WEIGHT	PIPE O.D.	
		P.V.C. AWWA C900	DUCTILE IRON ASTM A536
4"	8.8	4.800	4.800
6"	12.1	6.900	6.900
8"	16.3	9.050	9.050
10"	26.0	11.10C	11.10C
12"	31.4	13.20C	13.20C



ROD DIAMETER, GRADE AND LENGTH OF RESTRAINED PIPE

PIPE SIZE	4"			6"			8"			12"			16"			20"			24"			30"		
	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G
TEE (BRANCH ONLY)	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	40'	M.S.	3/4"	60'	H.S.	1"	80'	H.S.	-	155'	-	-	218'	-
PLUG OR 90° BEND	3/4"	40	M.S.	3/4"	40	M.S.	3/4"	40	M.S.	3/4"	40	M.S.	3/4"	60'	H.S.	1"	80'	H.S.	-	155'	-	-	218'	-
45° BEND	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	11'	M.S.	3/4"	18'	M.S.	3/4"	24'	H.S.	-	45'	-	-	64'	-
22-1/2° BEND	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	3'	M.S.	3/4"	5'	M.S.	3/4"	6'	M.S.	-	12'	-	-	17'	-
11-1/4° BEND	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	0	M.S.	3/4"	1'	M.S.	3/4"	1'	M.S.	3/4"	2'	M.S.	-	3'	-	-	5'	-
ALL VERTICAL BENDS	TOTALLY RESTRAINED, L = 40'																							

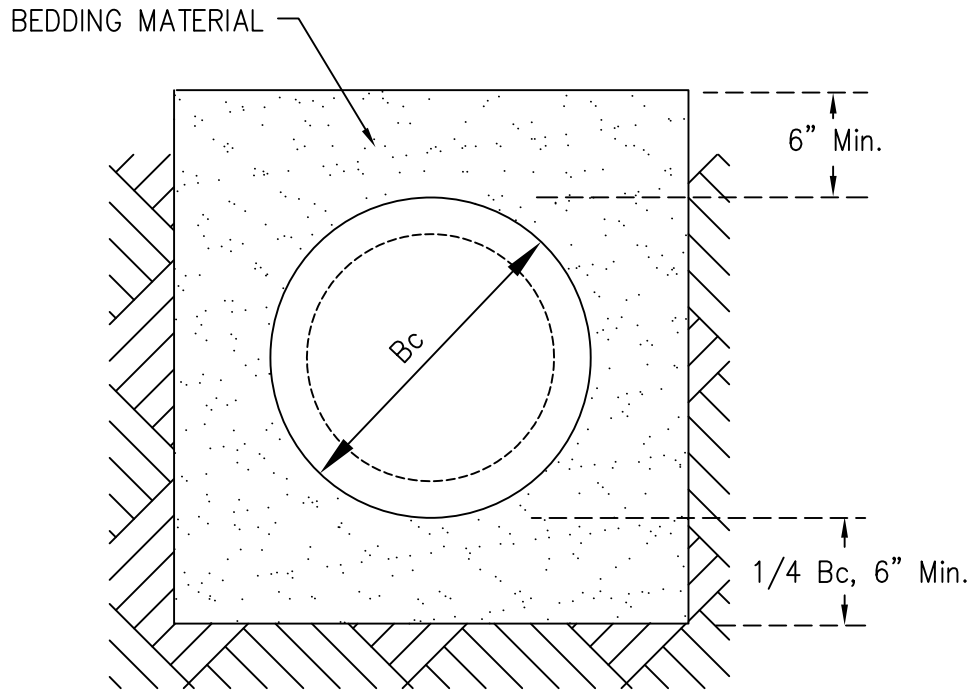
1. LENGTH OF RESTRAINED PIPE MEASURED EACH WAY FROM BENDS.
2. CLAMPS AND RODS SHALL BE EXTENDED TO NEXT PIPE.
3. D = DIAMETER, L = LENGTH, G = GRADE, M.S. = MILD STEEL, H.S. = HIGH STRENGTH STEEL.
4. MINIMUM 4.5' OF GROUND COVER IS REQUIRED.
5. BASED ON 150 P.S.I., INTERNAL PRESSURE.
6. M.S. MEANS MILD STEEL ROD, A.S.T.M. STANDARD DESIGNATION A-36.
7. H.S. MEANS HIGH STRENGTH ROD, A.S.T.M. STANDARD DESIGNATION A-193, GRADE B-7.
8. NUTS SHALL BE A.S.T.M., STANDARD DESIGNATION A-307, GRADE A OR B, HEXAGON HEAVY SERIES.
9. LENGTH REFERS TO THE AMOUNT OF PIPE WHICH MUST BE RESTRAINED TOGETHER, AND IS NOT NECESSARILY THE LENGTH OF THE RODS.
10. SEE PLAN AND PROFILE SHEETS FOR ACTUAL MINIMUM LENGTH OF RESTRAINED PIPE.
11. LENGTH OF TIED PIPE CHART IS ALSO FOR THE LENGTH OF JOINT RESTRAINT FOR MEG-A-LUGS.

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DOUGLAS COUNTY, COLORADO

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MECHANICAL JOINT RESTRAINING
RING AND RODDING

WM-12



NOTES:

1. SEE CHAPTER 4, PARAGRAPH 4.02 X FOR BEDDING MATERIALS.
2. SEE CHAPTER 4, PARAGRAPH 4.03 B.2 FOR BEDDING REQUIREMENTS.

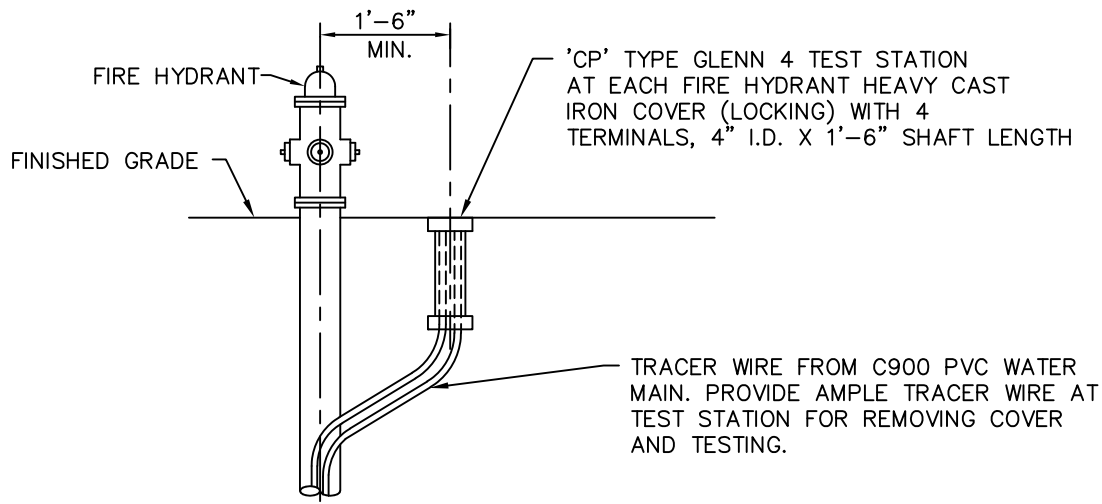
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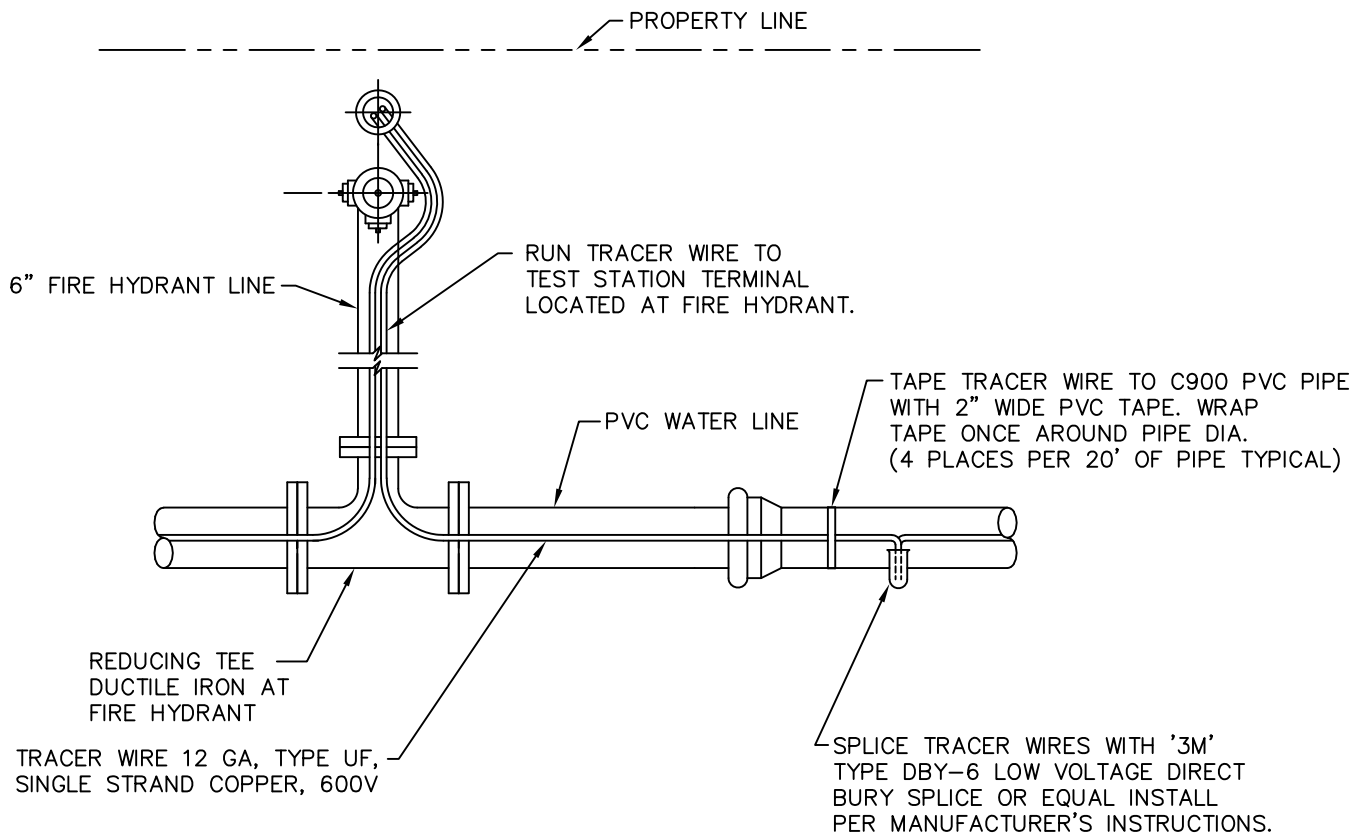
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DOUGLAS COUNTY, COLORADO

PIPE BEDDING DETAILS – WATER

WM-13



PROFILE



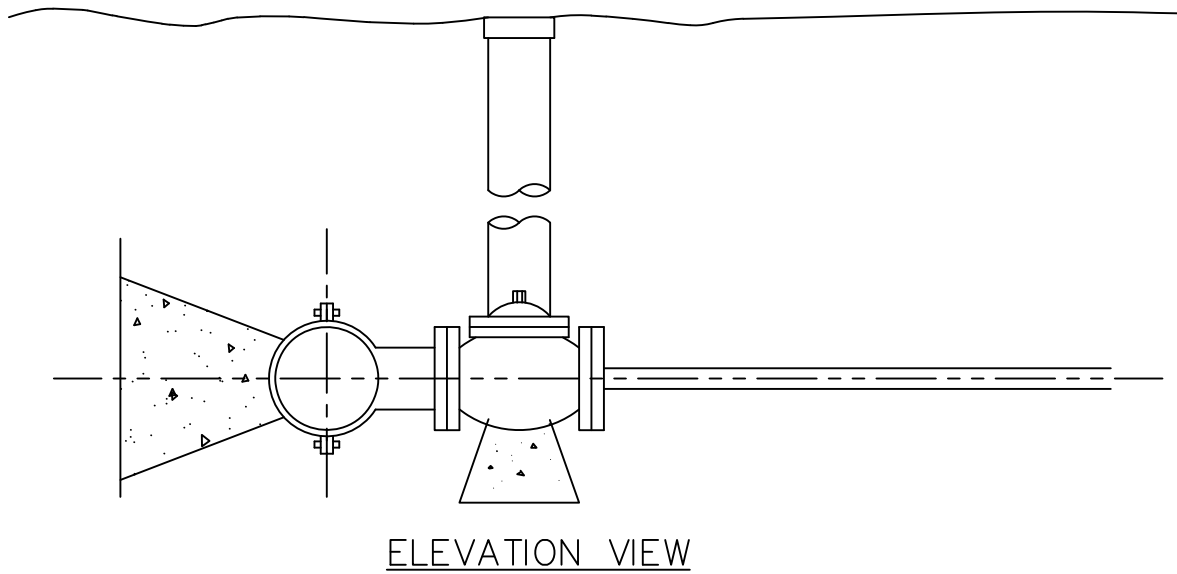
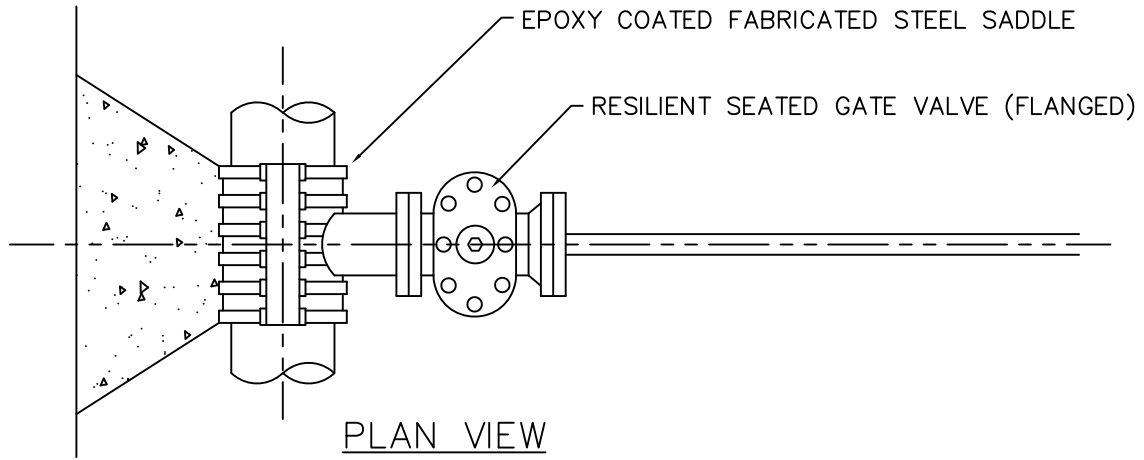
PLAN VIEW

APPROVED:
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

TRACER WIRE INSTALLATION FOR PVC WATER MAIN

WM-14



NOTE: WET TAP ON 16" OR LARGER MAINS SHALL BE A MINIMUM OF 4" DIAMETER.

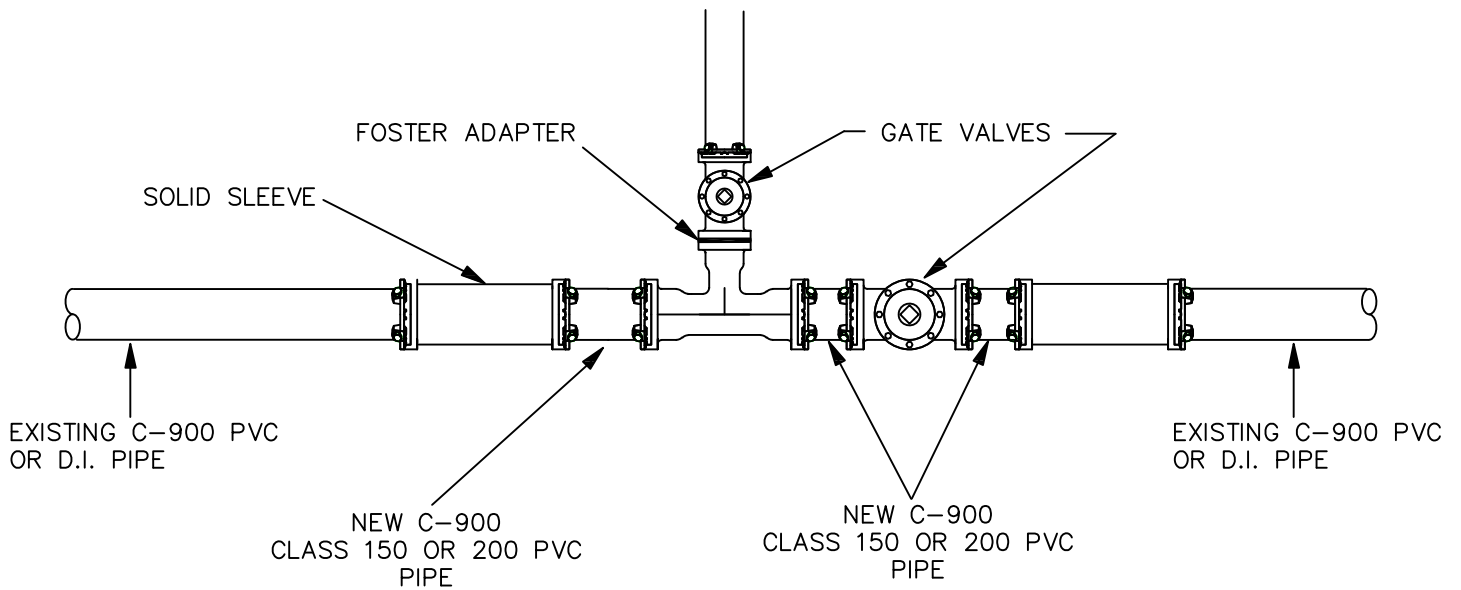
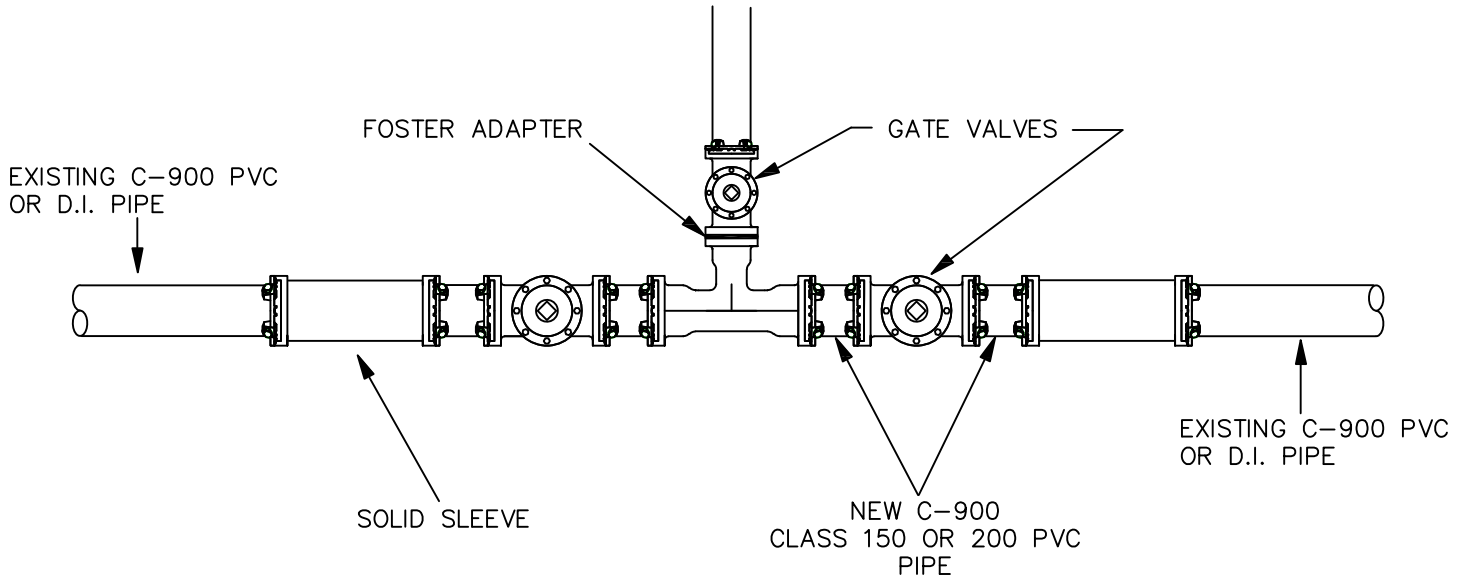
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

WET TAP

WM-15



NOTES:

1. NEW PVC WATER LINE WILL BE C-900, DR-14 OR DR-18 DEPENDING ON THE STATIC PRESSURE IN THE SYSTEM. DUCTILE IRON PIPE CAN BE USED IN ANY PRESSURE ZONE.

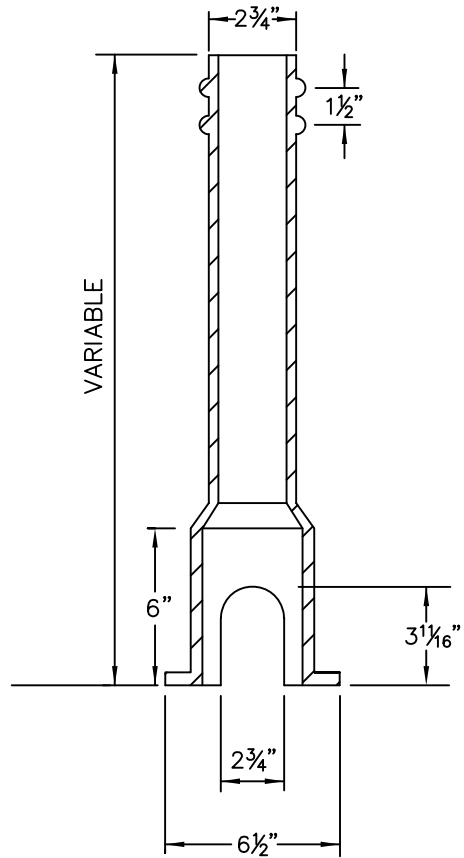
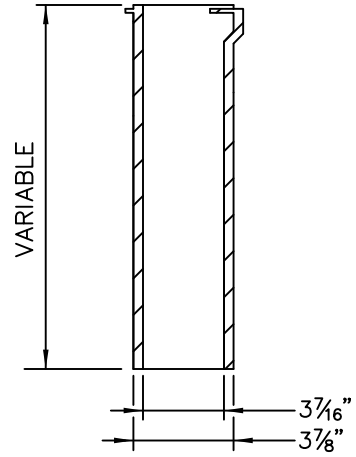
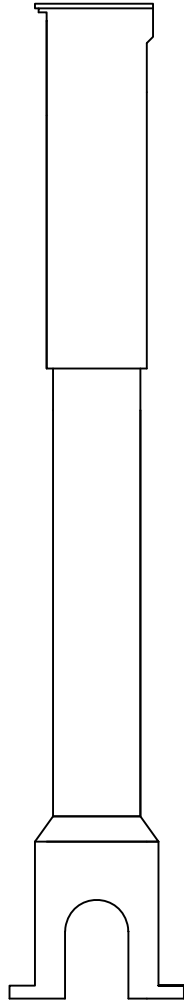
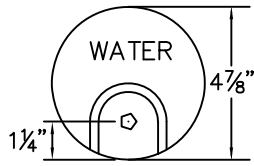
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

CONNECTION TO EXISTING WATER MAIN

WM-16



NOTES:

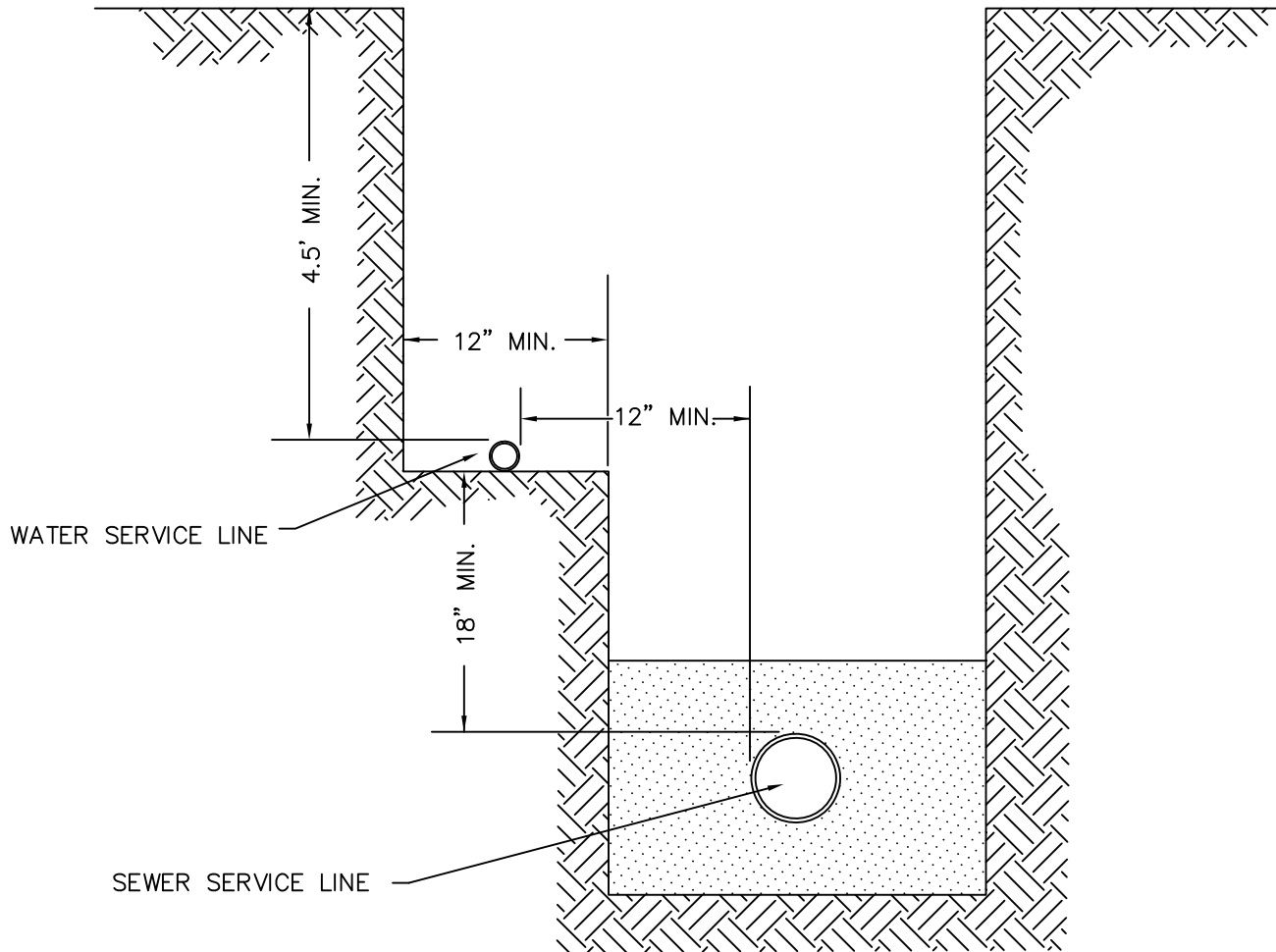
1. CURB STOP BOX SHALL BE TYLER MODEL 6500 SERIES, SIZE 95E OR APPROVED EQUAL.
2. A 2" x 9" CONCRETE PAD SHALL BE PLACED UNDER THE CURB STOP VALVE AND BOX.

APPROVED:
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

TYPICAL – CURB STOP FOR
3/4" AND 1" WATER SERVICE

WS-1



NOTES:

1. WATER SERVICE SHALL BE LOCATED AT THE CENTERLINE OF LOT.
2. WATER SERVICE SHALL MAINTAIN A MINIMUM COVER OF 4.5 FEET.
3. AN 18" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN THE WATER AND SEWER SERVICES.
4. A 12" MINIMUM HORIZONTAL CLEARANCE SHALL BE MAINTAINED BETWEEN THE WATER AND SEWER SERVICES.

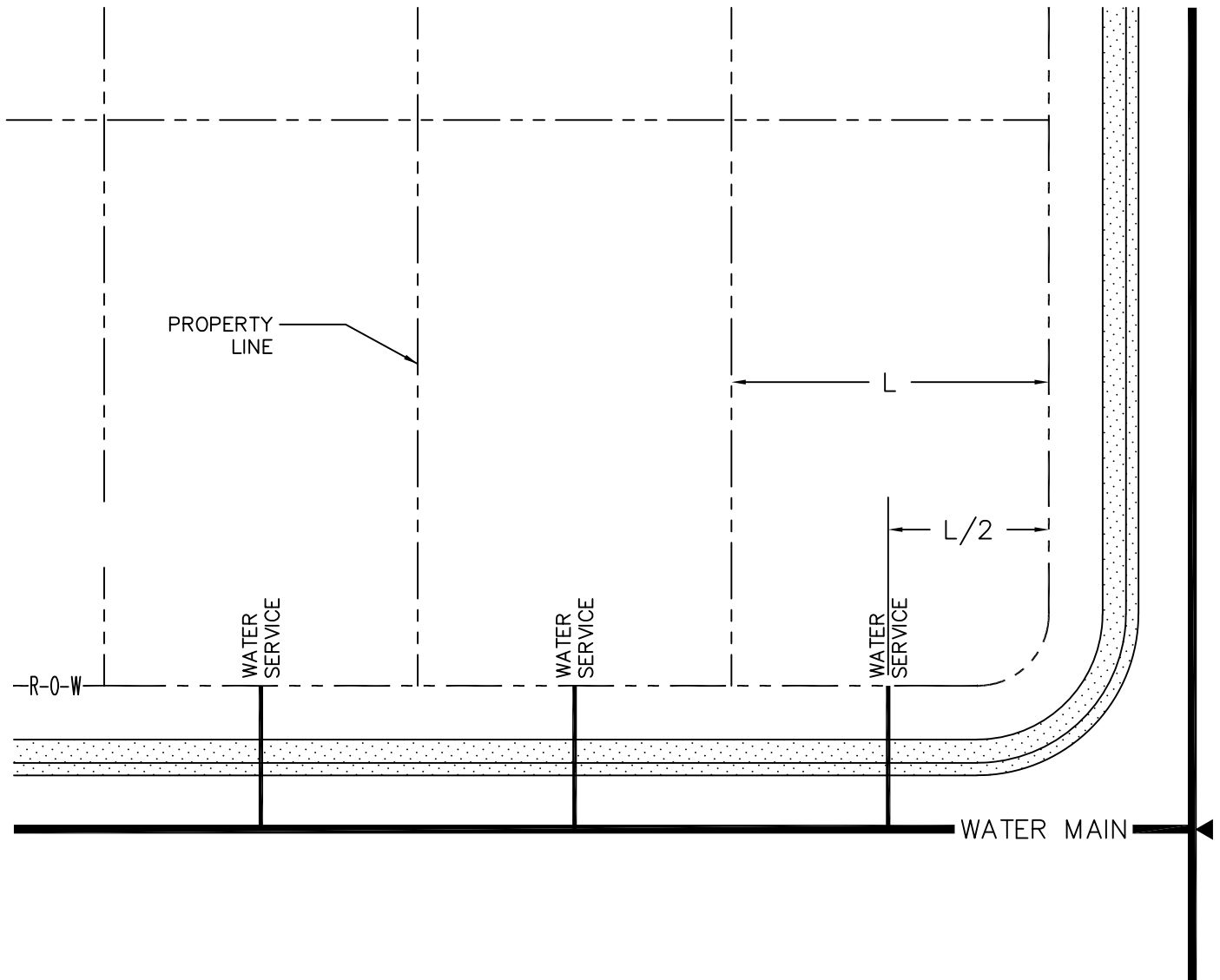
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

RESIDENTIAL – WATER AND SEWER SERVICE
JOINT TRENCH DETAIL

WS-2



NOTES:

1. WATER SERVICE LINES SHALL BE CENTERED ON THE FRONT LOT LINE.
2. CURB STOP VALVES SHALL BE INSTALLED PER DETAIL WS-4.

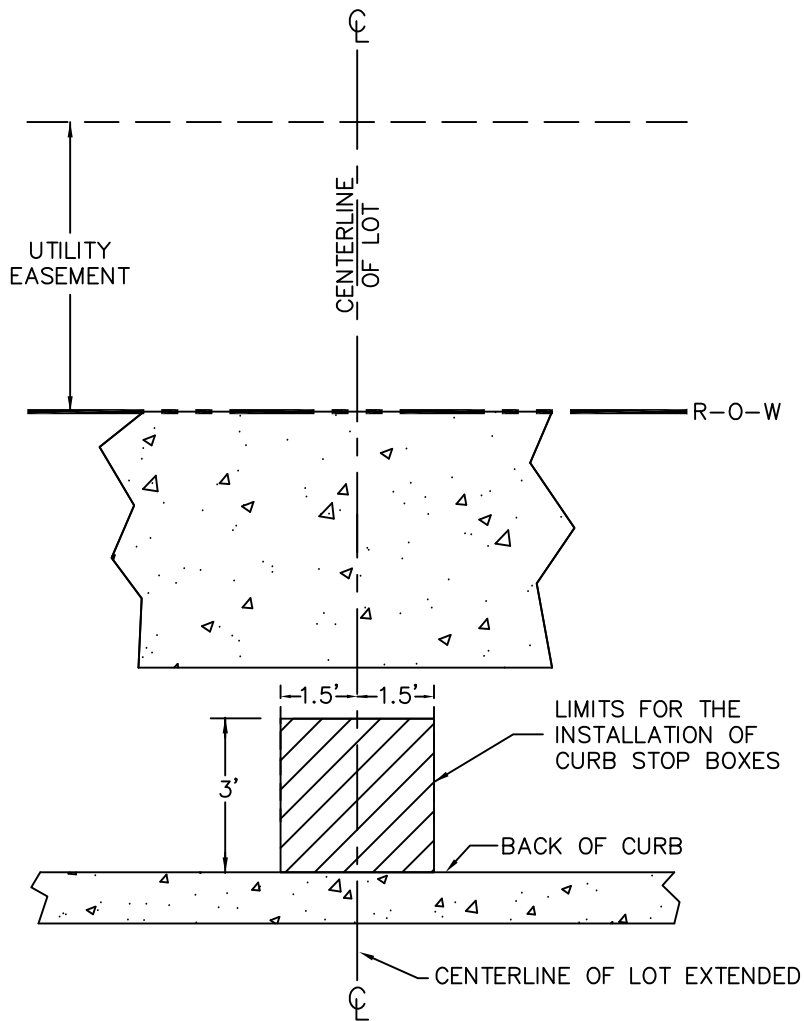
APPROVED:

MAY 2020

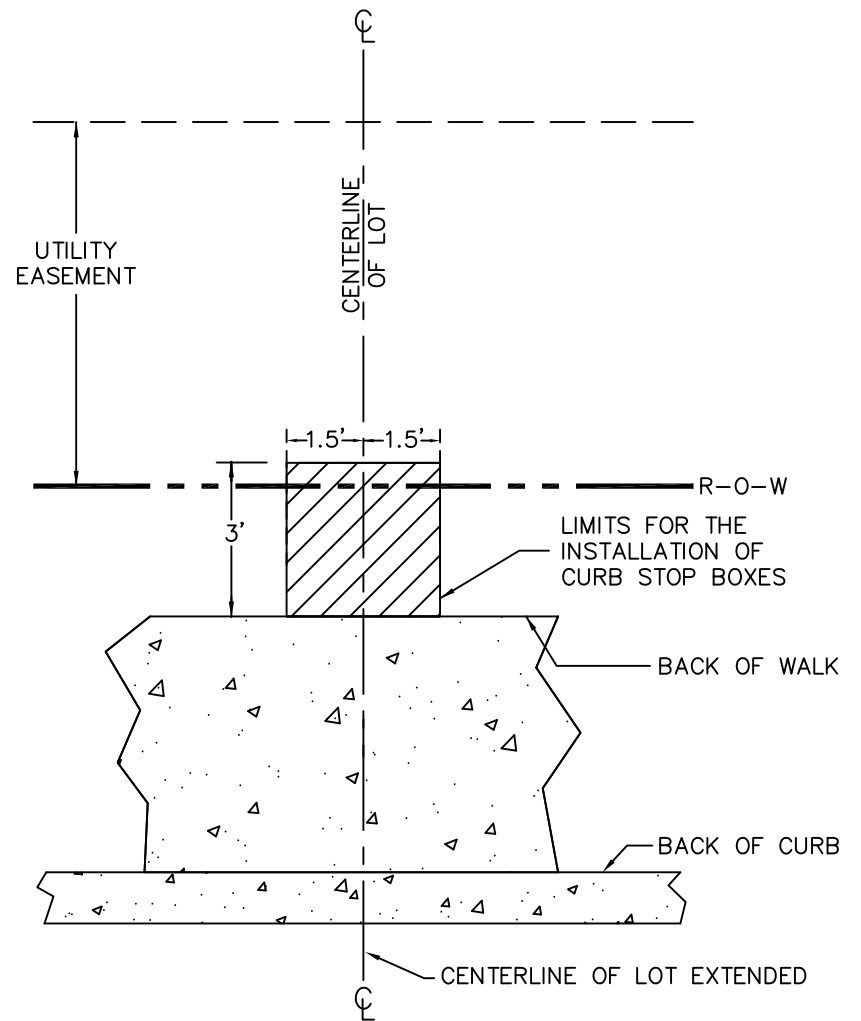
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

RESIDENTIAL – WATER SERVICE LOCATION

WS-3



DETACHED CURB INSTALLATION



ATTACHED CURB INSTALLATION

NOTES:

1. A "V" SHALL BE CUT IN THE FACE-OF-CURB BY THE BUILDER TO PERMANENTLY MARK THE LOCATION OF THE CURB STOP BOX. THE "V" SHALL BE A MINIMUM OF 3" IN HEIGHT AND 1/8" IN DEPTH.
2. ALL WATER SERVICE LINES SHALL BE PLACED AT THE CENTER OF THE LOT.

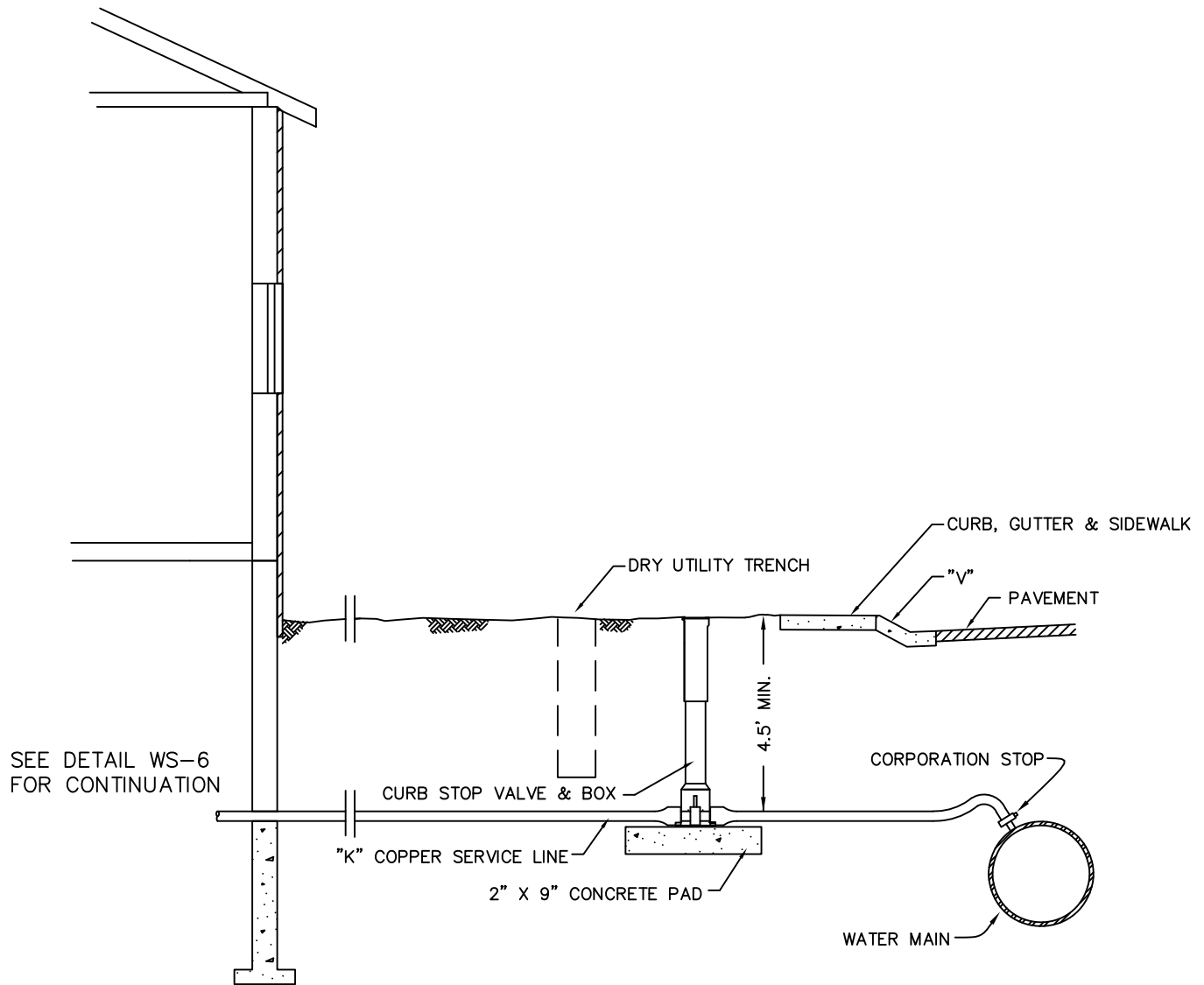
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

RESIDENTIAL – CURB STOP BOX LOCATION

WS-4



SEE DETAIL WS-6
FOR CONTINUATION

NOTES:

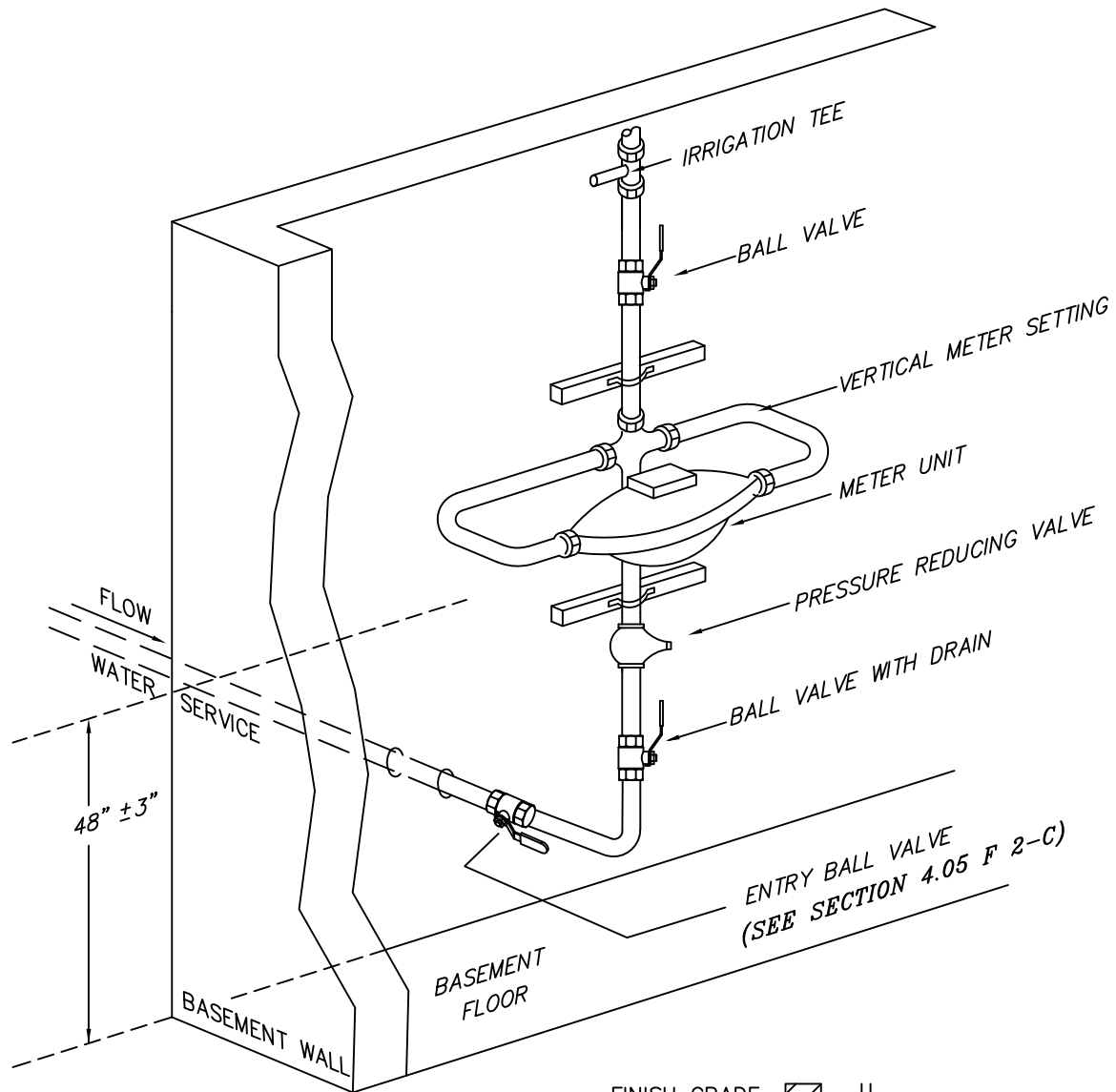
1. A "V" SHALL BE CUT IN THE FACE OF THE CURB-AND-GUTTER BY THE BUILDER TO PERMANENTLY MARK THE LOCATION OF THE CURB STOP BOX.
2. ALL WATER SERVICE LINES SHALL BE PLACED AT THE CENTER OF THE LOT.
3. TYLER 95-E CURB BOX OR APPROVED EQUAL.

APPROVED:
MAY 2020

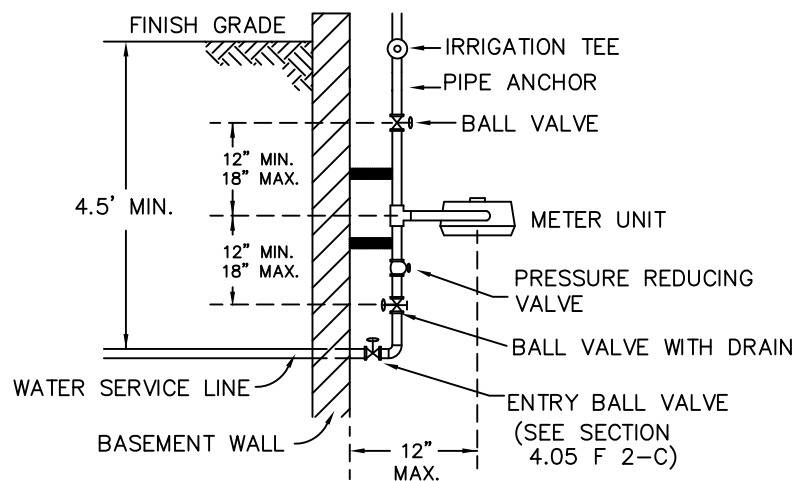
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

RESIDENTIAL – WATER SERVICE INSTALLATION
WITH CURB STOP VALVE

WS-5



3/4" WATER METER LAYING LENGTH = 7.5"



NOTES:

1. THE WATER LINE MUST BE ANCHORED TO THE WALL ABOVE AND BELOW THE METER ASSEMBLY.
2. ENTRY VALVE REQUIRED IMMEDIATELY INSIDE OF THE STRUCTURE.

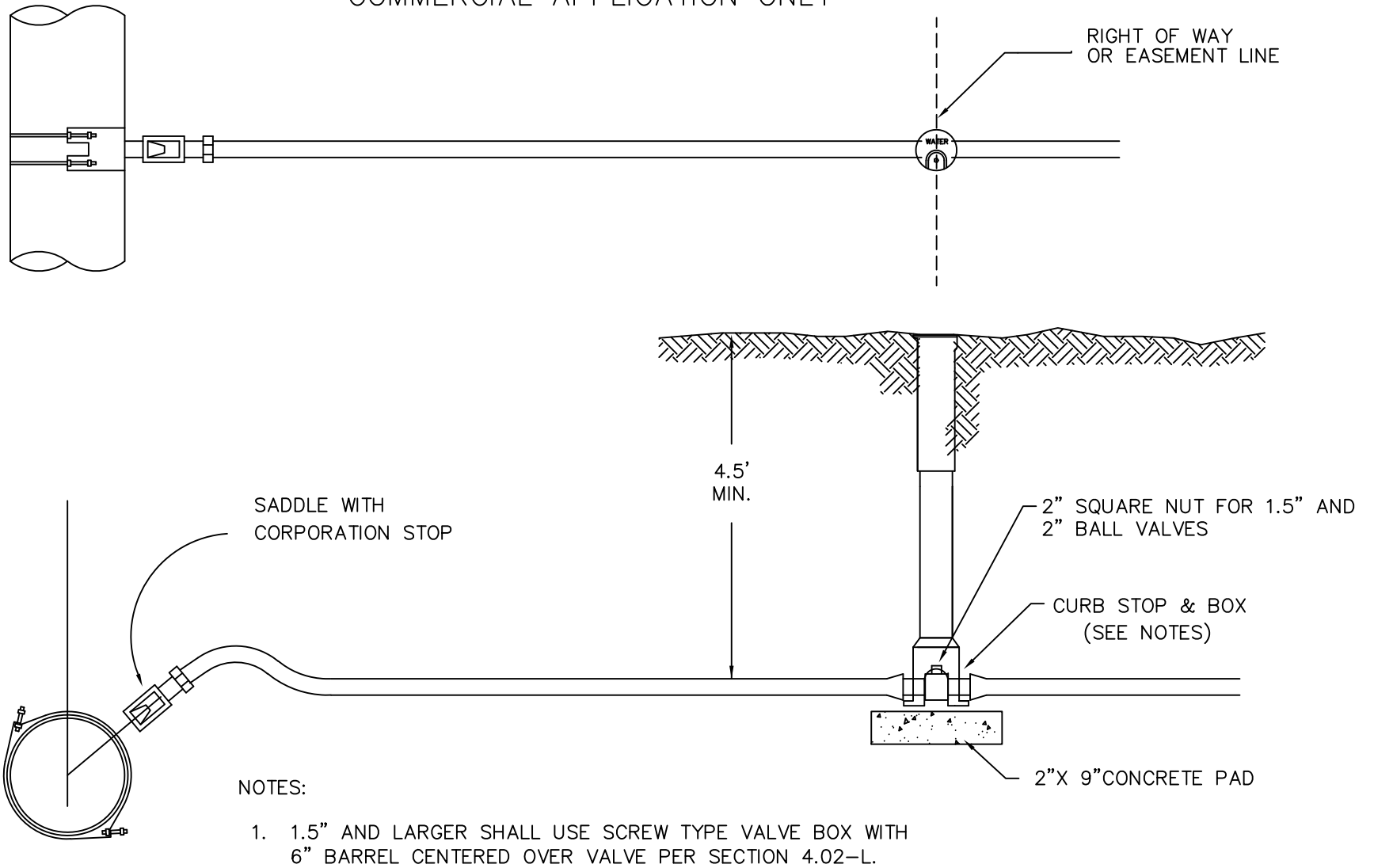
APPROVED:
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

RESIDENTIAL – METER SETTING
FOR 3/4" SERVICE

WS-6

COMMERCIAL APPLICATION ONLY



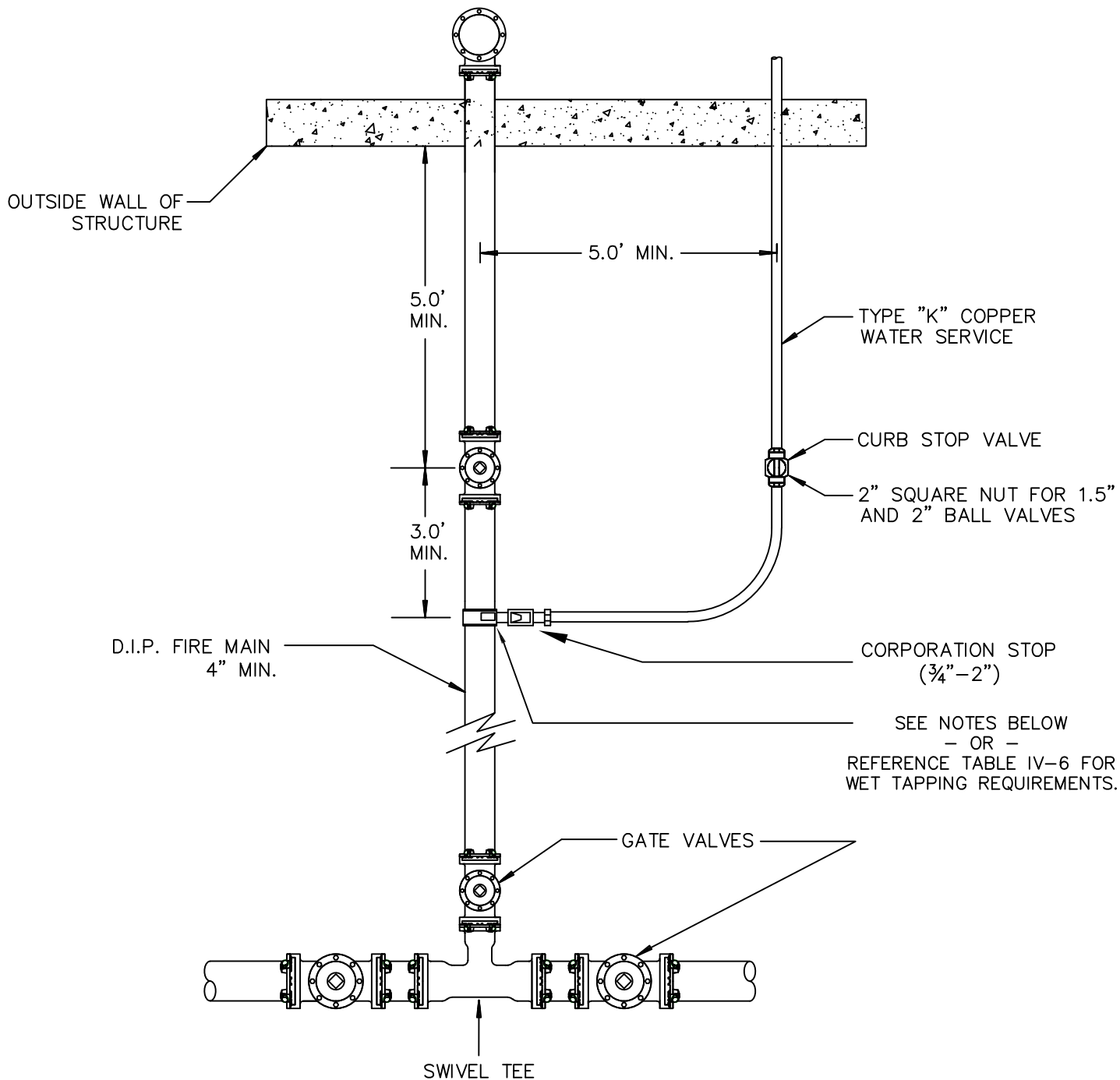
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:

MAY 2020

COMMERCIAL – CORPORATION TAP & SERVICE LINE DETAIL

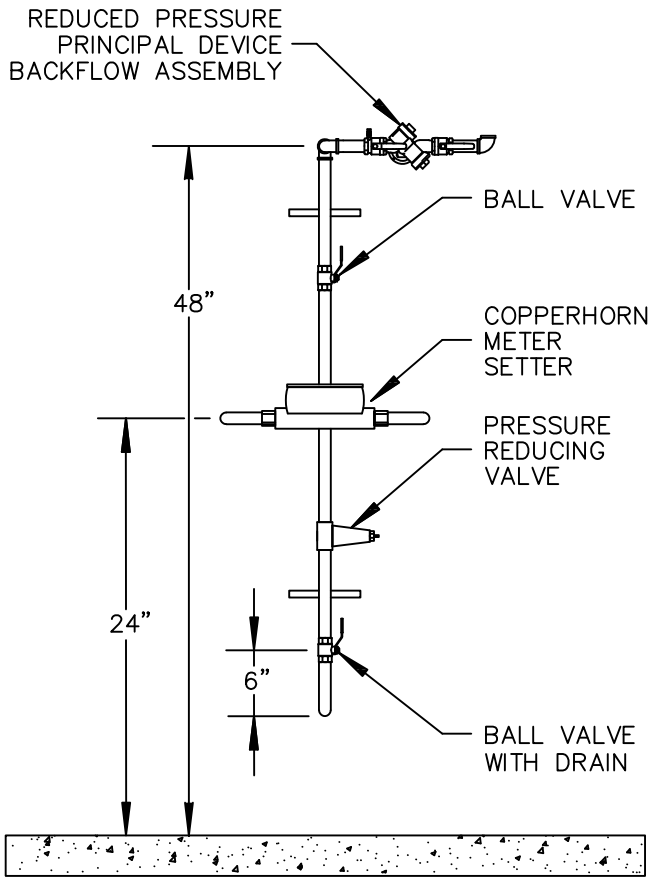
WS-7



NOTES:

1. ON 6" FIRE LINES OR LARGER WITH A 2" OR SMALLER DOMESTIC TAP, USE A DOUBLE STRAP BRONZE TAPPING SADDLE.
2. ON 4" FIRE LINES WITH A 2" DOMESTIC TAP, USE A 4" M.J. x 2" THD TEE.
3. ON 4" FIRE LINES WITH A 1½" DOMESTIC TAP, USE A 4" M.J. x 2" THD TEE WITH A BRASS BUSHING.
4. ON A 4" FIRE SERVICE WITH A ¾" OR 1" SERVICE, USE A DOUBLE STRAP BRONZE TAPPING SADDLE.

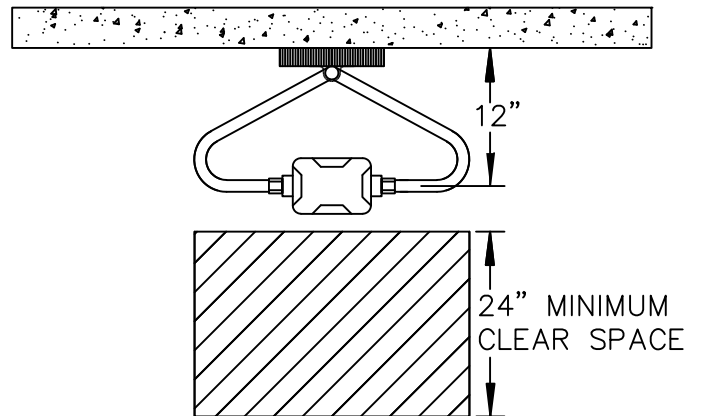
<p>APPROVED:</p> <p>MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO</p>	<p>WS-8</p>
	<p>COMMERCIAL – JOINT FIRE MAIN/WATER SERVICE INSTALLATION DETAIL</p>	



ELEVATION VIEW

WATER METER LAYING LENGTH

$$\begin{aligned} 3/4" &= 7-1/2" \\ 1" &= 10-3/4" \end{aligned}$$



PLAN VIEW

NOTES:

1. THE CENTER OF THE METER AND BACKFLOW SHALL BE PLACED 12" AWAY FROM THE ADJACENT WALL WITH A MINIMUM OF 24" CLEAR SPACE IN FRONT OF THE DEVICE FROM FLOOR TO CEILING.
2. THE WATER LINE MUST BE ANCHORED TO THE WALL ABOVE AND BELOW THE METER ASSEMBLY.
3. ENTRY VALVE REQUIRED IMMEDIATELY INSIDE OF STRUCTURE WITHIN 6" OF THE OUTSIDE WALL.

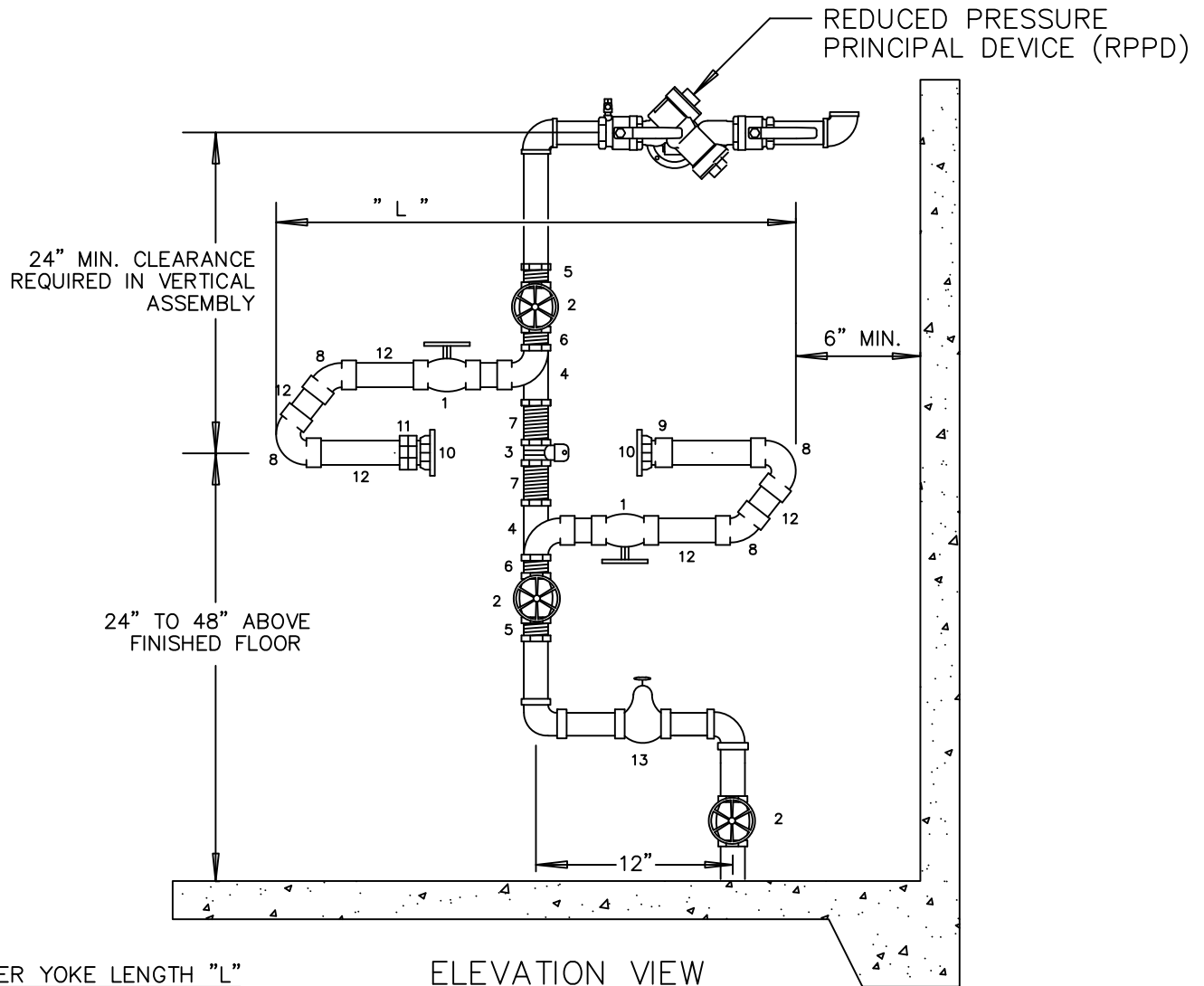
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

COMMERCIAL – METER/BACKFLOW FOR
3/4" AND 1" SERVICE

WS-9



METER YOKE LENGTH "L"

1-1/2" = 28"
2" = 32"

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. SWEAT GATE VALVE 2. SCREWED GATE VALVE 3. 1-1/4" BALL VALVE WITH LOCKING WING 4. FORD CUSTOM SETTER TEE 5. COMP. COPPER X MIPT ADAPTER 6. CLOSE BRASS NIPPLE 7. 1-1/4" X CLOSE BRASS NIPPLE | <ol style="list-style-type: none"> 8. SWEAT 90 DEGREE BEND 9. MIPT X SWEAT ADAPTER 10. BRASS METER FLANGE 11. LOC-PAC COUPLING 12. CUT TYPE K - COPPER TUBING 13. PRESSURE REDUCING VALVE |
|--|---|

NOTES:

1. AN APPROVED REDUCED PRESSURE PRINCIPAL BACKFLOW PREVENTION DEVICE IS REQUIRED DOWNSTREAM OF THE WATER METER FOR ALL COMMERCIAL PROPERTIES..
2. THE ASSEMBLY MAY BE CONSTRUCTED OF THREADED OR SWEAT FITTINGS.
3. A MINIMUM OF 24" CLEARANCE IS REQUIRED BETWEEN THE METER AND BACKFLOW DEVICE.
4. NO GALVANIZED FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.

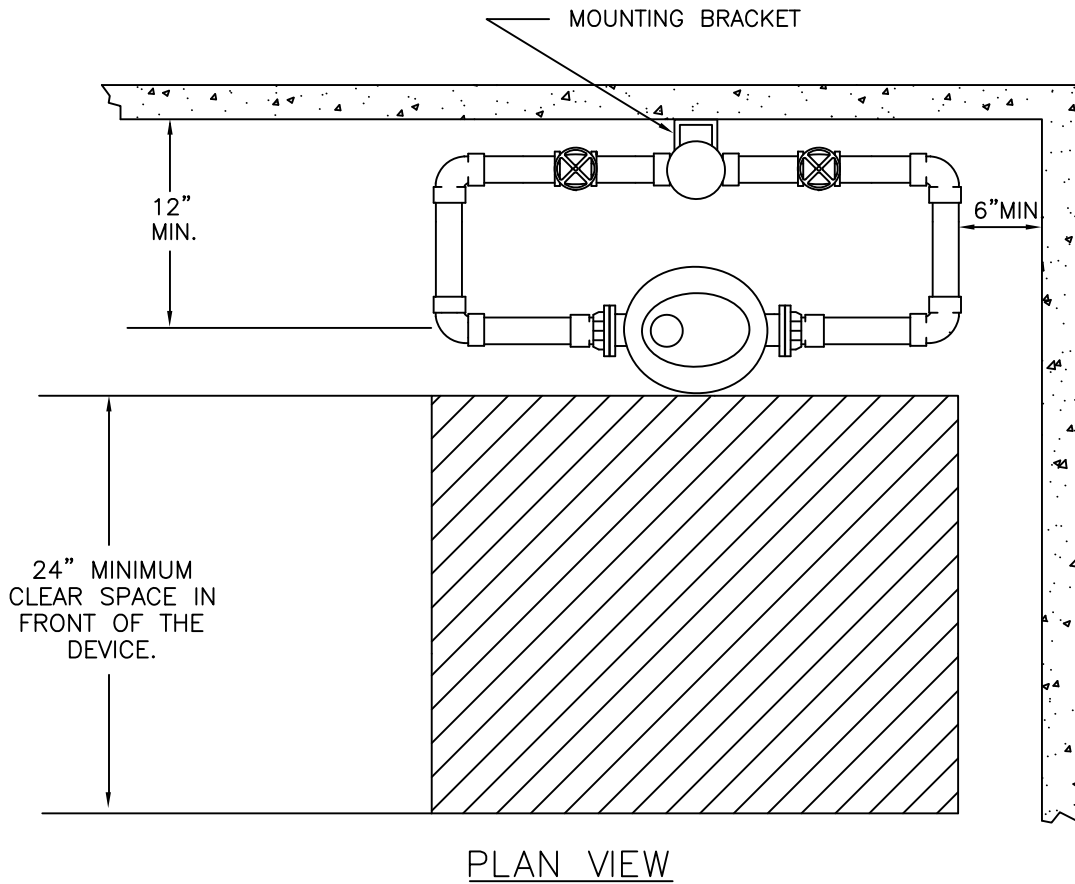
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

COMMERCIAL - METER/BACKFLOW FOR
1 1/2" AND 2" SERVICE - VERTICAL SETTING
(DETAIL 1 OF 2)

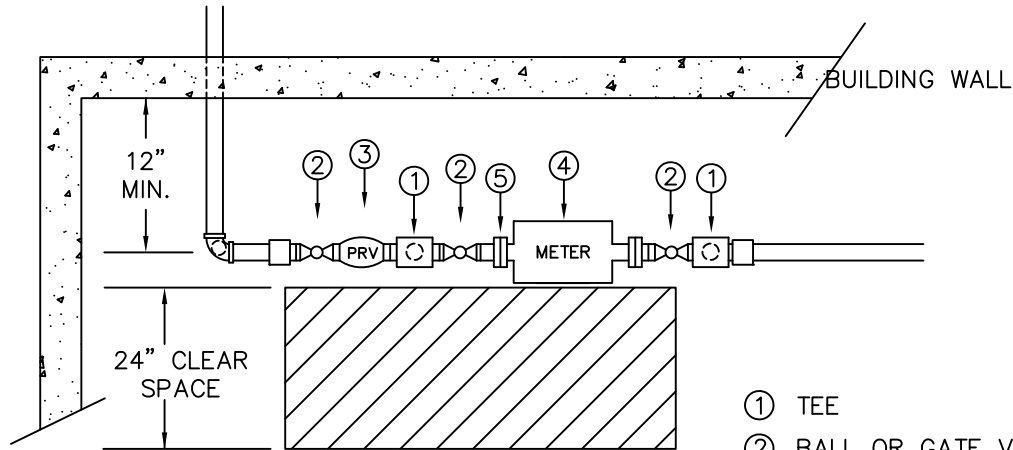
WS-10A



NOTES:

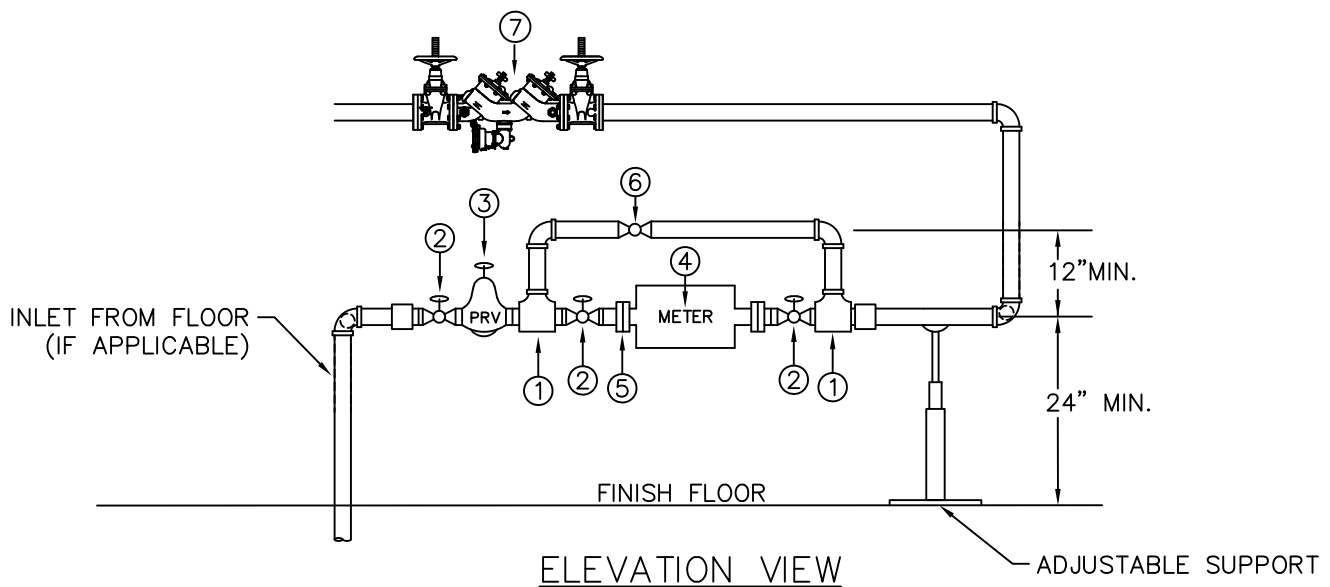
1. THE DEVICE SHALL BE INSTALLED BETWEEN 24" AND 48" ABOVE FINISHED FLOOR. THE DEVICE SHALL BE PLACED WITH A MINIMUM CLEARANCE, AS ILLUSTRATED, BETWEEN THE EDGE OF THE DEVICE AND THE ADJACENT WALL(S). A 24" CLEAR SPACE, FROM FLOOR TO CEILING, IS REQUIRED IN FRONT OF THE DEVICE.
2. AN ADEQUATE DRAIN IS REQUIRED FOR THE BACKFLOW (DIRECTLY UNDER THE DEVICE WHENEVER POSSIBLE).
3. METER SETTING MUST BE SECURED TO THE WALL ABOVE AND BELOW THE METER.

<p>APPROVED: MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO</p>	<p>WS-10B</p>
	<p>COMMERCIAL – METER/BACKFLOW FOR 1½" AND 2" SERVICE – VERTICAL SETTING (DETAIL 2 OF 2)</p>	



PLAN VIEW

- ① TEE
- ② BALL OR GATE VALVE WITH HAND WHEEL
- ③ PRESSURE REDUCING VALVE
- ④ METER
- ⑤ LOCK-PAK COUPLING
- ⑥ LOCKING WING BALL VALVE
- ⑦ REDUCED PRESSURE BACKFLOW DEVICE



ELEVATION VIEW

NOTES:

1. A REDUCED PRESSURE PRINCIPAL BACKFLOW DEVICE IS REQUIRED DOWNSTREAM OF THE WATER METER FOR ALL COMMERCIAL PROPERTIES.
2. WATER METER TO BE SECURED TO THE WALL AND SUPPORTED WITH JACK STANDS.
3. NO GALVANIZED PIPE FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.

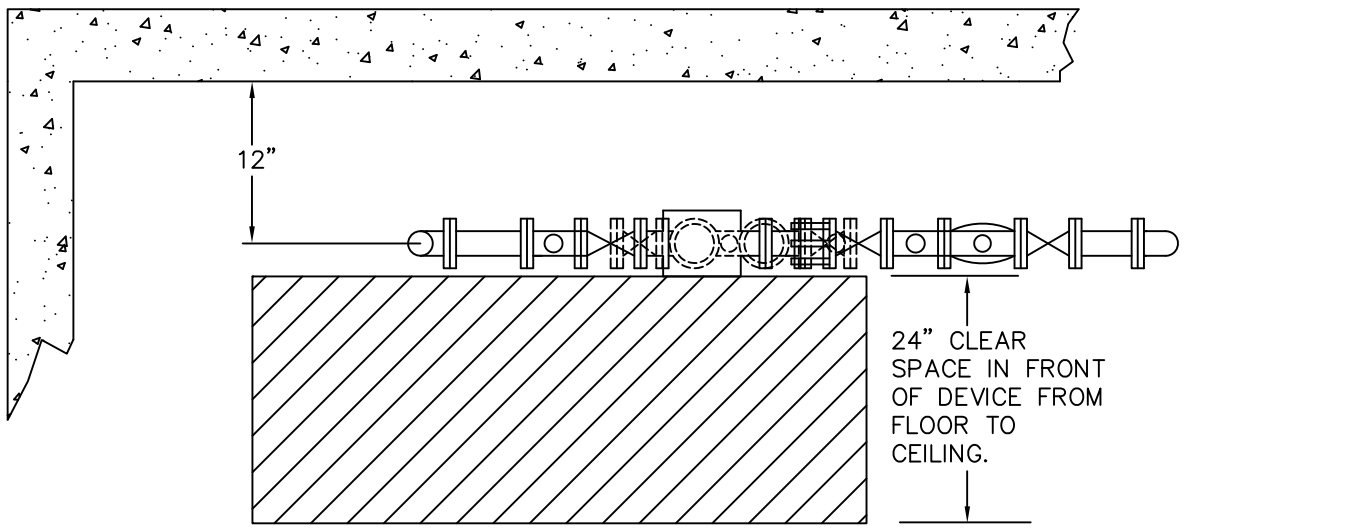
APPROVED:

MAY 2020

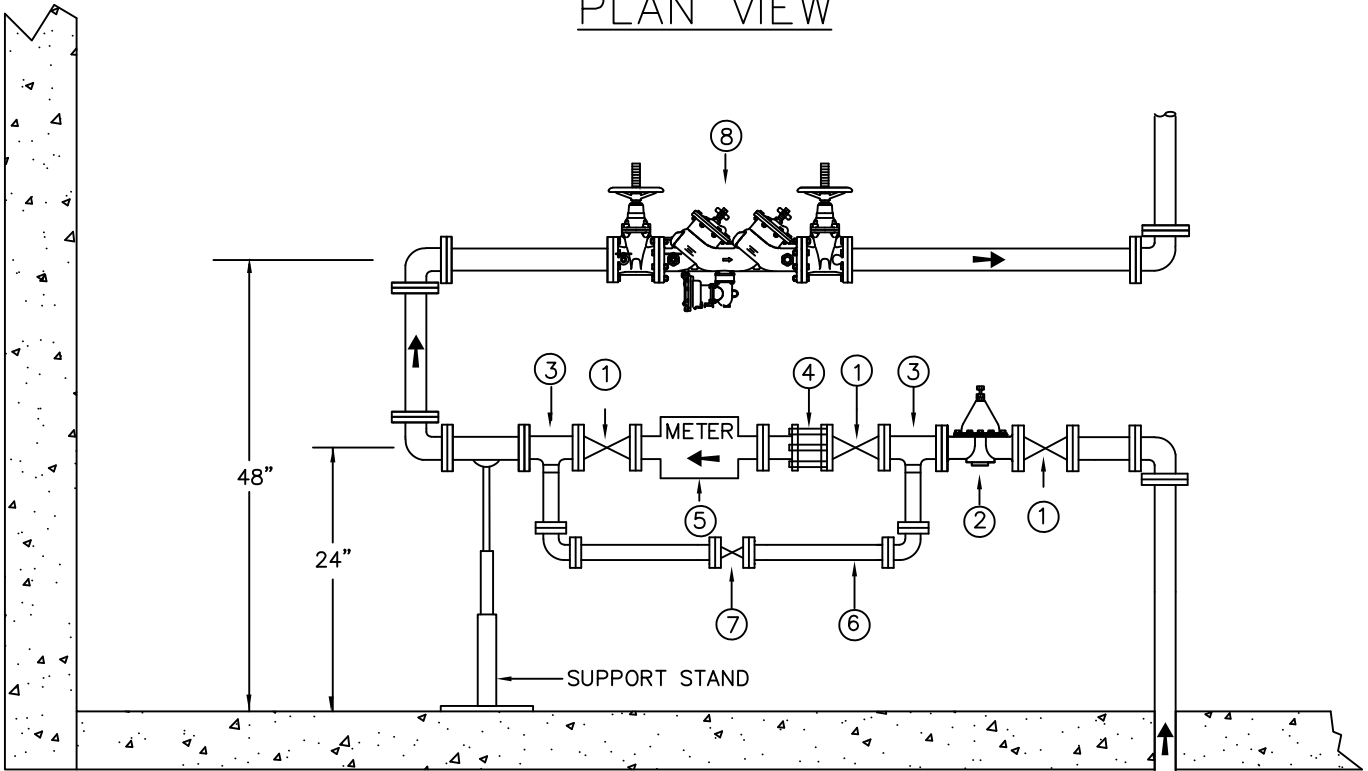
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

COMMERCIAL – METER/BACKFLOW FOR
1½” AND 2” SERVICE – HORIZONTAL SETTING

WS-11



PLAN VIEW



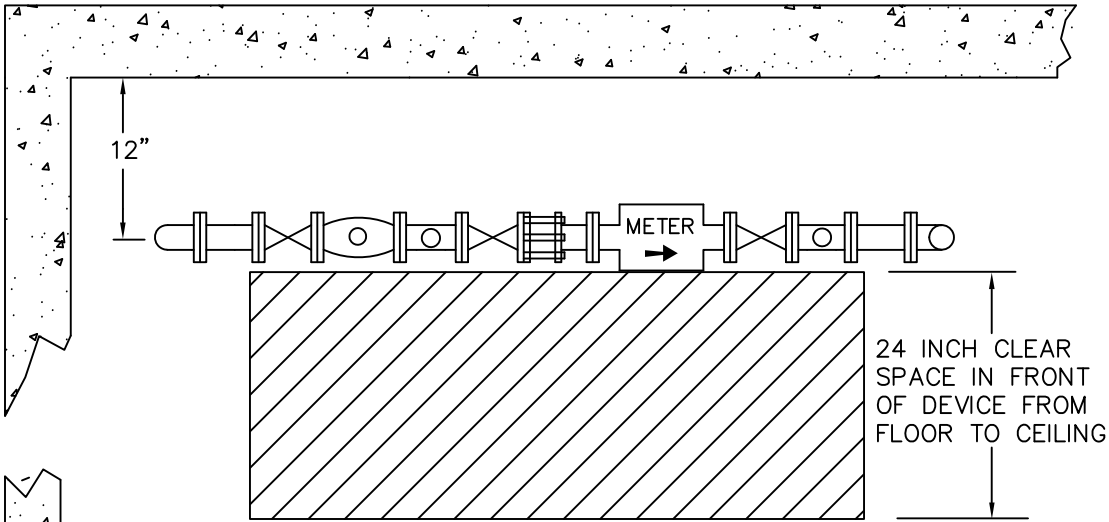
ELEVATION VIEW

- ① HAND WHEEL GATE VALVE
- ② FLANGED PRV
- ③ TEE
- ④ DRESSER COUPLING/
-ADAPTOR
-ROMAC 511
-MUELLER MAX-RANGE
-OR APPROVED EQUAL
- ⑤ METER (PURCHASED
FROM THE DISTRICT)
- ⑥ BYPASS (MINIMUM OF A 2 INCH DIAMETER LINE).
- ⑦ LOCKING WING BALL VALVE (LOCKABLE IN THE CLOSED POSITION).
- ⑧ REDUCED PRESSURE PRINCIPAL DEVICE BACKFLOW PREVENTER

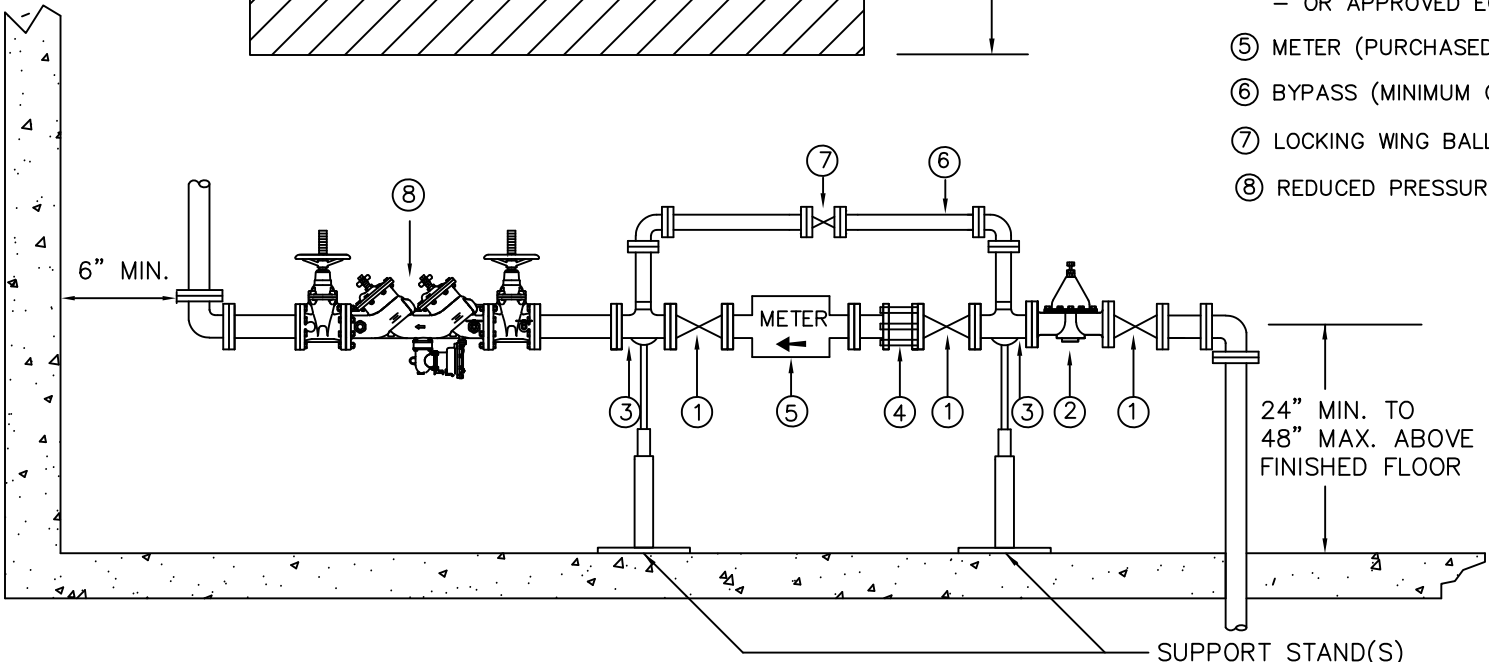
NOTES:
 1. NO GALVANIZED PIPES OR FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.
 2. ALL VALVES SHALL BE RESILIENT EPOXY COATED, CAST IRON BODY, WITH A NON-RISING STEM.
 3. GATE VALVES SHALL BE MUELLER, CLOW, AFC, WATEROUS, OR US PIPE METRO SEAL.

APPROVED: MAY 2020	HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO	WS-12
	COMMERCIAL – METER/BACKFLOW FOR 3” AND LARGER SERVICE – VERTICAL SETTING	

PLAN VIEW



- ① HAND WHEEL GATE VALVE
- ② FLANGED PRV
- ③ TEE
- ④ DRESSER COUPLING/
- ADAPTOR
- ROMAC 511
- MUELLER MAX-RANGE
- OR APPROVED EQUAL
- ⑤ METER (PURCHASED FROM THE DISTRICT)
- ⑥ BYPASS (MINIMUM OF A 2 INCH DIAMETER PIPE)
- ⑦ LOCKING WING BALL VALVE (LOCKABLE IN THE CLOSED POSITION)
- ⑧ REDUCED PRESSURE PRINCIPAL DEVICE BACKFLOW PREVENTER



ELEVATION VIEW

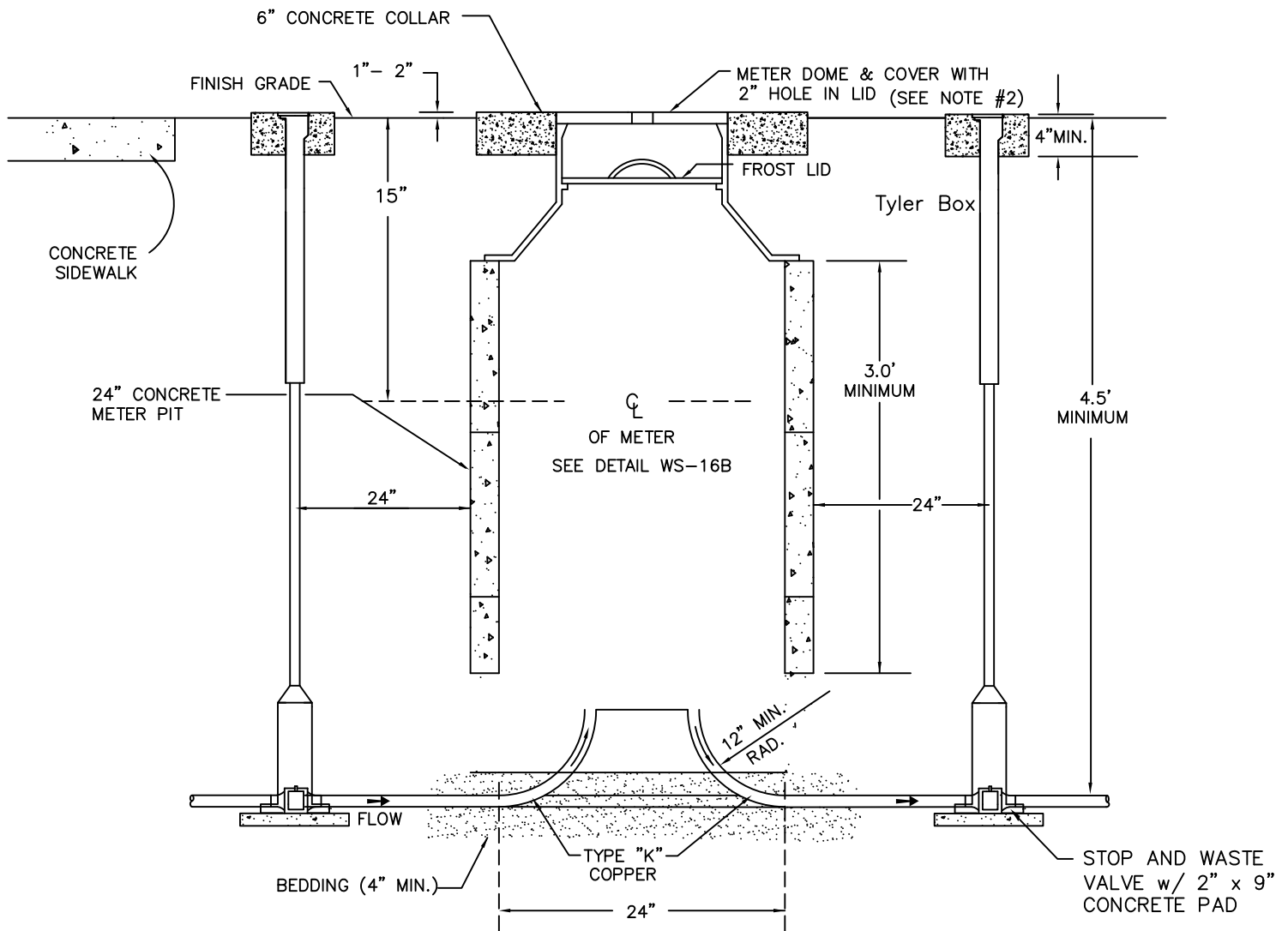
- NOTES:
- 1. NO GALVANIZED PIPES OR FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.
 - 2. ALL VALVES SHALL BE RESILIENT EPOXY COATED, CAST IRON BODY, WITH A NON-RISING STEM.
 - 3. GATE VALVES SHALL BE MUELLER, CLOW, AFC, WATEROUS, OR US PIPE METRO SEAL.

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

COMMERCIAL – METER/BACKFLOW FOR 3” AND LARGER
SERVICE – HORIZONTAL SETTING

WS-13



NOTES:

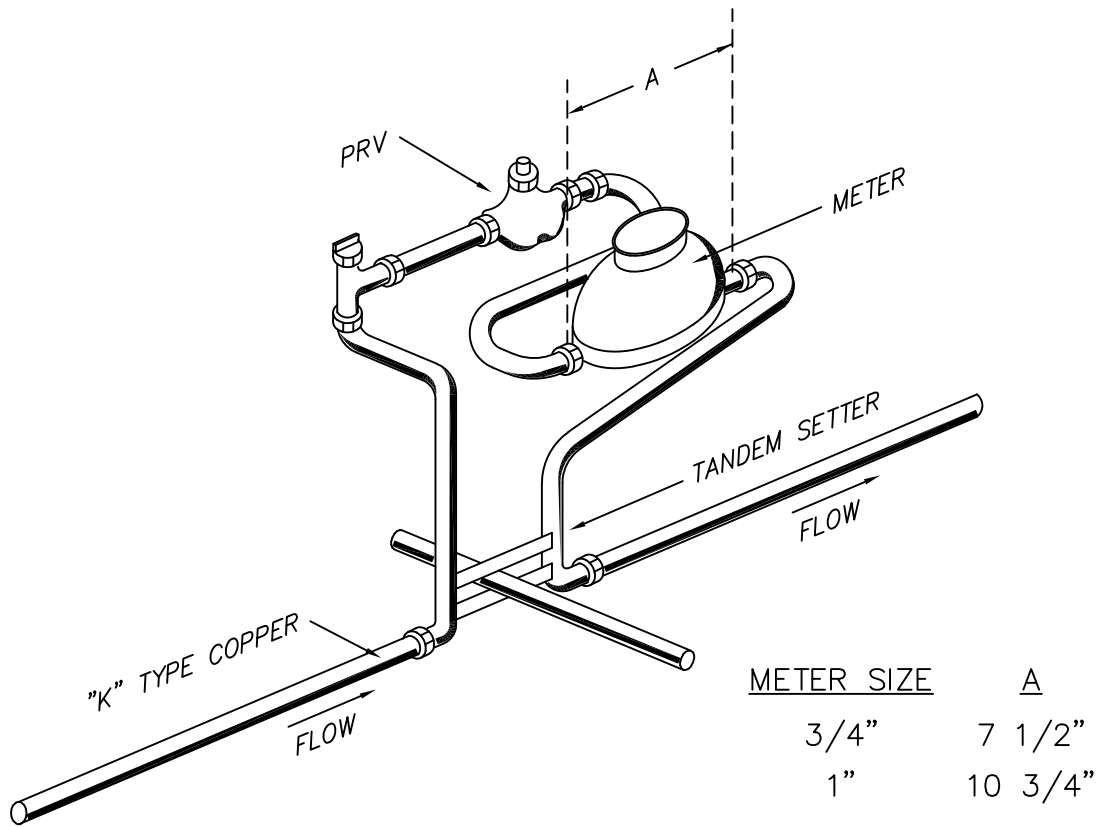
1. WHEN LOCATED IN CONCRETE, THE DISTRICT MUST APPROVE THE METER PIT LOCATION AND THE PIT MUST HAVE A CAST IRON DOME AND COVER.
2. ALL METER PIT LIDS SHALL HAVE A 2" HOLE IN THE CENTER OF THE LID FOR THE PURPOSE OF INSTALLING A REMOTE SENSING UNIT.

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

IRRIGATION - METER PIT FOR
3/4" AND 1" SERVICE WITH TANDEM SETTER
(DETAIL 1 OF 2)

WS-16A



NOTES:

1. METER TO BE INSTALLED IN A 24" CONCRETE METER PIT (SEE DETAIL WS-16A).
2. ALL METER PITS LOCATED IN CONCRETE, WHEN PERMITTED, SHALL HAVE A CAST IRON DOME AND COVER.
3. THE 3/4" METER SETTER SHALL BE A FORD SERIES 70 TANDEM COPPER SETTER, MODEL TV 73-36W, WITH PADLOCK WINGS ON INLET VALVE AND COMPRESSION END CONNECTIONS.
4. METER PITS INSTALLED IN PARKING OR ROADWAYS WILL REQUIRE THE INSTALLATION OF A 3/4" P.V.C. CONDUIT FOR THE REMOTE READOUT CABLE. METER PITS INSTALLED IN LANDSCAPED AREAS WILL REQUIRE THAT A 2" HOLE BE PROVIDED IN THE CENTER OF THE DOME LID FOR THE INSTALLATION OF A REMOTE READING SENSOR.
5. THERE SHALL BE A MINIMUM COVER OF 4.5' OVER THE PIPE.
6. THE 1" METER SETTER SHALL BE A FORD 70 SERIES TANDEM COPPER SETTER, MODEL TV 74-36W, WITH PADLOCK WINGS ON INLET VALVE AND COMPRESSION END CONNECTIONS.
7. WHEN USED FOR AN IRRIGATION SYSTEM, AN APPROVED BACKFLOW PROTECTION DEVICE MUST BE INSTALLED, INCLUDING A STOP AND WASTE VALVE ON THE CUSTOMERS SIDE OF THE PIT.
8. WHEN USED FOR AN IRRIGATION SYSTEM, ALL INSTALLATIONS WHERE THE STATIC PRESSURE EXCEEDS 100 P.S.I. WILL REQUIRE A P.R.V.
9. NO RESETTERS ALLOWED IN NEW CONSTRUCTION.

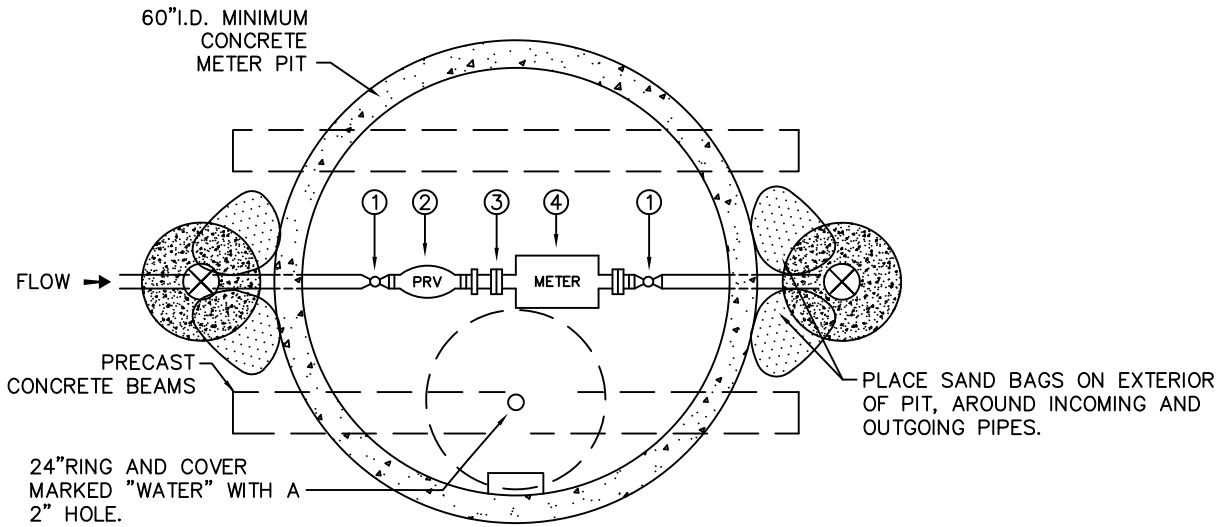
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

IRRIGATION - METER PIT FOR
3/4" AND 1" SERVICE WITH TANDEM SETTER
(DETAIL 2 OF 2)

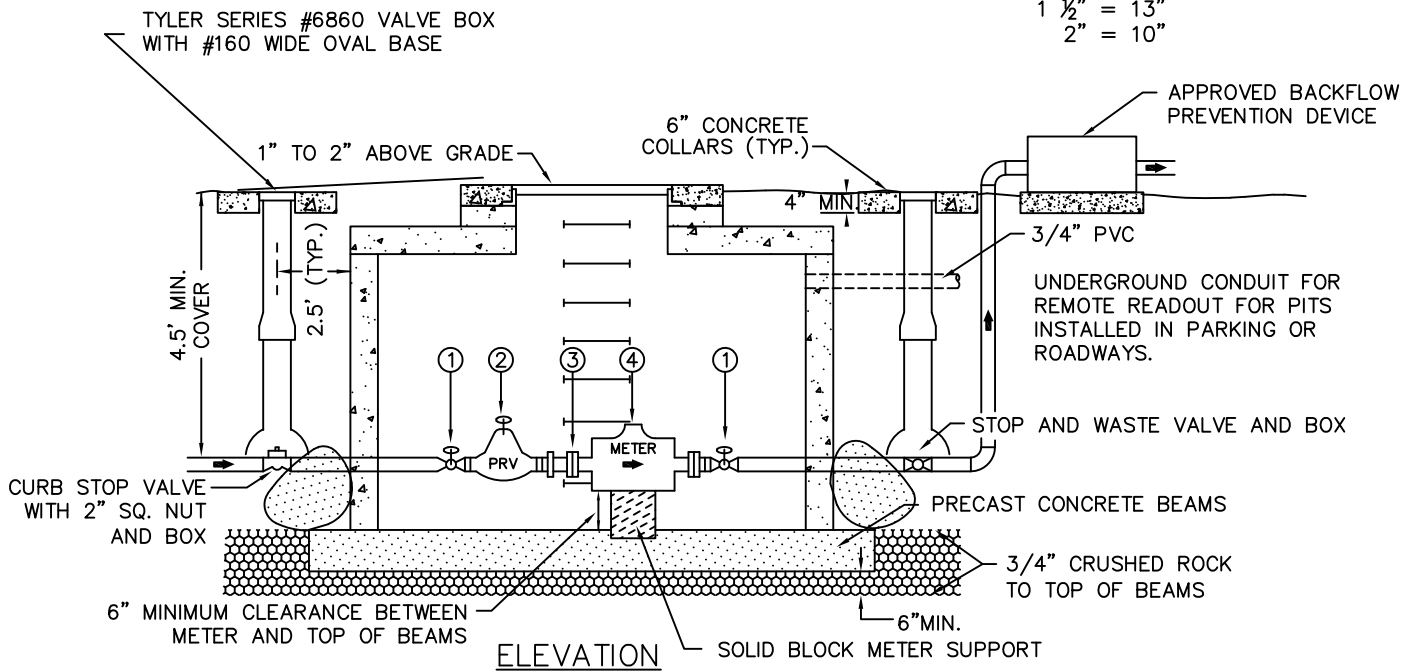
WS-16B



PLAN VIEW

- ① BALL VALVE WITH HANDLE
- ② PRESSURE REDUCING VALVE
- ③ LOCK-PAK COUPLING
- ④ METER

A. LAY LENGTHS:
 $1 \frac{1}{2}'' = 13''$
 $2'' = 10''$



ELEVATION

NOTES:

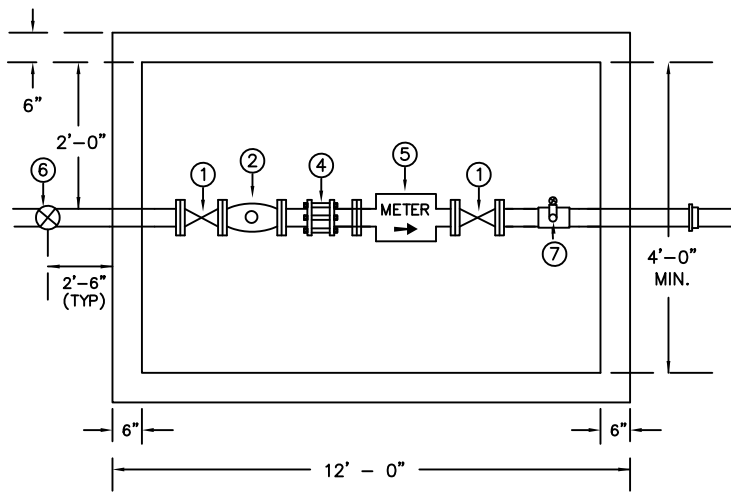
1. THE DISTANCE BETWEEN THE P.R.V. AND THE METER MUST BE AT LEAST 3 PIPE DIAMETERS.
2. P.R.V.'S ARE REQUIRED WHEN THE STATIC PRESSURE IS 100 P.S.I. OR MORE.
3. ALL METER PIT LIDS SHALL HAVE A 2" HOLE IN THE CENTER OF THE LID FOR THE PURPOSE OF INSTALLING A REMOTE SENSING UNIT.
4. NO GALVANIZED PIPES OR FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.

HIGHLANDS RANCH METROPOLITAN DISTRICT
 DOUGLAS COUNTY, COLORADO

APPROVED:
 MAY 2020

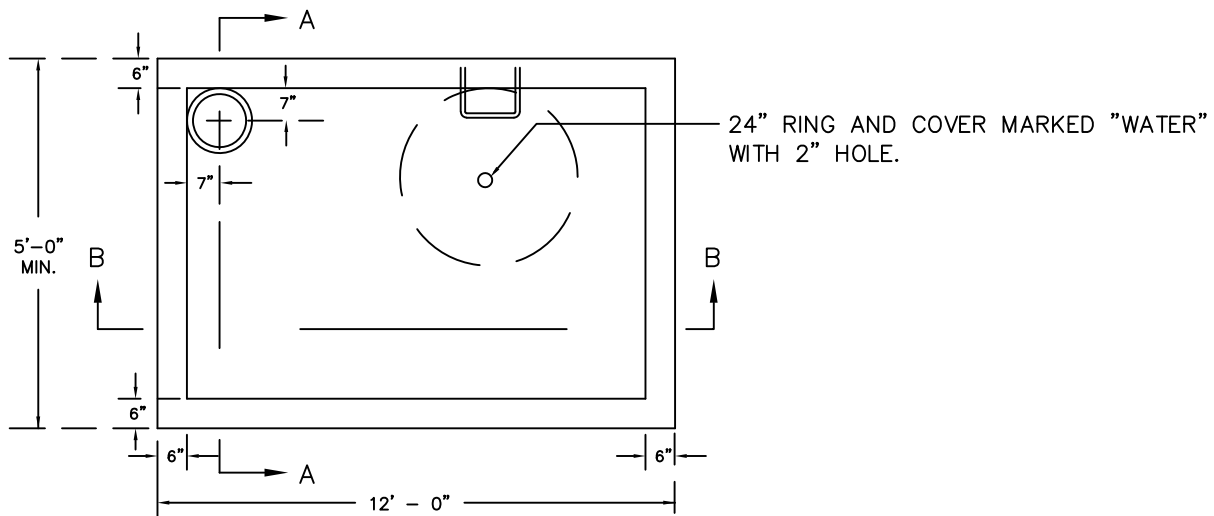
IRRIGATION – METER PIT FOR
 $1 \frac{1}{2}''$ AND $2''$ SERVICE

WS-17



- ① GATE VALVE
- ② FLANGED PRV
- ④ DRESSER COUPLING/ ADAPTOR
- ADAPTOR
- ROMAC 571
- MUELLER MAX-RANGE
- APPROVED EQUAL
- ⑤ METER
- ⑥ CURB STOP VALVE IN BOX
(TYPICAL)
- ⑦ DRAIN VALVE
INVERTED CxCxC TEE
W/ 3/4" CxC ELBOW AND
3/4" BRONZE BALL VALVE

PIPING AND VAULT - PLAN VIEW



VAULT LID - PLAN VIEW

NOTES:

1. P.R.V.'S ARE REQUIRED WHEN THE STATIC PRESSURE IS 100 P.S.I. OR MORE.
2. ALL METER VAULT LIDS SHALL HAVE A 2" HOLE IN THE CENTER OF THE LID FOR THE PURPOSE OF INSTALLING A REMOTE SENSING UNIT.
3. NO GALVANIZED PIPES OR FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.
4. ALL VALVES SHALL BE RESILIENT EPOXY COATED, CAST IRON BODY, WITH A NON-RISING STEM.
5. GATE VALVES SHALL BE MUELLER, CLOW, AFC, WATEROUS, OR US PIPE METRO SEAL.

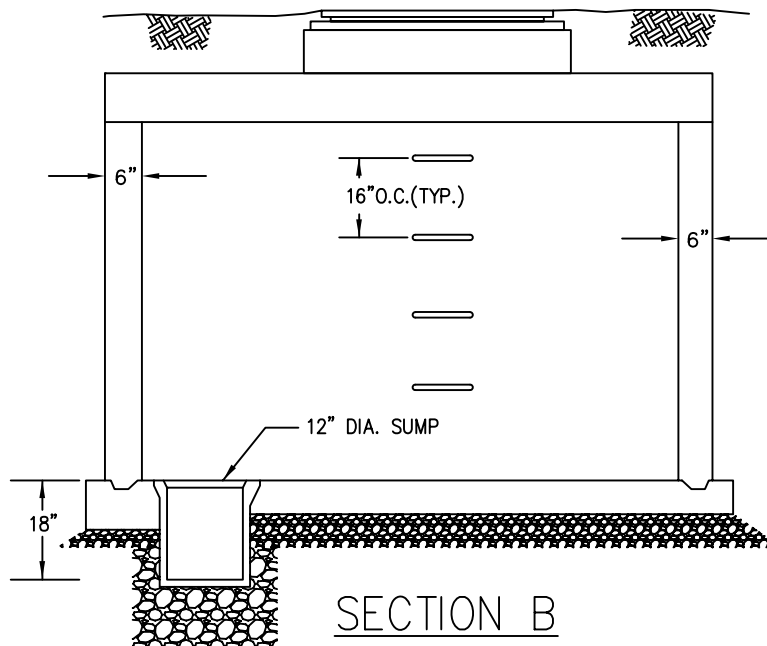
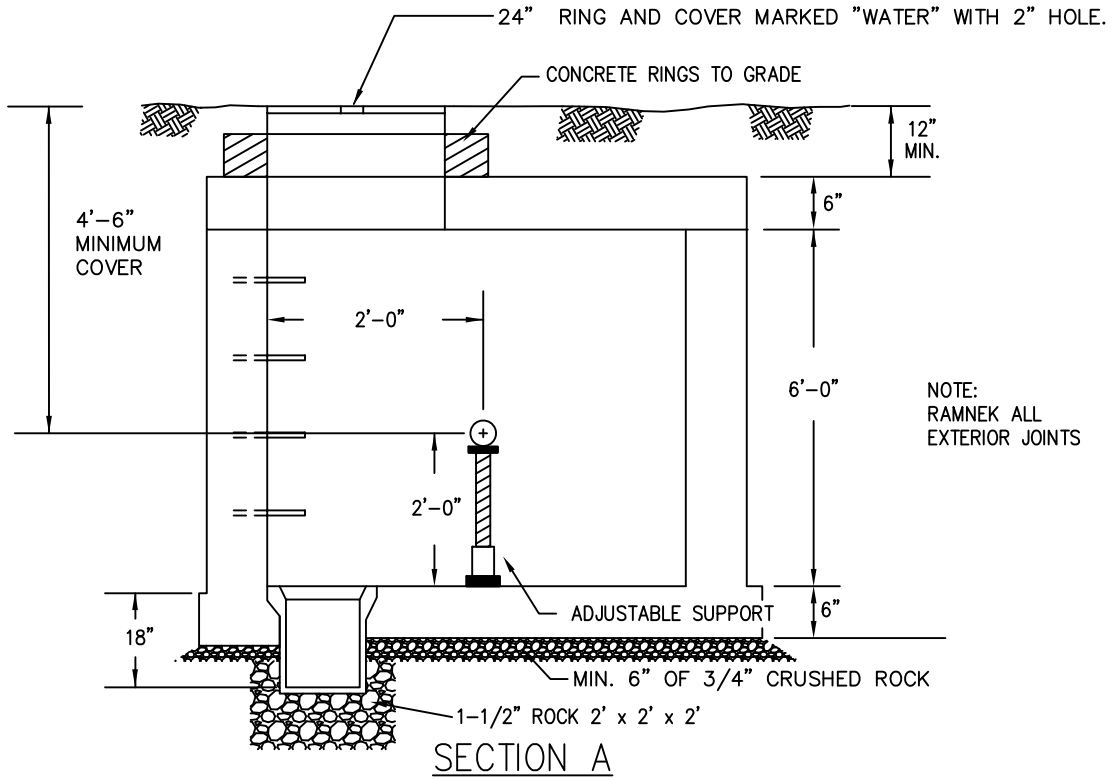
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

IRRIGATION - METER VAULT FOR
3" AND LARGER SERVICE
(DETAIL 1 OF 2)

WS-18A

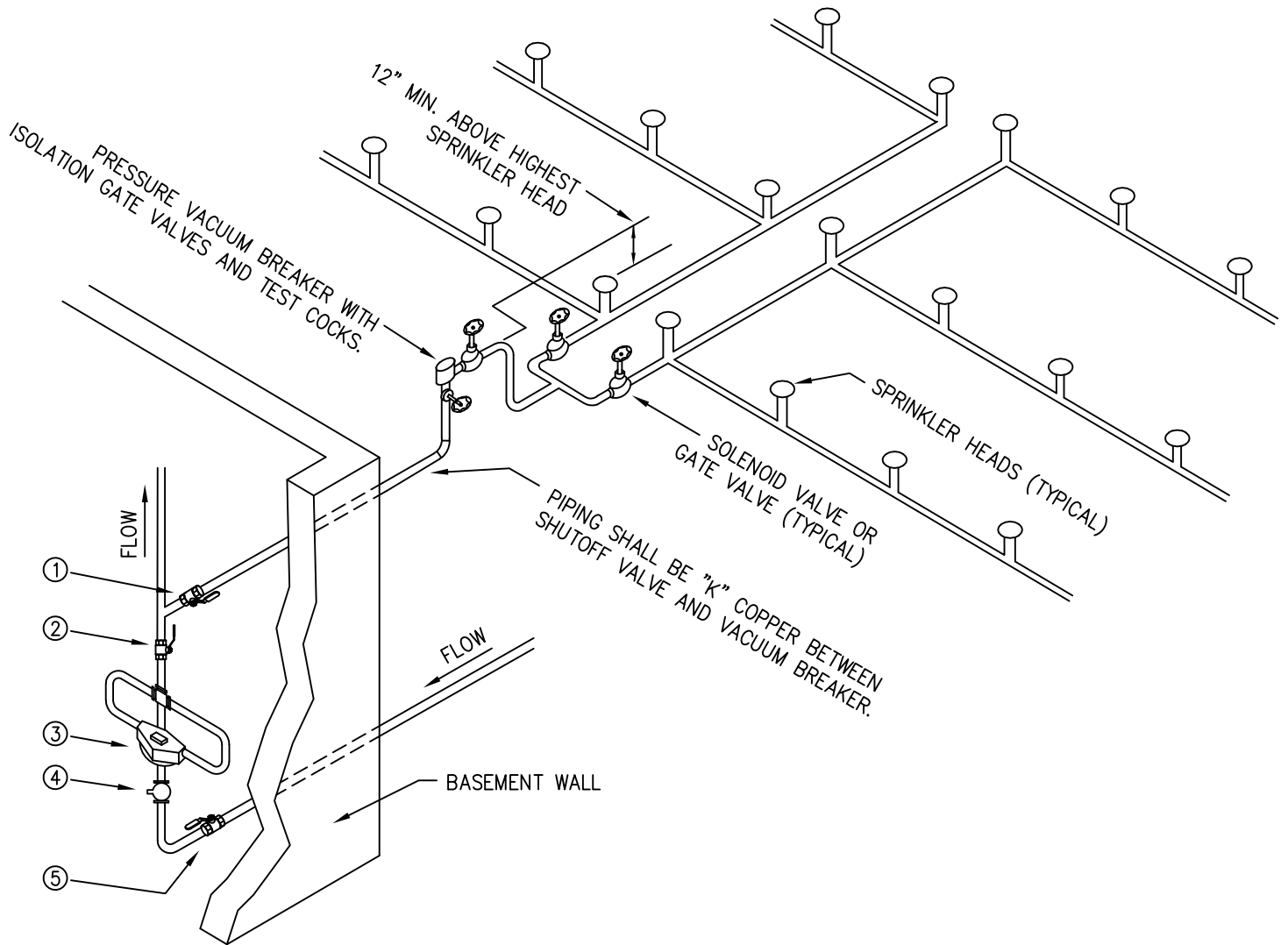


HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

IRRIGATION - METER VAULT FOR
3" AND LARGER SERVICE
(DETAIL 2 OF 2)

WS-18B



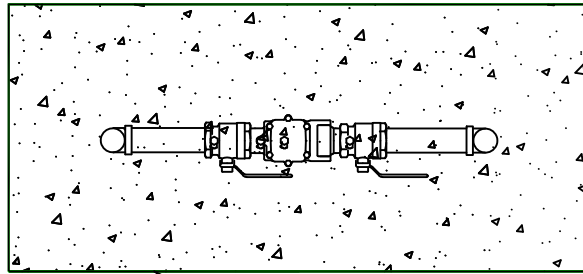
- ① STOP & WASTE VALVE OR BALL VALVE WITH DRAIN
- ② BALL VALVE
- ③ WATER METER
- ④ PRESSURE REDUCING VALVE
- ⑤ BALL VALVE WITH DRAIN

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

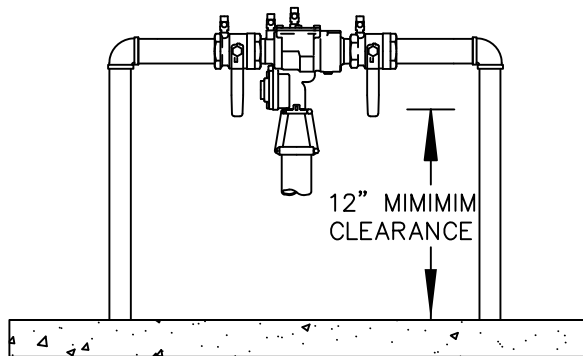
APPROVED:
MAY 2020

IRRIGATION – SYSTEM PRESSURE VACUUM BREAKER
(RESIDENTIAL USE)

WS-19



CONCRETE PAD



CONCRETE PAD

NOTES: ALL BACKFLOW PREVENTERS ARE REQUIRED TO BE AN APPROVED REDUCED PRESSURE PRINCIPAL ASSEMBLY.

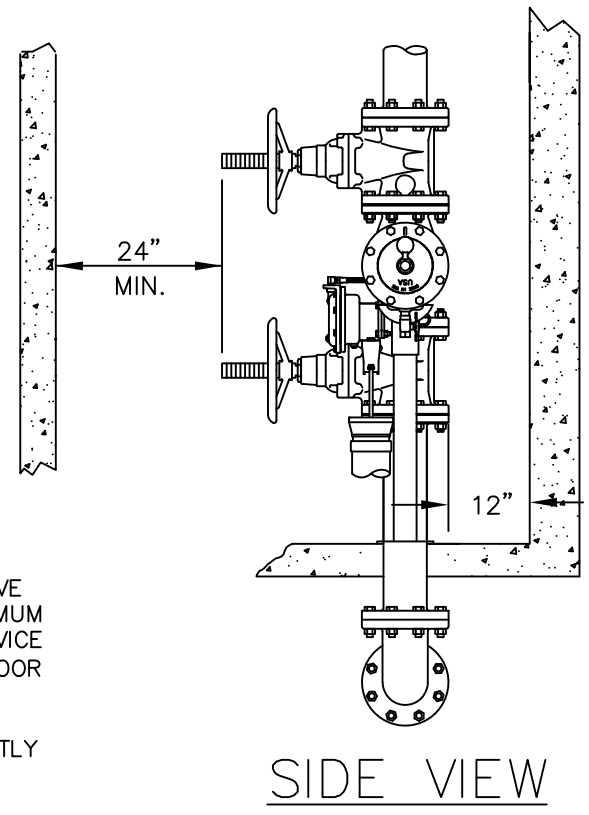
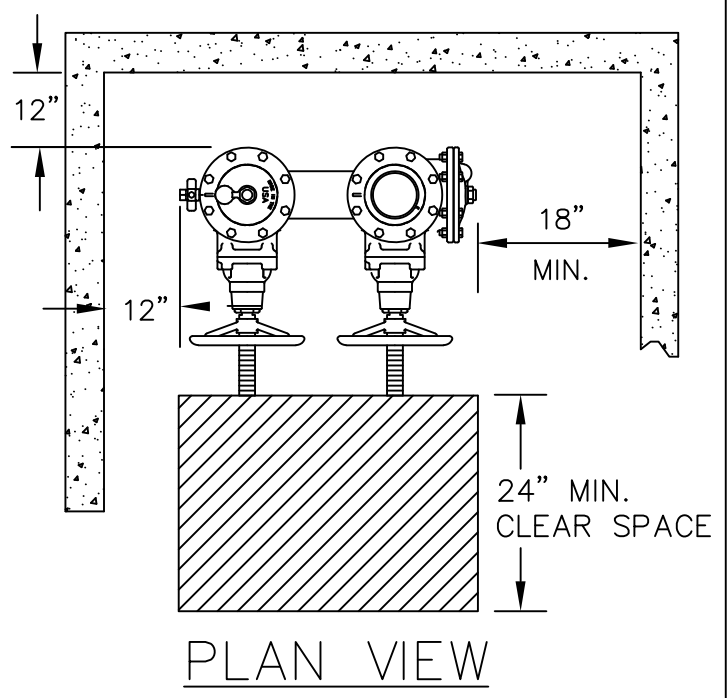
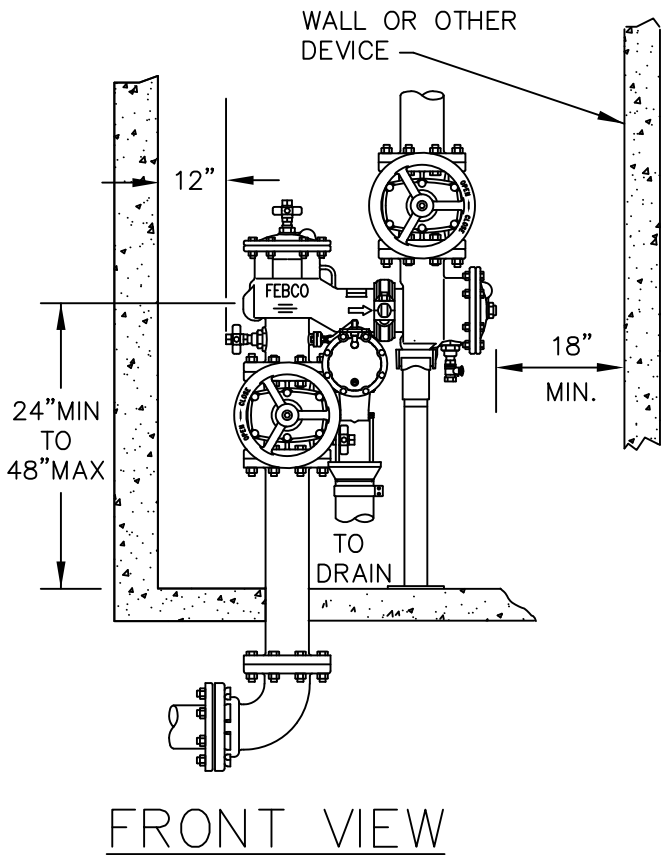
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

IRRIGATION – TYPICAL BACKFLOW ASSEMBLY

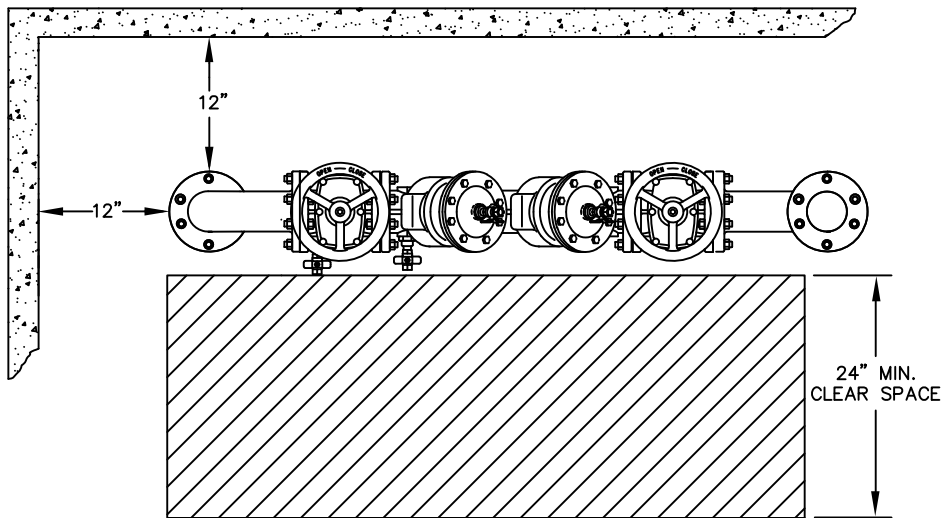
WS-20



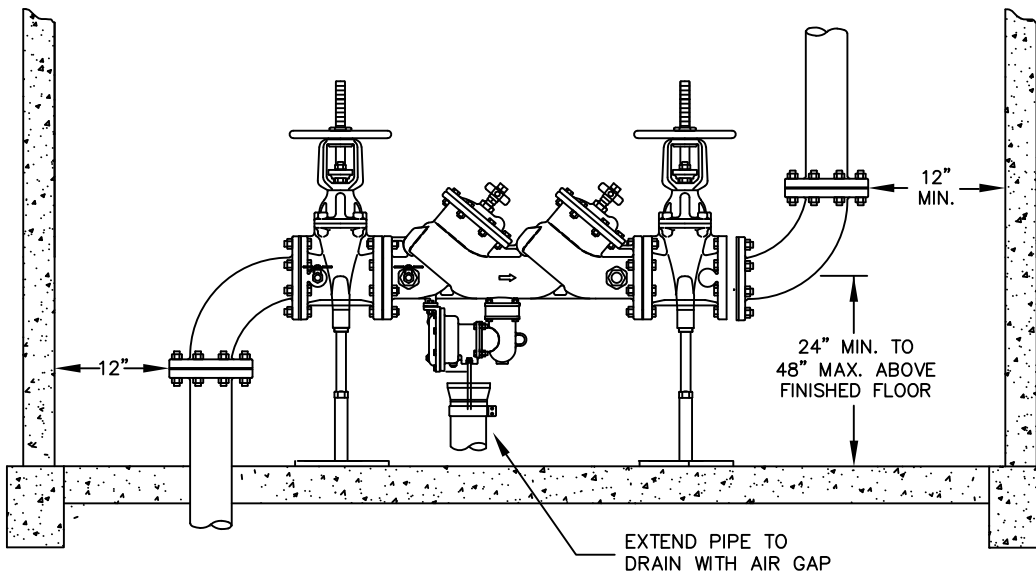
NOTES:

1. THE DEVICE SHALL BE INSTALLED BETWEEN 24" AND 48" ABOVE FINISHED FLOOR. THE DEVICE SHALL BE PLACED WITH A MINIMUM CLEARANCE, AS ILLUSTRATED, BETWEEN THE EDGE OF THE DEVICE AND THE ADJACENT WALL(S). A 24" CLEAR SPACE, FROM FLOOR TO CEILING, IS REQUIRED IN FRONT OF THE DEVICE.
2. AN ADEQUATE DRAIN IS REQUIRED FOR THE BACKFLOW (DIRECTLY UNDER THE DEVICE WHENEVER POSSIBLE).
3. ALL VALVES SHALL BE RESILIENT EPOXY COATED, CAST IRON BODY, WITH A NON-RISING STEM.
4. NO GALVANIZED FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY.

<p>APPROVED:</p> <p>MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO</p>	<p>WS-21</p>
	<p>BACKFLOW ASSEMBLY FOR LARGER SERVICE – VERTICAL SETTING</p>	



PLAN VIEW



ELEVATION VIEW

NOTES:

1. THE DEVICE SHALL BE INSTALLED BETWEEN 24" AND 48" ABOVE FINISHED FLOOR. THE DEVICE SHALL BE PLACED WITH A MINIMUM CLEARANCE, AS ILLUSTRATED, BETWEEN THE EDGE OF THE DEVICE AND THE ADJACENT WALL(S). A 24" CLEAR SPACE, FROM FLOOR TO CEILING, IS REQUIRED IN FRONT OF THE DEVICE.
2. AN ADEQUATE DRAIN IS REQUIRED FOR THE BACKFLOW (DIRECTLY UNDER THE DEVICE WHENEVER POSSIBLE).
3. ALL VALVES SHALL BE RESILIENT EPOXY COATED, CAST IRON BODY, WITH A NON-RISING STEM.
4. NO GALVANIZED FITTINGS ARE ALLOWED AS PART OF THE ASSEMBLY UNLESS APPROVED BY DISTRICT ENGINEER.

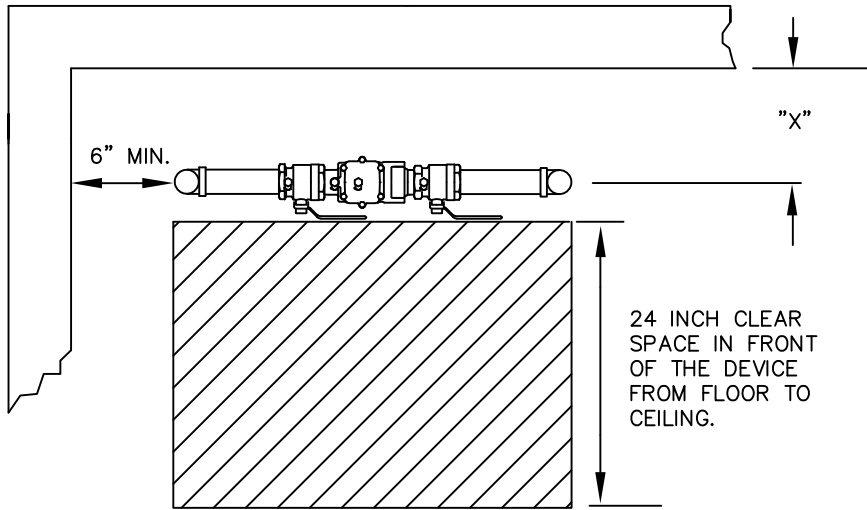
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

BACKFLOW ASSEMBLY FOR 2½" AND
LARGER SERVICE – HORIZONTAL SETTING

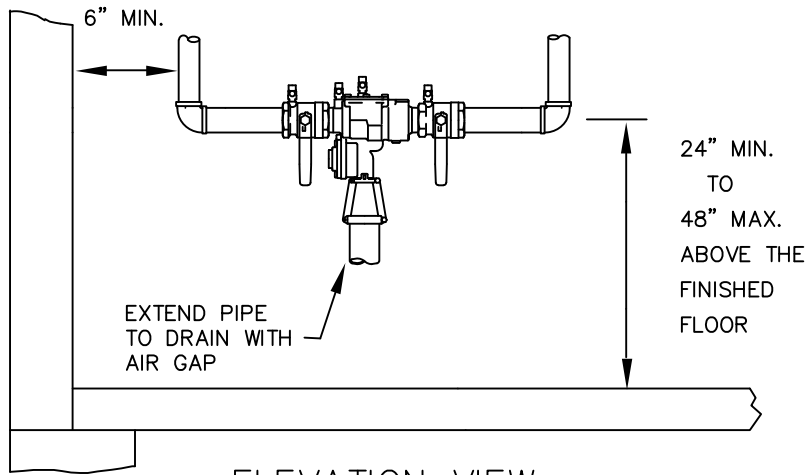
WS-22



DEVICE SIZE	"X" = DISTANCE FROM THE WALL TO THE CENTER OF THE DEVICE
1/4" THRU 3/4"	* 3 INCHES
1" THRU 2"	* 6 INCHES
2 1/2" AND LARGER	* 12 INCHES

* THE OFFSET FROM THE WALL TO THE CENTER OF THE DEVICE ONLY APPLIES WHEN THE TEST COCKS ARE POINTED UP OR AWAY FROM THE ADJACENT WALL. OTHERWISE THE DEVICE SHALL BE PLACED 12 INCHES AWAY FROM THE ADJACENT WALL.

PLAN VIEW



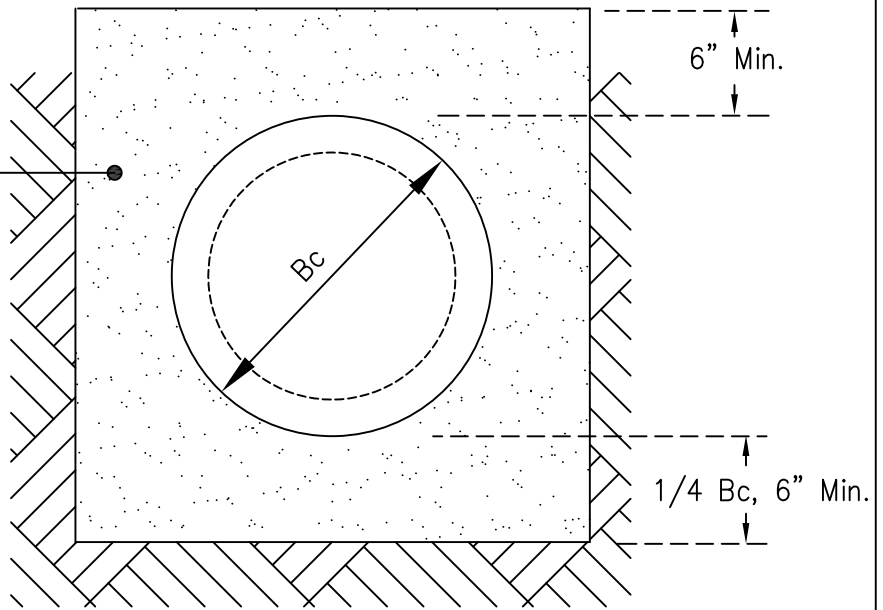
ELEVATION VIEW

NOTE: THE BACKFLOW PREVENTER IS REQUIRED TO BE DOWNSTREAM OF THE WATER METER ASSEMBLY.
THE DRAIN FROM THE BACKFLOW PREVENTER SHALL NOT EXTEND OUTSIDE THE STRUCTURE TO DAYLIGHT.

<p>APPROVED:</p> <p>MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT</p> <p>DOUGLAS COUNTY, COLORADO</p>	<p>WS-23</p>
	<p>TYPICAL ELEVATION FOR A REDUCED PRESSURE</p> <p>PRINCIPAL DEVICE BACKFLOW PREVENTER</p>	

STANDARD BEDDING

BEDDING MATERIAL



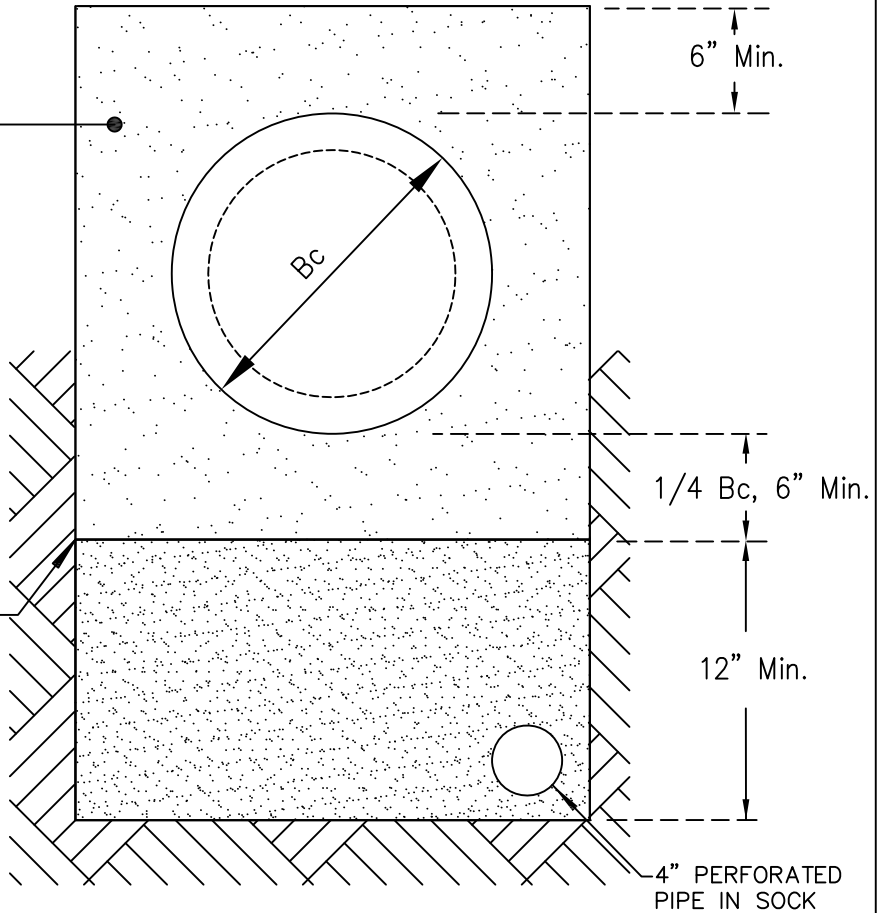
NOTES:

1. SEE CHAPTER 4, PARAGRAPH 4.02 X FOR BEDDING MATERIALS.
2. SEE CHAPTER 4, PARAGRAPH 4.03 B.2 FOR BEDDING REQUIREMENTS.
3. SEE CHAPTER 5, PARAGRAPH 5.06B FOR MATERIAL VARIANCE.

BEDDING W/ UNDERDRAIN

BEDDING MATERIAL

8 MIL POLY OR FILTER FABRIC



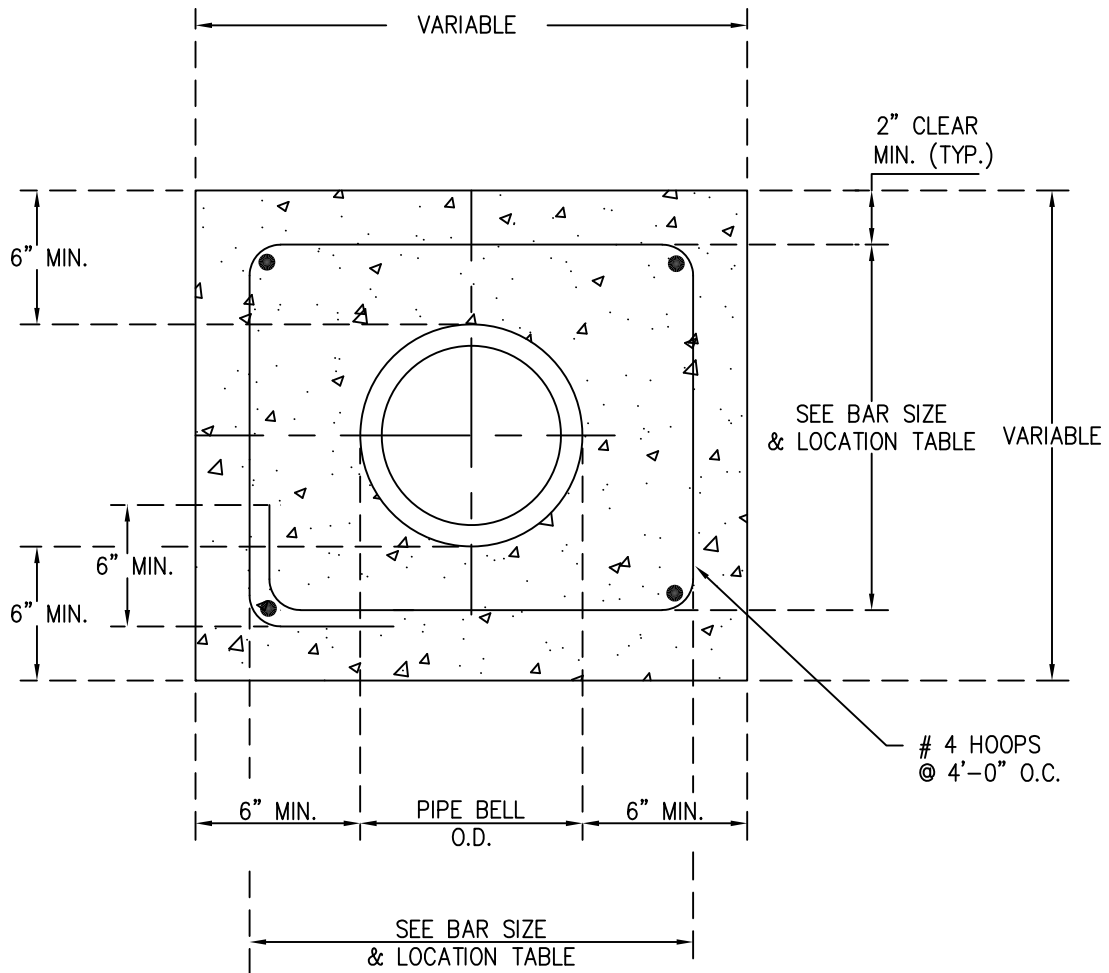
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

PIPE BEDDING DETAILS – SEWER

SM-1



PIPE I.D.	NO. OF LONGITUDINAL BARS & LOCATION
8"	4 - NO. 4 BARS 1 EACH CORNER
10"	8 - NO. 4 BARS 3 EACH SIDE
12"	8 - NO. 4 BARS 3 EACH SIDE
15"	8 - NO. 4 BARS 3 EACH SIDE
18"	8 - NO. 4 BARS 3 EACH SIDE
21"	12 - NO. 4 BARS 4 EACH SIDE
24"	12 - NO. 4 BARS 4 EACH SIDE
27"	12 - NO. 4 BARS 4 EACH SIDE
30"	12 - NO. 4 BARS 4 EACH SIDE
33"	12 - NO. 4 BARS 4 EACH SIDE
36"	16 - NO. 4 BARS 5 EACH SIDE

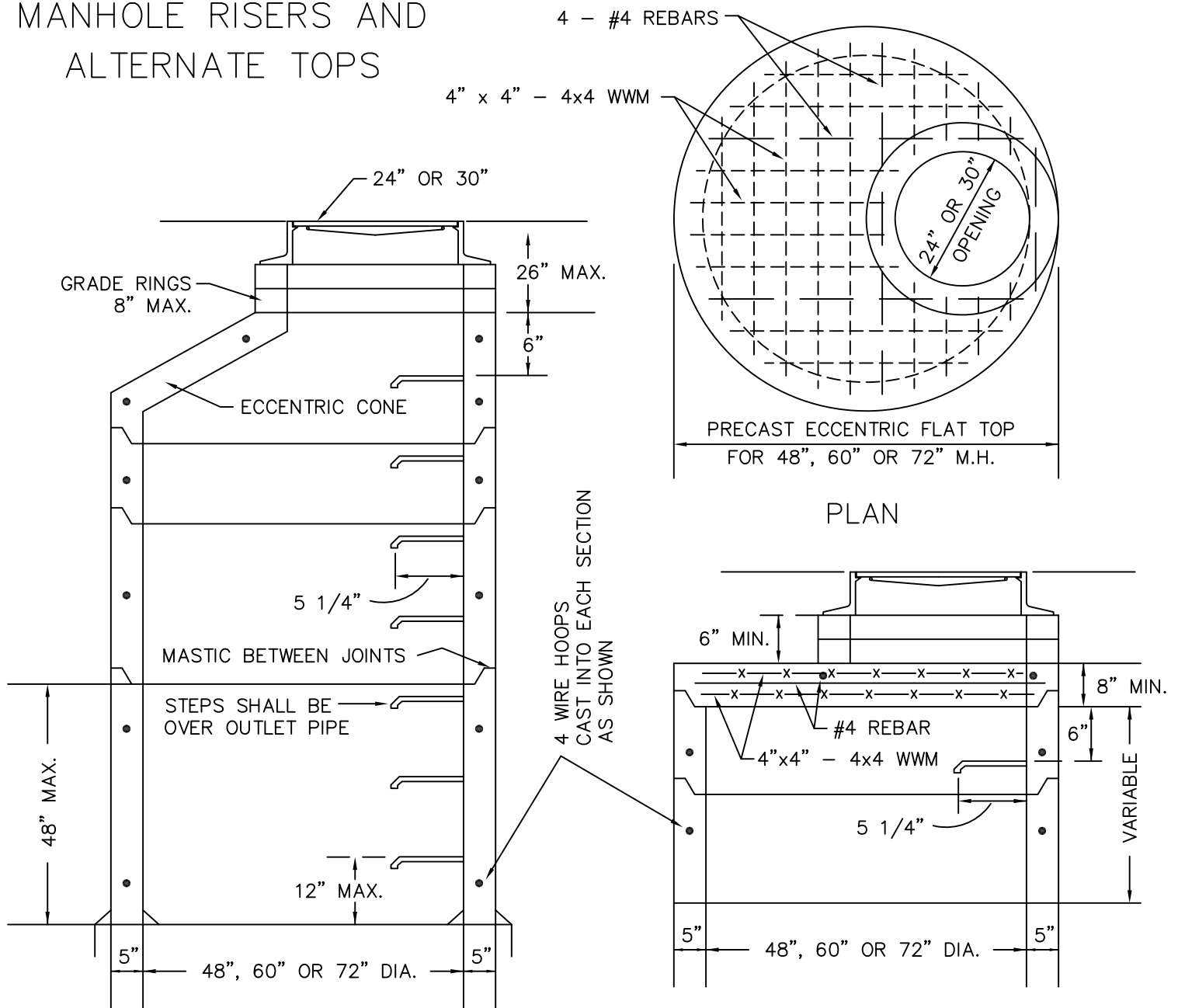
APPROVED:
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

CONCRETE ENCASEMENT DETAIL

SM-2

MANHOLE RISERS AND ALTERNATE TOPS



TYPICAL MANHOLE SECTION WITH ECCENTRIC CONE

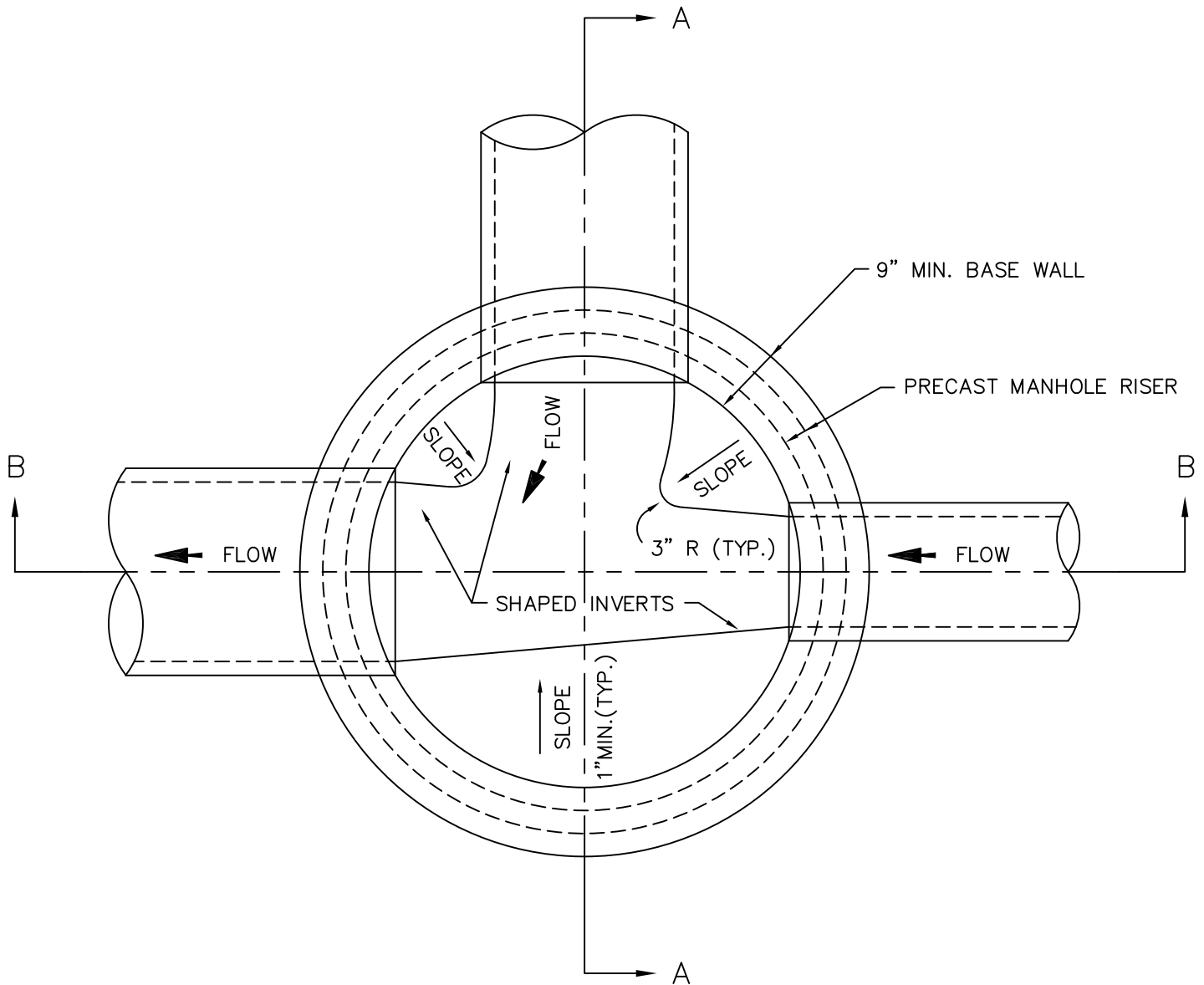
ALTERNATE FLAT TOP

NOTES:

1. ALL JOINTS TO BE RUBBERNEK OR RAMNEK IF ABOVE THE WATER TABLE, FLEXIBLE PLASTIC SEALING COMPOUND IF BELOW THE WATER TABLE, AS PER SPECIFICATION.
2. ALL JOINTS SHALL BE DOUBLE SEALED WITH FLEXIBLE PLASTIC JOINT SEALING MATERIAL TO EXTRUDE INTO MANHOLE, AND BE TRIMMED OFF.
3. ALL MANHOLES PLACED IN THE "OPEN SPACE" AREAS SHALL BE INSTALLED WITH THE RING AND COVER AT AN ELEVATION THAT IS 6" ABOVE FINAL GRADE WITH A COLLAR OF CONCRETE.
4. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

<p>APPROVED: MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO</p>	
	<p>STANDARD SEWER MANHOLE (DETAIL 1 OF 3)</p>	<p>SM-3A</p>

PLAN
MONOLITHIC BASE



NOTES:

1. MANHOLES SHALL HAVE REINFORCED CONCRETE BASES PER DETAIL SM-3C.
2. SQUARE BASES ARE ALLOWED PER DETAIL SM-11.
3. SEE DETAIL SM-3C FOR CROSS SECTIONS A-A AND B-B.

APPROVED:

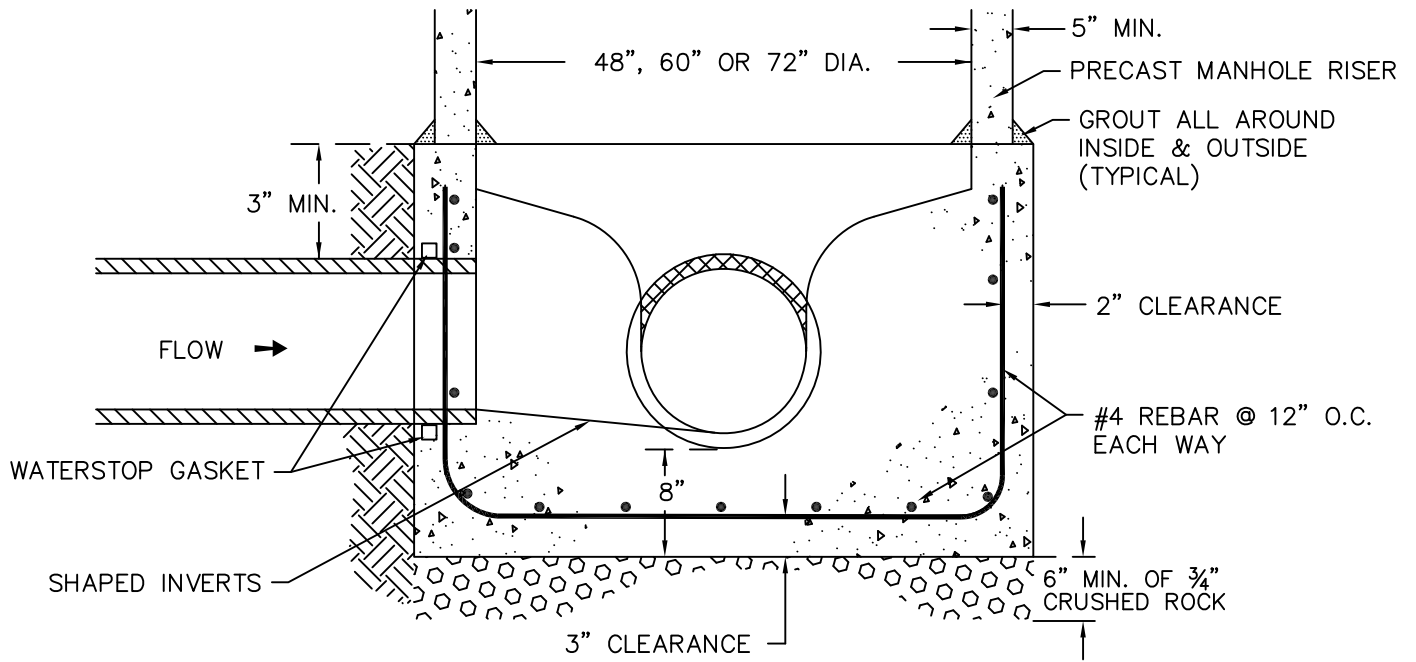
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

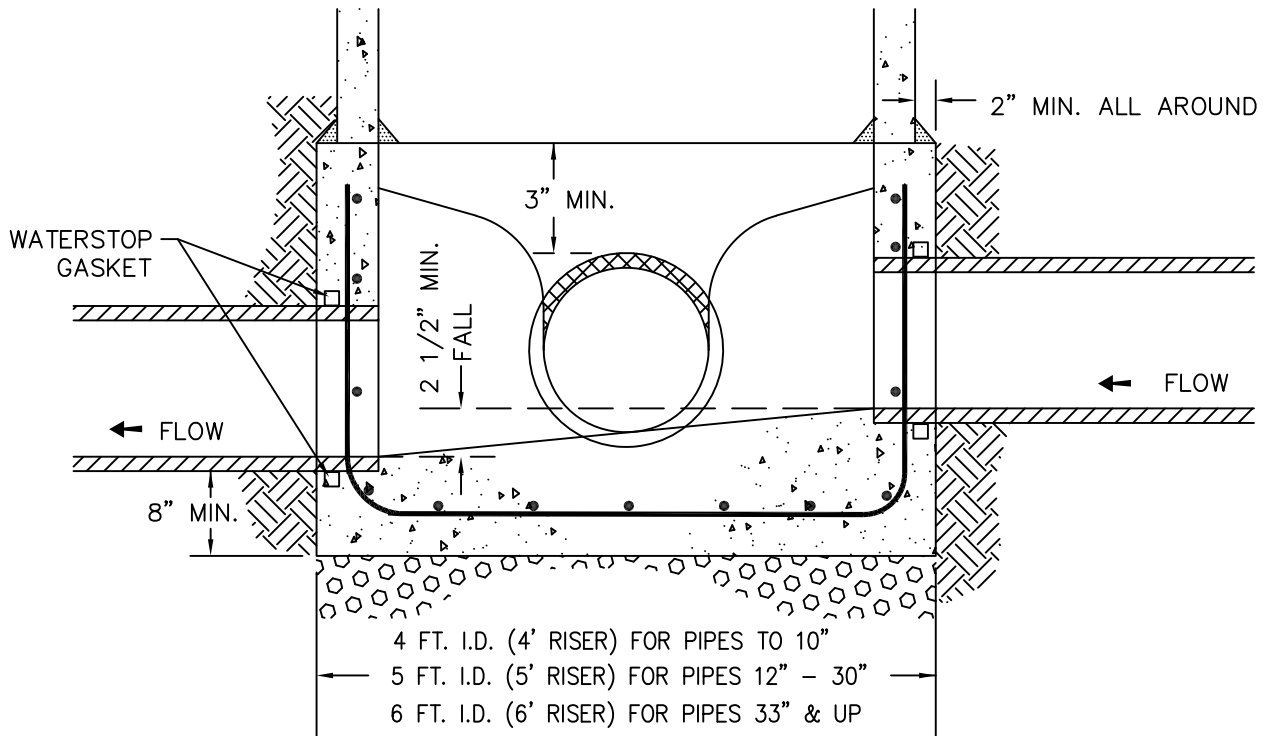
STANDARD SEWER MANHOLE
(DETAIL 2 OF 3)

SM-3B

TYPE 1 MANHOLE BASE



SECTION A-A



SECTION B-B

ALL INFRASTRUCTURE TIE-IN'S WILL BE A MINIMUM OF 5 FT. I.D. MANHOLE.

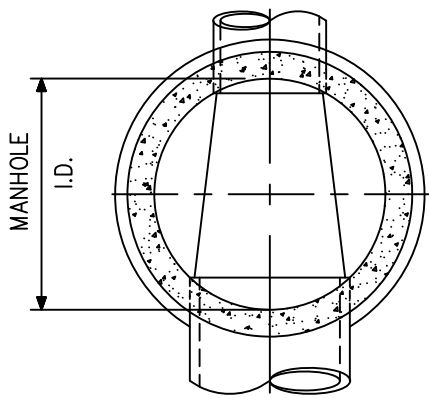
APPROVED:

MAY 2020

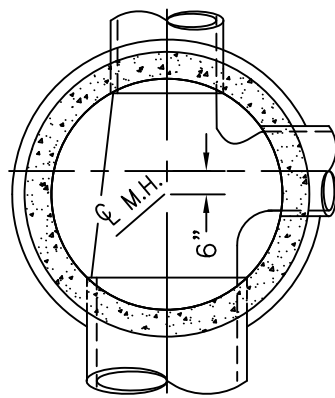
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

STANDARD SEWER MANHOLE
(DETAIL 3 OF 3)

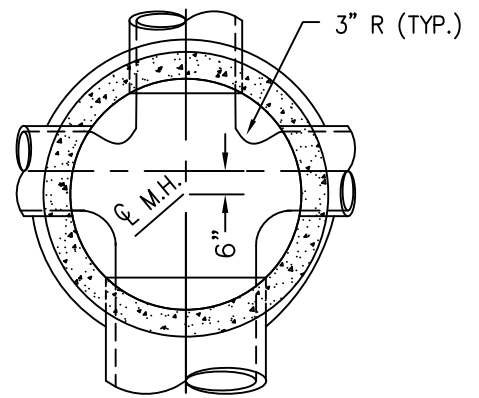
SM-3C



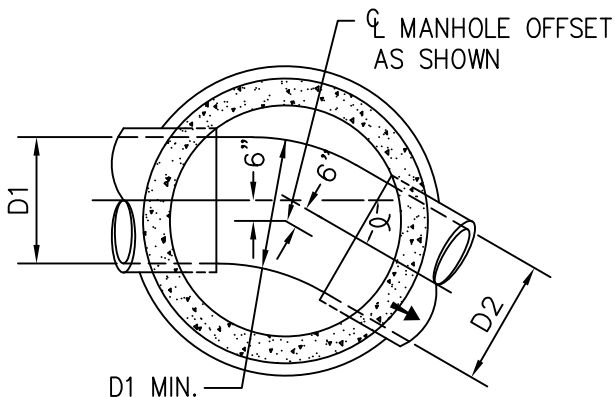
THROUGH PIPE



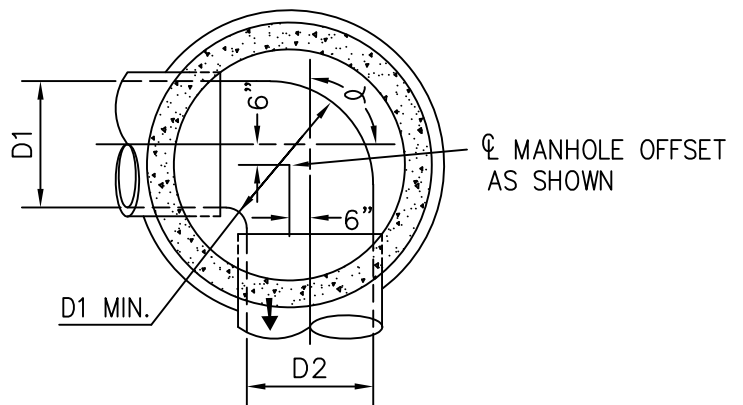
THROUGH PIPE
ONE COLLECTION LINE



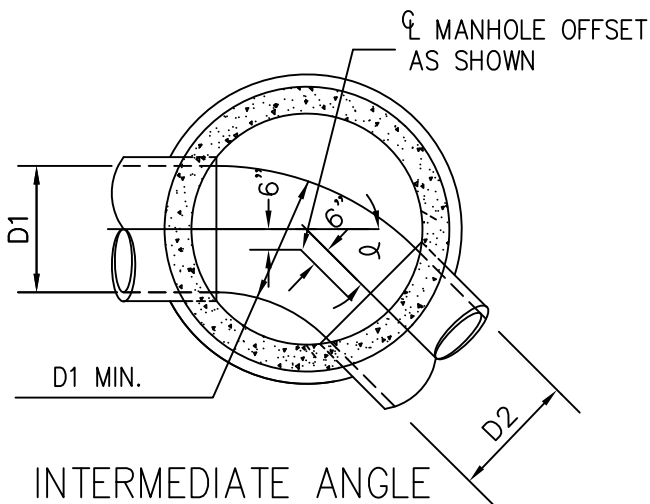
THROUGH PIPE
TWO COLLECTION LINES



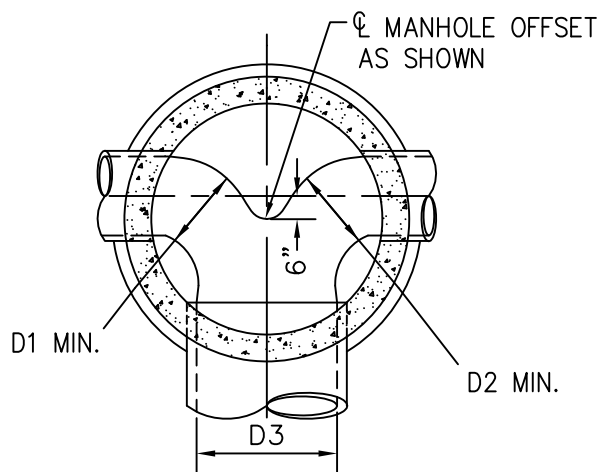
INTERMEDIATE ANGLE
 $\alpha = 30^\circ$



SHARP ANGLE
 $\alpha = 90^\circ$



INTERMEDIATE ANGLE
 $\alpha = 45^\circ$



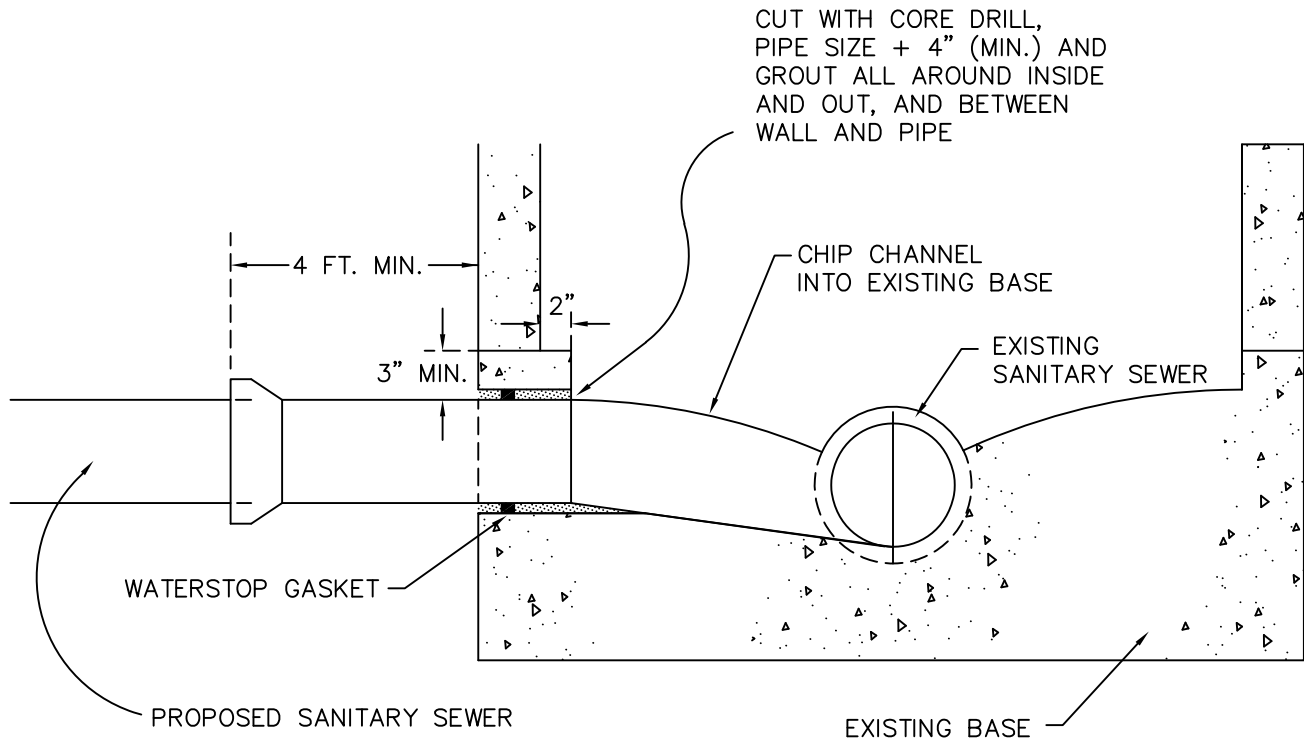
OPPOSED LATERALS

APPROVED:
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

TYPICAL BASE AND DEFLECTOR DETAILS

SM-4



NOTES:

1. TIE-INS SHALL ONLY BE PERMITTED THROUGH BASE WALL.
2. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

APPROVED:

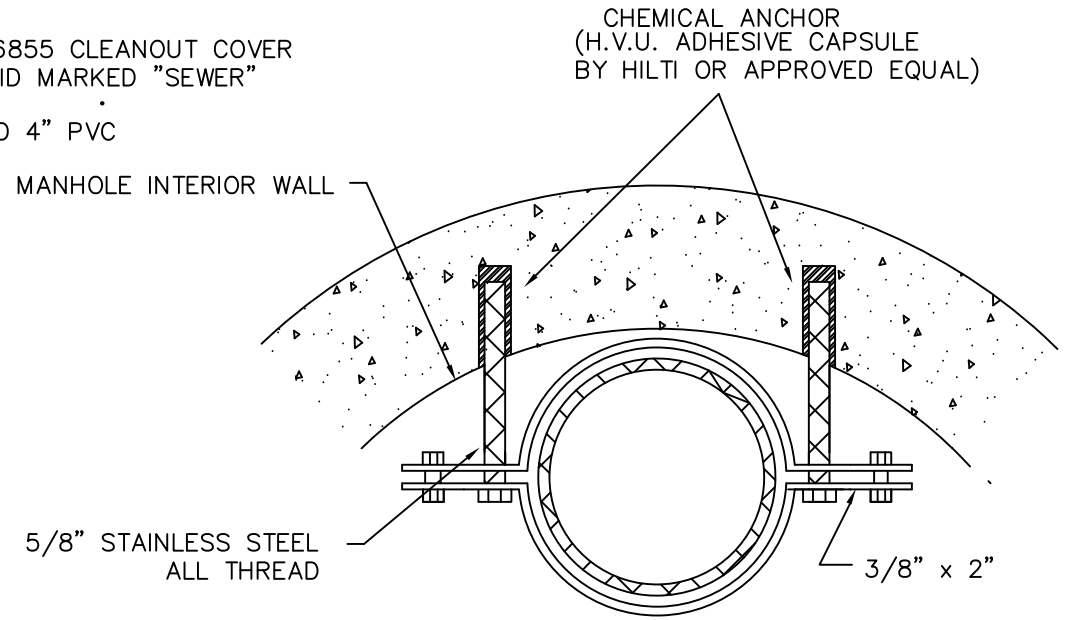
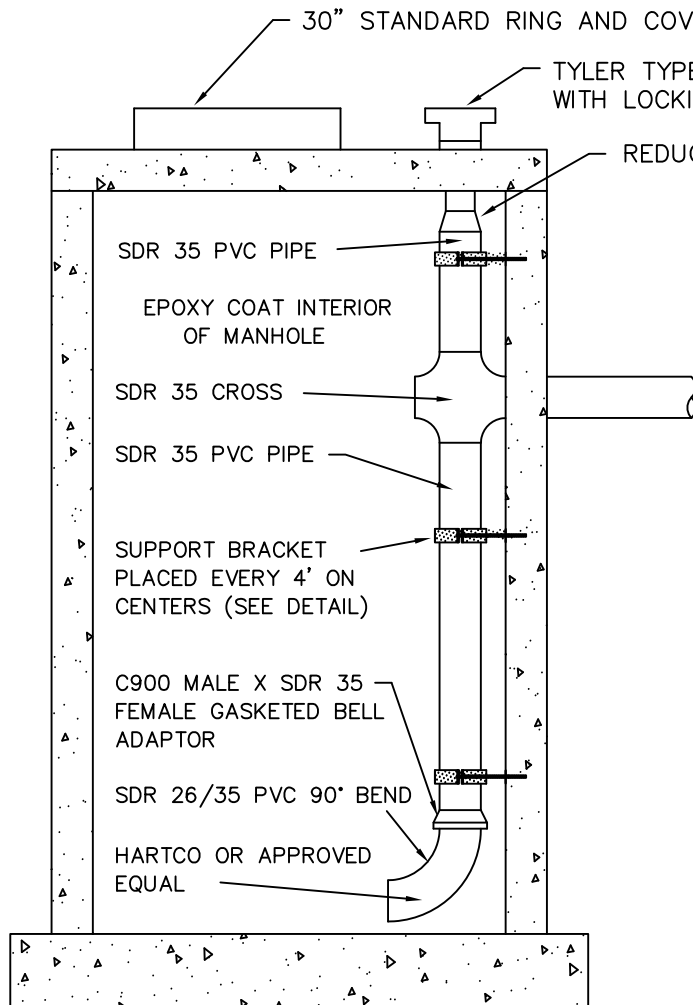
MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

MANHOLE INVERT TIE-IN DETAIL

SM-5

NOTE: CONCRETE COLLAR TO BE POURED AROUND BOTH RING AND LOCKING CLEANOUT.



BRACKET DETAIL

MANUFACTURE BRACKET FROM 3/8" STAINLESS STEEL.
 ALL BRACING MATERIALS SHALL BE CONSTRUCTED USING STAINLESS STEEL.

NOTES:

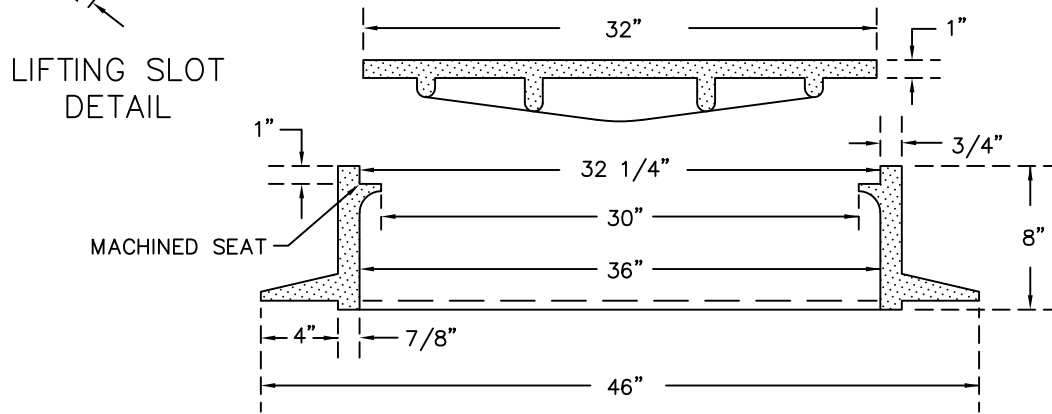
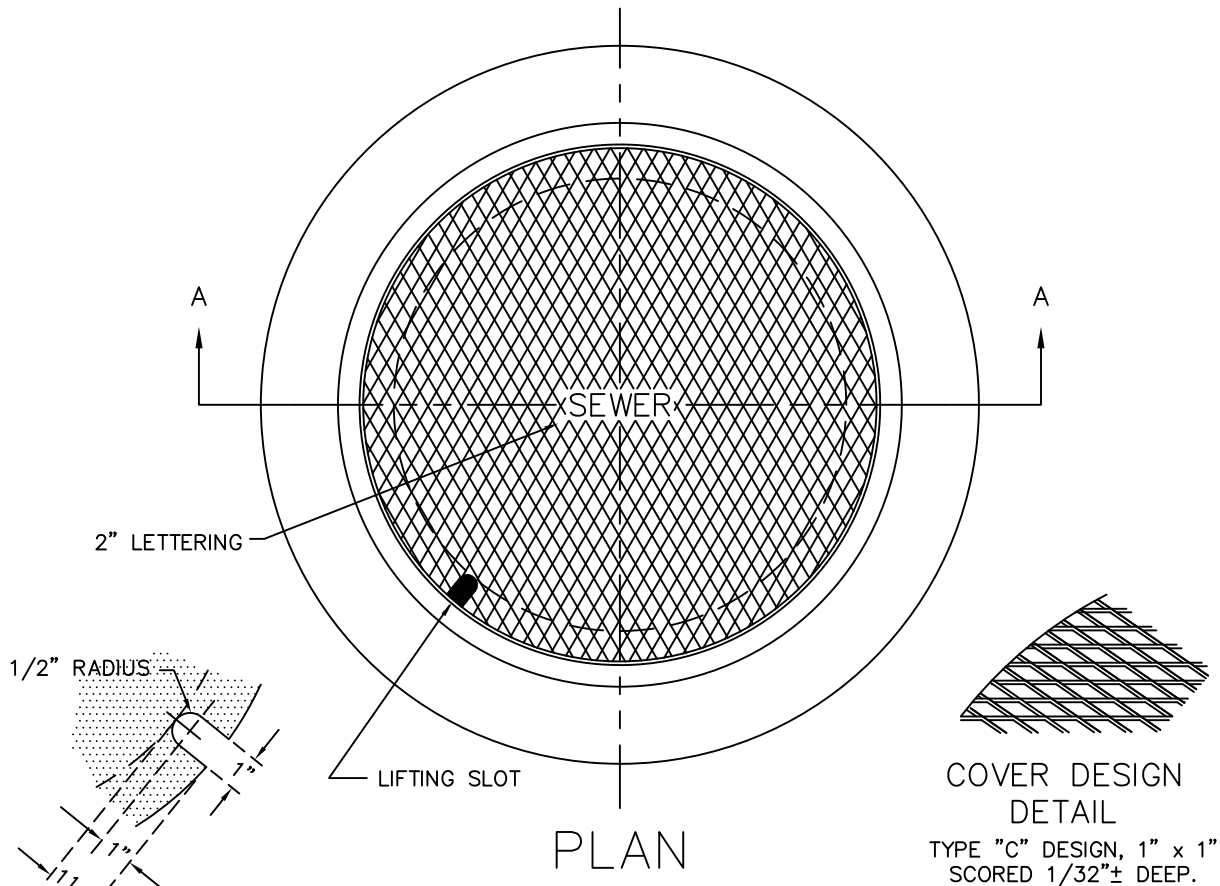
1. MANHOLE SIZE VARIES WITH SIZE OF THE MAINLINE.
 - 1.1. 8"-10" MAINLINE = 5' DIA. MANHOLE
 - 1.2. 12"-15" MAINLINE = 6' DIA. MANHOLE
 - 1.3. MAINLINES LARGER THAN 15" = 7' DIA. MANHOLE
2. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

HIGHLANDS RANCH METROPOLITAN DISTRICT
 DOUGLAS COUNTY, COLORADO

APPROVED:
 MAY 2020

INSIDE DROP MANHOLE CONSTRUCTION DETAIL

SM-6



NOTES:

1. A.S.T.M. DESIGNATED A-48 CLASS 35 B (UNPAINTED).
2. LETTERING ON COVER AS REQUIRED (I.E. WATER, SEWER).
3. ALL BEARING SURFACES TO BE MACHINED.
4. TOTAL MINIMUM WEIGHT APPROXIMATELY 400 LBS., CAST IRON ONLY.
5. LIFTING SLOT SHALL NOT EXTEND PAST INSIDE FACE OF RING SEAT.
6. MINIMUM FRAME WEIGHT - 235LBS., MINIMUM LID WEIGHT - 165 LBS.

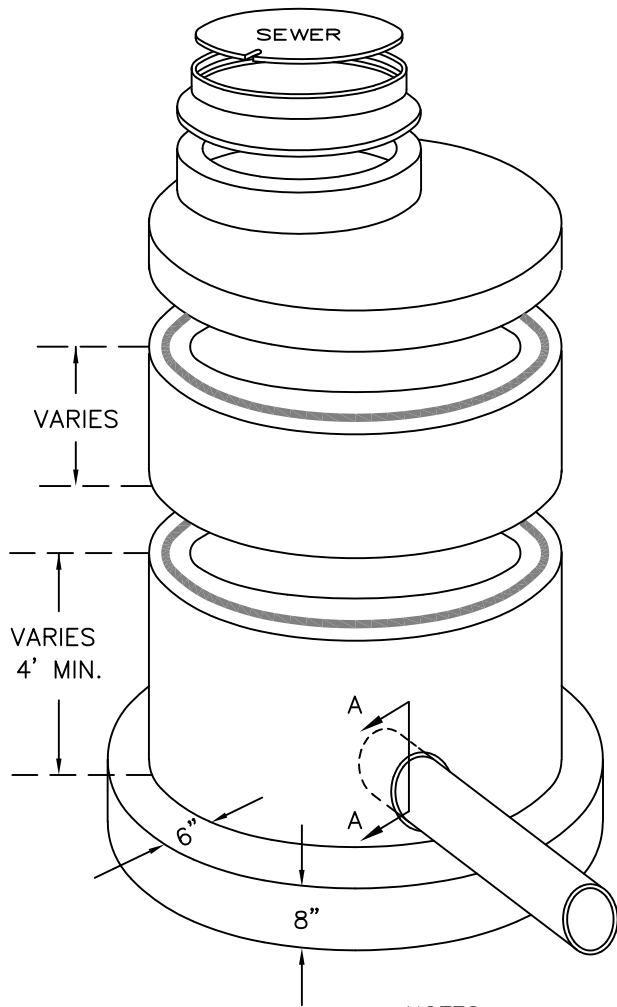
APPROVED:

MAY 2020

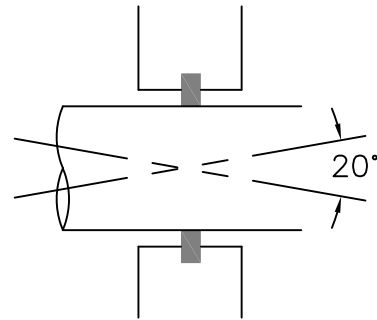
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

30" MANHOLE RING AND COVER

SM-8

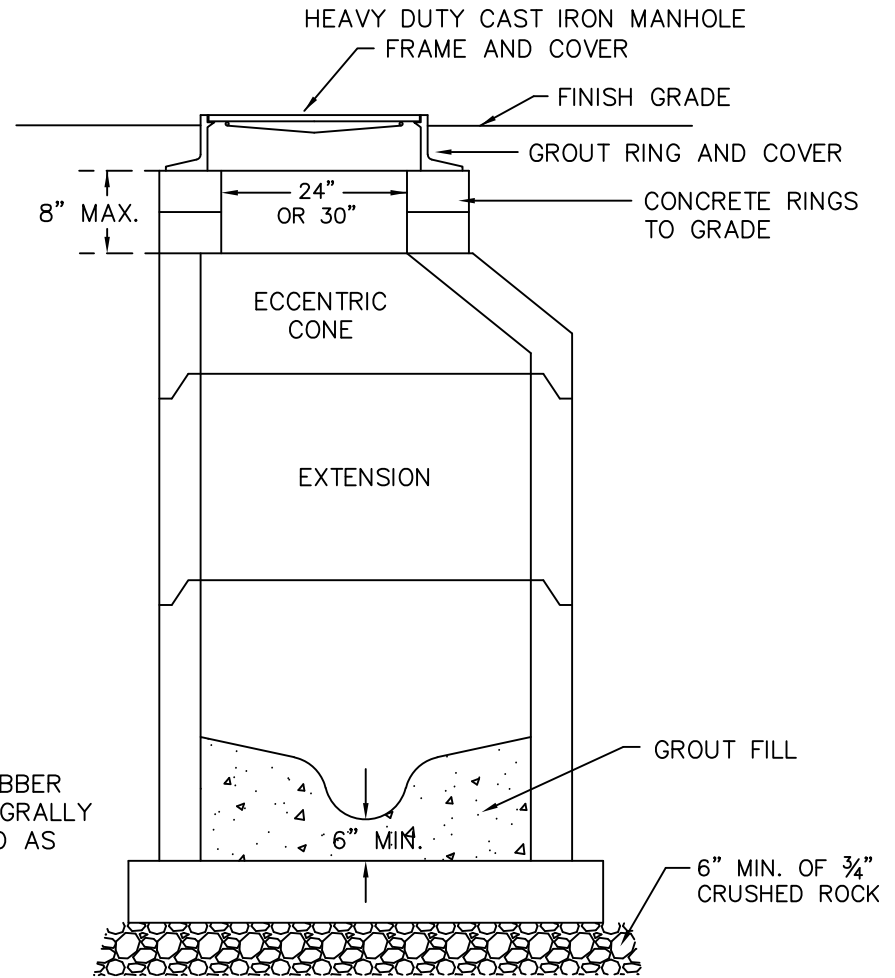


NOTES:
 1. 60" OR LARGER DIAMETER MANHOLES, REQUIRE A 30" OPENING.



SECTION A-A
 PIPE TO MANHOLE SEAL

A LOK GASKET PER A.S.T.M. RUBBER GASKET SPEC. C443, CAST INTEGRALLY IN MANHOLE WALL AND LOCATED AS REQUIRED (JOINT ALLOWS 10° OMNIDIRECTIONAL DEFLECTION) OR EQUIVALENT.



BASE DIAMETER IS 5' - 10" ON 48" I.D. MANHOLE AND 7' - 0" ON 60" I.D. MANHOLE. BASE SHALL BE CAST INTEGRALLY WITH FLOOR.

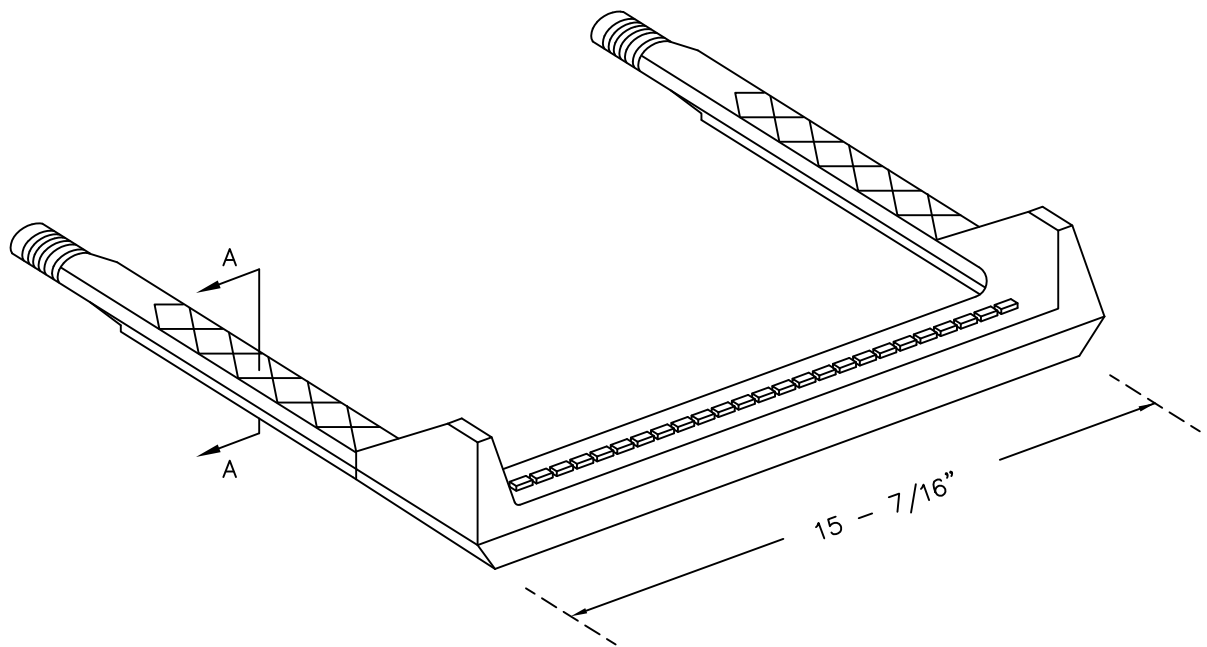
STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

APPROVED:
 MAY 2020

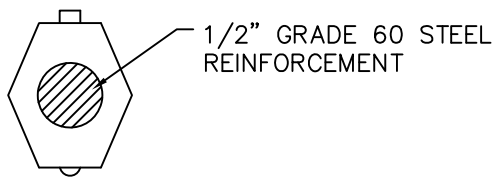
HIGHLANDS RANCH METROPOLITAN DISTRICT
 DOUGLAS COUNTY, COLORADO

PRECAST CONCRETE MANHOLE

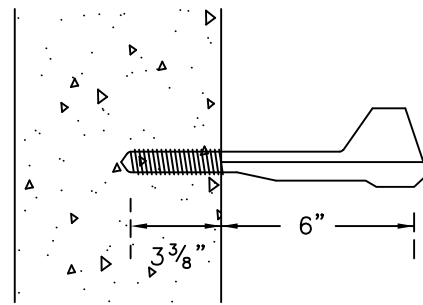
SM-9



DETAIL FOR M.A. INDUSTRIES STEP, OR APPROVED EQUAL



SECTION A-A



TYPICAL STEP INSTALLATION

NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.
2. STEPS SHALL BE IMPACT RESISTANT CO-POLYMER POLYPROPYLENE PLASTIC MOLDED AROUND 1/2" DIAMETER GRADE 60 REINFORCING STEEL, CAST IRON STEPS WILL NOT BE PERMITTED.

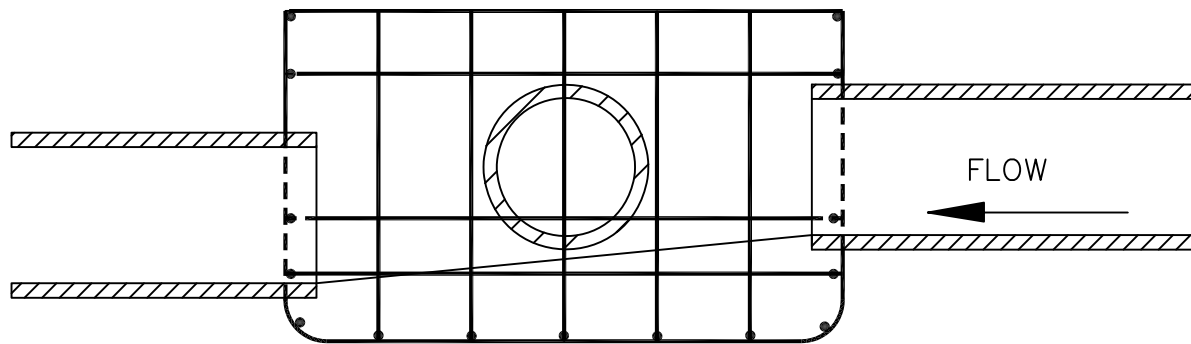
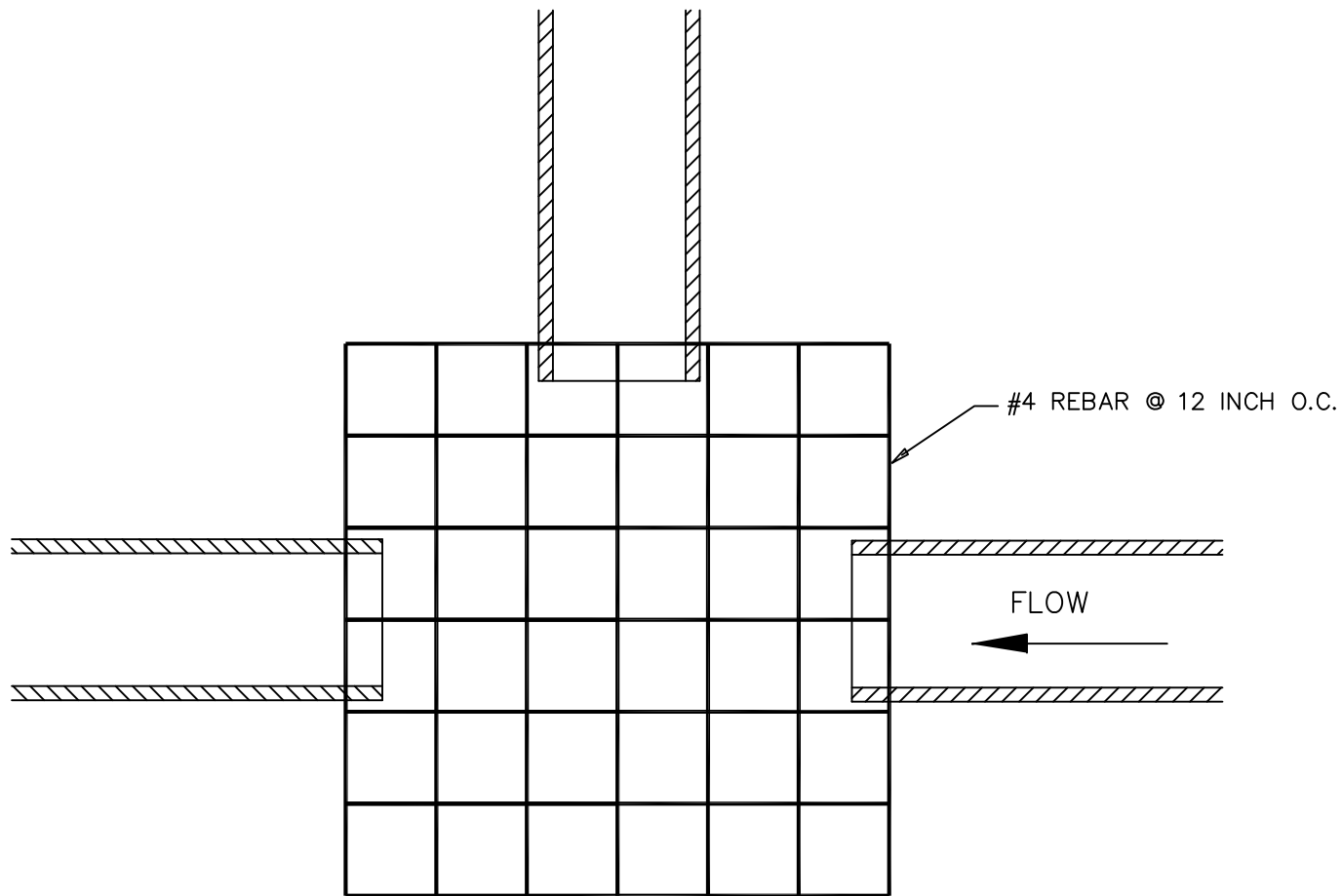
APPROVED:

MAY 2020

HIGHLANDS RANCH METRO DISTRICT
DOUGLAS COUNTY, COLORADO

STANDARD STEP FOR MANHOLES

SM-10



NOTES:

1. THE RE-BAR BASKET MAY BE EITHER CIRCULAR (SEE SM-12) OR SQUARE.

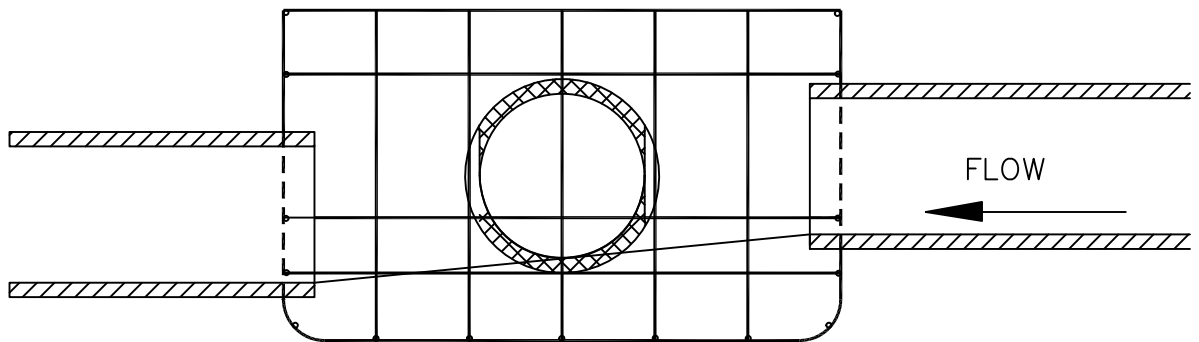
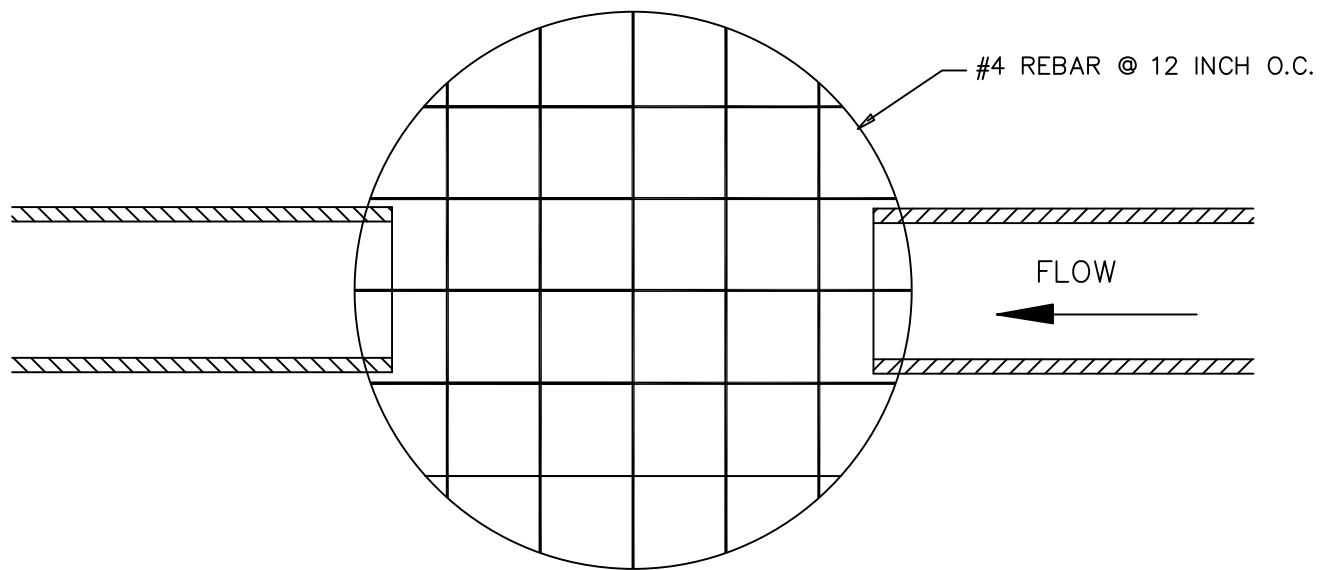
APPROVED:

MAY 2020

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

SQUARE MANHOLE BASE RE-BAR BASKET

SM-11



NOTES:

1. THE RE-BAR BASKET MAY BE EITHER CIRCULAR OR SQUARE (SEE SM-11).

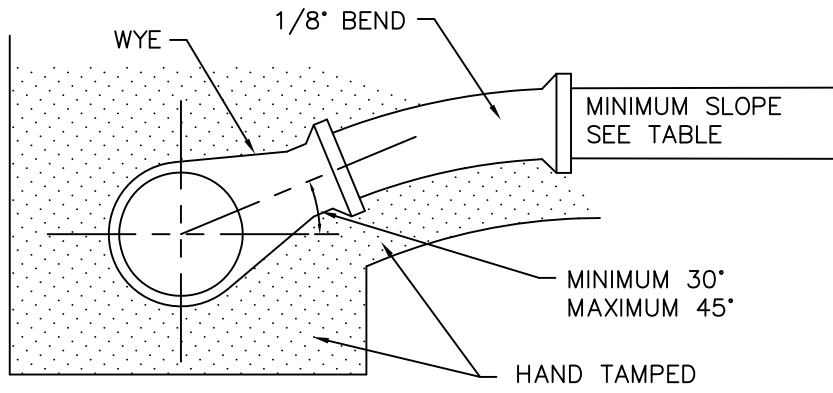
APPROVED:

MAY 2020

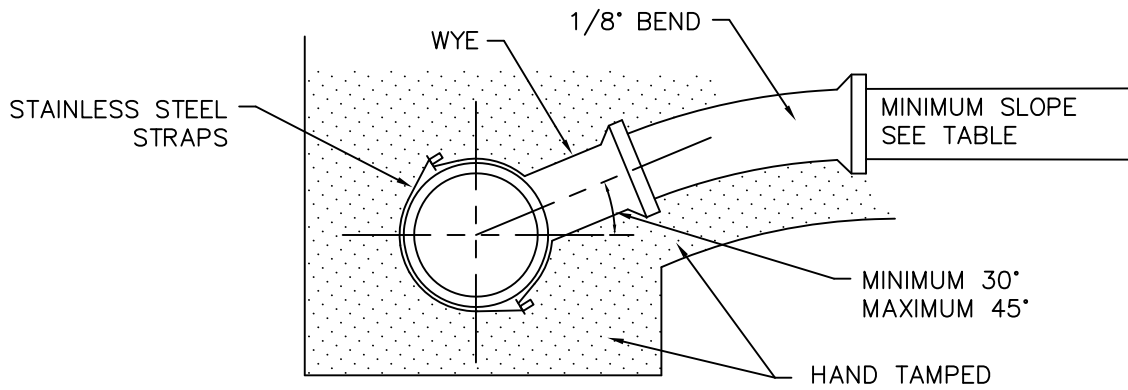
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

CIRCULAR MANHOLE BASE RE-BAR BASKET

SM-12



1/8° BEND CONNECTION TO WYE



1/8° BEND CONNECTION TO TAPPING SADDLE

SERVICE LINE SIZING CRITERIA (MINIMUM SLOPE)

4" 2.08%

6" 1.04%

8" 0.50%

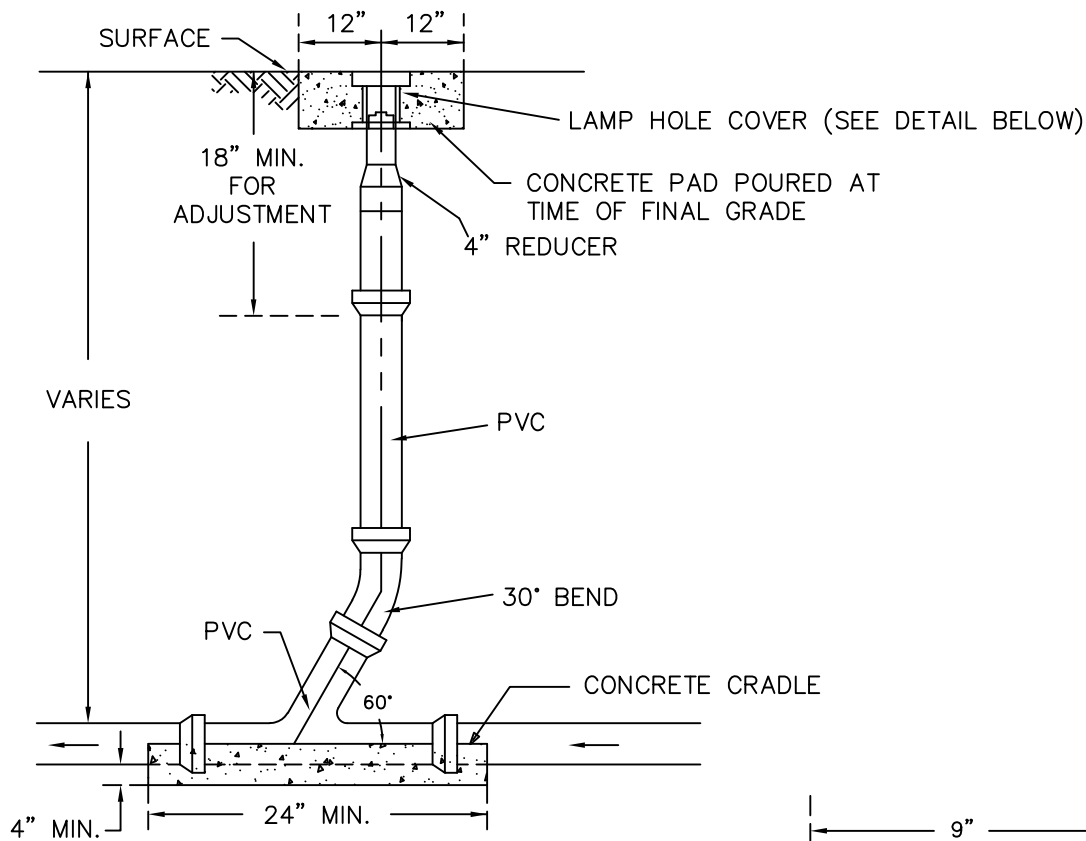
APPROVED:

MAY 2020

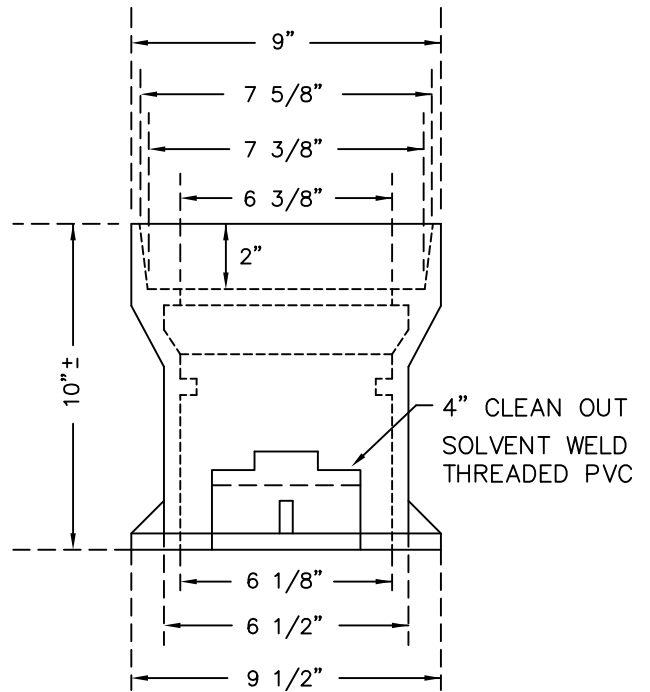
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

SEWER SERVICE LINE TAPPING DETAIL

SS-1



PLAN VIEW



COVER DETAIL

NOTES:

1. COVER SHALL HAVE A LOCKING LID MARKED "SEWER".
2. TYLER SERIES 6855 SLIP TYPE TOP SECTION, D & L SUPPLY SERIES M8056 OR EQUAL.
3. I.D. = 6 1/8".

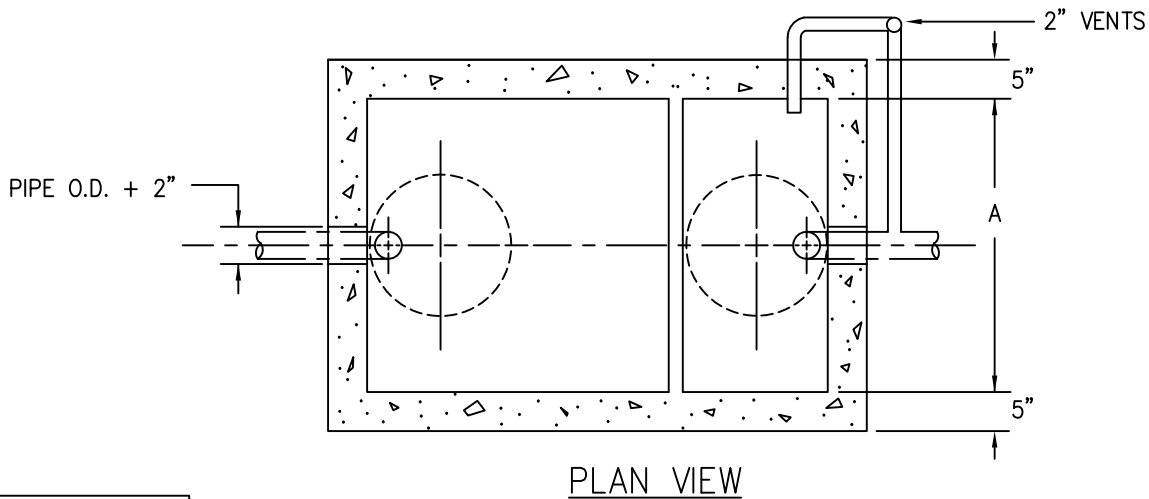
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:

MAY 2020

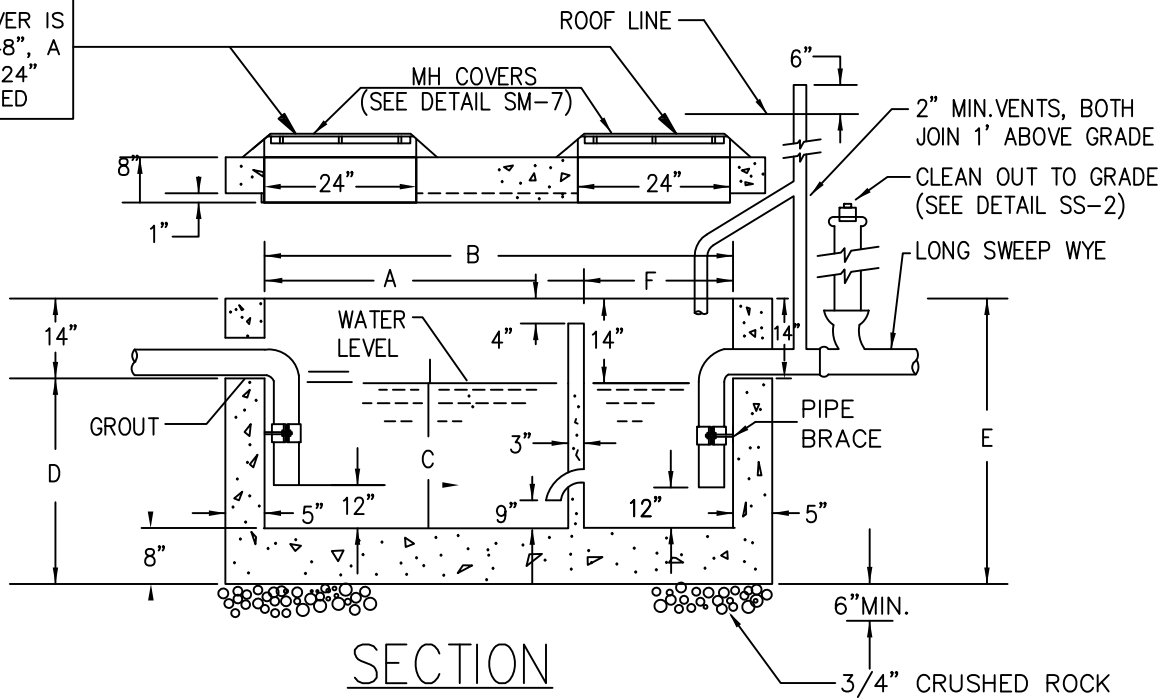
IN-LINE SANITARY SEWER
CLEANOUT (4" AND 6")

SS-2



PLAN VIEW

NOTE:
IF DEPTH OF COVER IS
GREATER THAN 48", A
36" ACCESS W/ 24"
COVER IS REQUIRED



SECTION

NOTES:

1. SECONDARY COMPARTMENT HAS VOLUME EQUAL TO 1/3 OF TOTAL CAPACITY.
2. ALL PIPE AND FITTINGS SHALL BE SOLVENT WELDED SCHEDULE 40 P.V.C. MIN. 3" DIA. WITHIN TRAP.
3. WALLS AND BOTTOM REINFORCED THROUGHOUT WITH 2x16 6/10 REMESH.
4. COVERS TO BE REINFORCED LONGITUDINALLY WITH NO. 6 REBAR ON 6" CENTERS, NO. 4 REBAR ON 6" CENTERS WIDTHWISE, AND NO. 8 REBAR DIAGONALLY AROUND ACCESS HOLES.
5. CLEAN OUT SHALL BE PVC SCREW PLUG.
6. VENT PIPE MAY BE CAST IRON OR PVC SCHEDULE 40, TO A POINT 6" ABOVE ROOF LINE.
7. MANHOLE RING AND COVER SHALL BE 24" DENVER HEAVY, OR EQUAL. SEE 4.02 W THESE SPECIFICATIONS (SEE SM-7)
8. CHECK WITH SUPPLIER FOR EXACT DIMENSIONS.
9. ALL BRACING SHALL BE CONSTRUCTED OF STAINLESS STEEL MATERIALS (SEE SM-6)
10. NO BOLT DOWN COVERS ALLOWED WITHOUT PERMISSION FROM HIGHLANDS RANCH METROPOLITAN DISTRICT.
11. SEE SECTION 5.05-E4

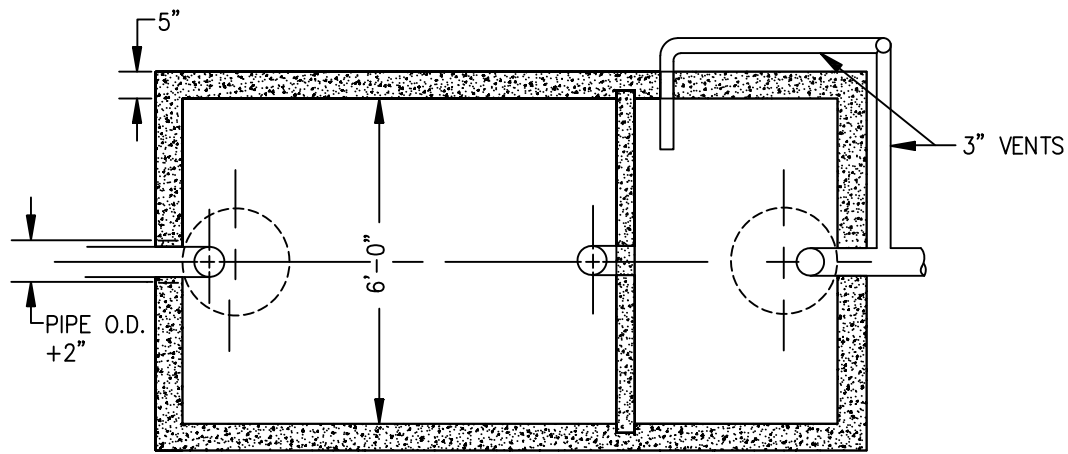
WATER CAPACITY APPROX. GALLONS	DIMENSIONS					
	TWO COMPARTMENT TANK					
	INCHES					
	A	B	C	D	E	F
320	48	72	22	30	44	24
500	48	72	36	46	44	24
780	48	96	40	48	62	32
1060	72	102	34	42	56	34

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

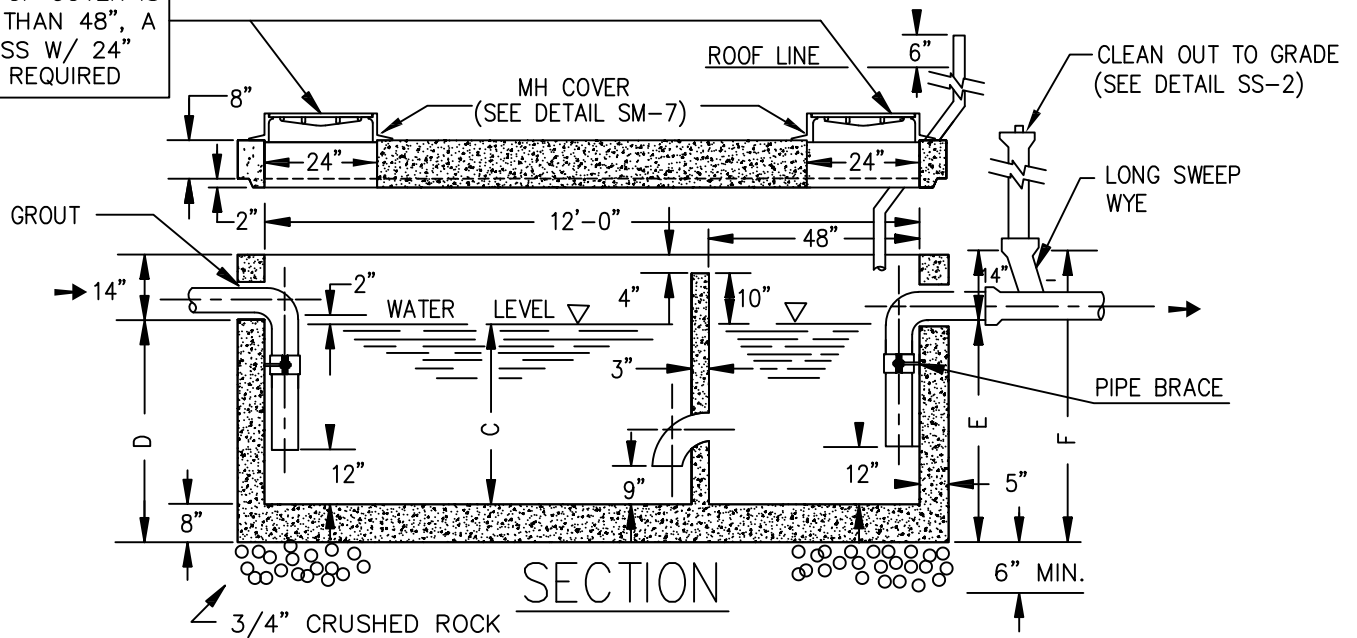
GREASE INTERCEPTOR
(320 TO 1060 GALLON CAPACITY)

SS-3



PLAN VIEW

NOTE:
IF DEPTH OF COVER IS
GREATER THAN 48", A
36" ACCESS W/ 24"
COVER IS REQUIRED



SECTION

NOTES:

1. SECONDARY COMPARTMENT HAS VOLUME EQUAL TO 1/3 OF TOTAL CAPACITY.
2. ALL PIPE AND FITTINGS SHALL BE SOLVENT WELDED SCHEDULE 40 P.V.C. MIN. 3" DIA. WITHIN TRAP.
3. WALLS AND BOTTOM REINFORCED THROUGHOUT WITH 2x16 6/10 REMESH.
4. COVERS TO BE REINFORCED LONGITUDINALLY WITH NO. 6 REBAR ON 6" CENTERS, NO. 4 REBAR ON 6" CENTERS WIDTHWISE, AND NO. 8 REBAR DIAGONALLY AROUND ACCESS HOLES.
5. CLEAN OUT SHALL BE A PVC SCREW PLUG.
6. VENT PIPE MAY BE CAST IRON OR PVC, SCHEDULE 40, TO A POINT 6" ABOVE GROUND.
7. MANHOLE RING AND COVER SHALL BE J-MARK #1161 OR EQUAL. SEE 4.02 W THESE SPECIFICATIONS (SEE SM-7).
8. NO BOLT DOWN COVERS ALLOWED WITHOUT PERMISSION FROM HIGHLANDS RANCH METROPOLITAN DISTRICT.
9. GREASE CAPACITY RATED FOR LARGE COMPARTMENT ONLY.
10. CHECK WITH SUPPLIER FOR EXACT DIMENSIONS.
11. SEE SECTION 5.03-D.
12. ALL BRACING SHALL BE CONSTRUCTED OF STAINLESS STEEL MATERIALS (SEE SM-6).

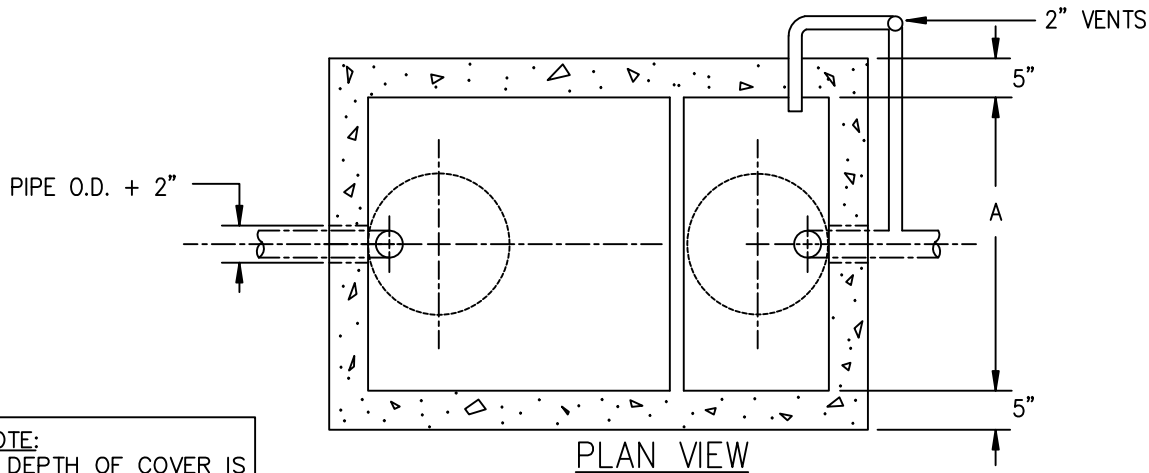
Water Capacity (Approx. Gallons)	DIMENSIONS INCHES			
	C	D	E	F
1565	40	50	48	62
1800	46	56	54	68
2035	52	62	60	74
2505	64	74	72	86
2975	76	86	84	98
3210	82	92	90	104
3445	88	98	96	110

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

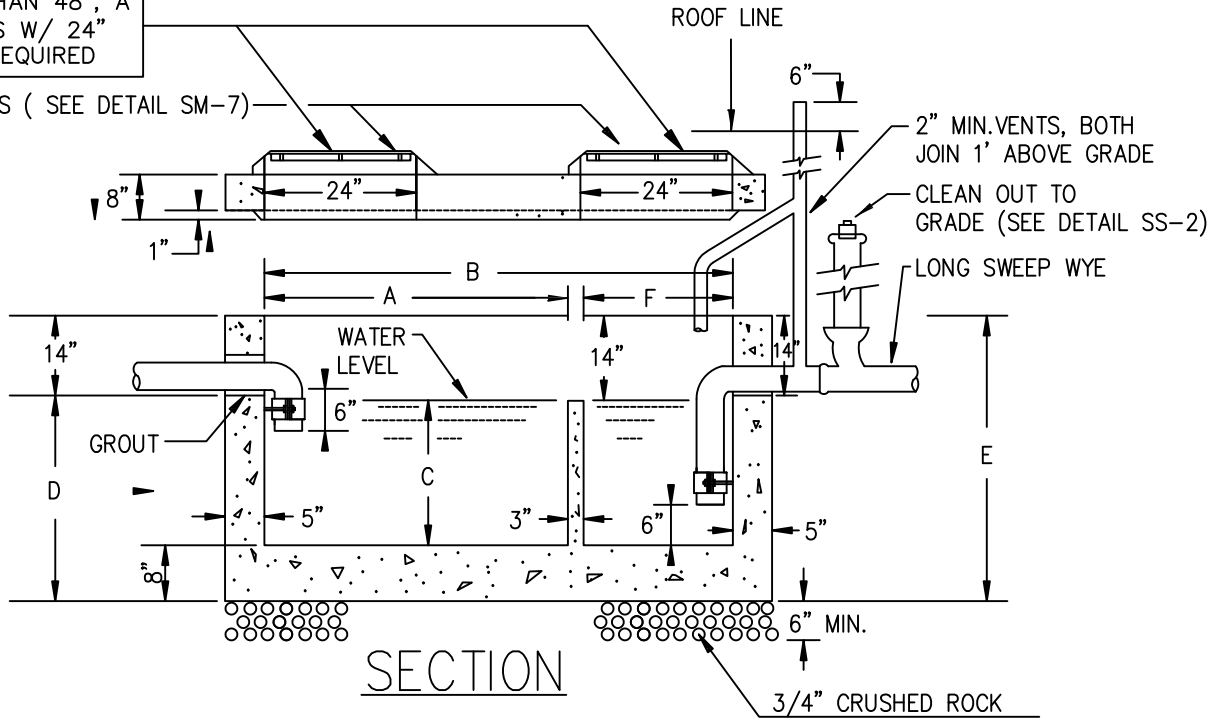
APPROVED:
MAY 2020

GREASE INTERCEPTOR
(1565 TO 3445 GALLON CAPACITY)

SS-4



NOTE:
IF DEPTH OF COVER IS
GREATER THAN 48", A
36" ACCESS W/ 24"
COVER IS REQUIRED



NOTES:

1. SECONDARY COMPARTMENT HAS VOLUME EQUAL TO 1/3 OF TOTAL CAPACITY.
2. ALL PIPE AND FITTINGS SHALL BE SOLVENT WELDED SCHEDULE 40 P.V.C. MIN. 3" DIA. WITHIN TRAP.
3. WALLS AND BOTTOM REINFORCED THROUGHOUT WITH 2x16 6/10 REMESH.
4. COVERS TO BE REINFORCED LONGITUDINALLY WITH NO. 6 REBAR ON 6" CENTERS, NO. 4 REBAR ON 6" CENTERS WIDTHWISE, AND NO. 8 REBAR DIAGONALLY AROUND ACCESS HOLES.
5. CLEAN OUT SHALL BE PVC SCREW PLUG.
6. VENT PIPE MAY BE CAST IRON OR PVC SCHEDULE 40, TO A POINT 6" ABOVE GROUND.
7. MANHOLE RING AND COVER SHALL BE 24" DENVER HEAVY, OR EQUAL. SEE 7.02-H THESE SPECIFICATIONS (SEE SM-7).
8. ALL BRACING SHALL BE CONSTRUCTED OF STAINLESS STEEL MATERIALS (SEE SM-6).
9. CHECK WITH SUPPLIER FOR EXACT DIMENSIONS.
10. NO BOLT DOWN COVERS ALLOWED WITHOUT PERMISSION FROM HIGHLANDS RANCH METROPOLITAN DISTRICT.
11. SEE SECTION 5.03-D.

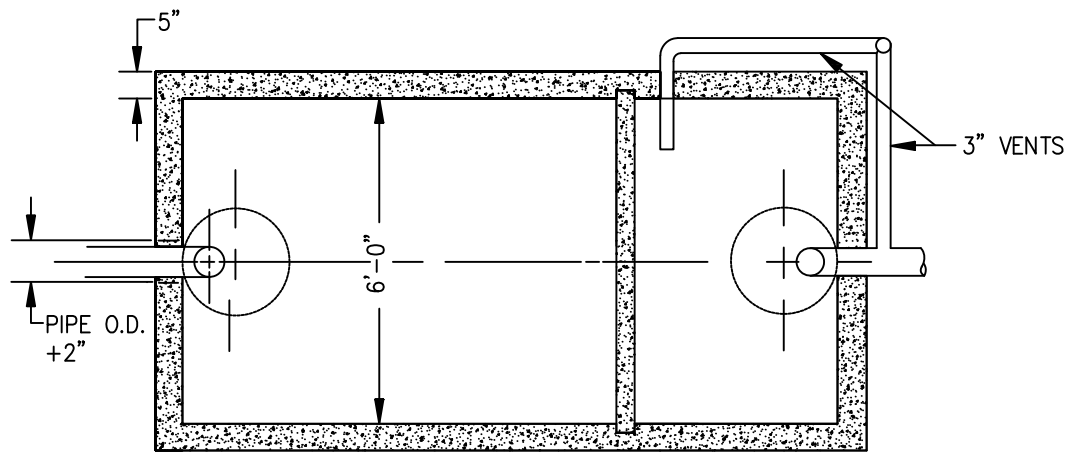
WATER CAPACITY APPROX. GALLONS	DIMENSIONS					
	TWO COMPARTMENT TANK					
	INCHES					
	A	B	C	D	E	F
320	48	72	22	30	44	24
500	48	72	36	46	44	24
780	48	96	40	48	62	32
1060	72	102	34	42	56	34

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

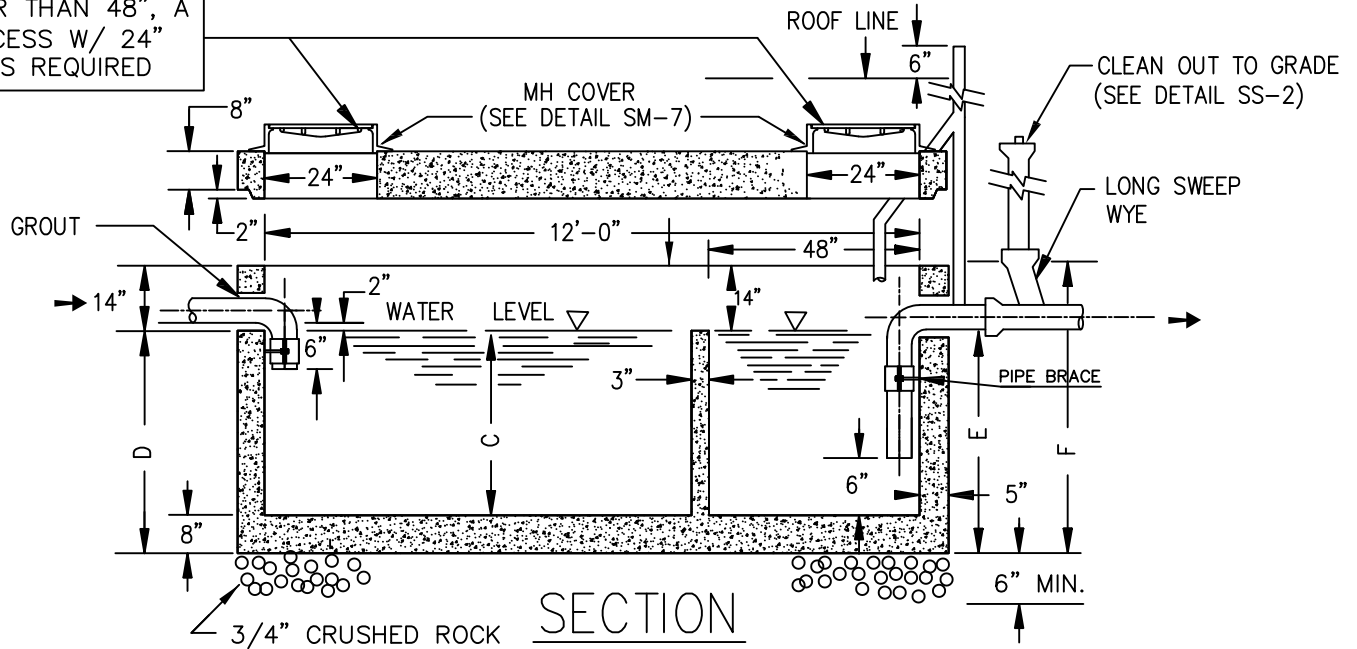
SAND AND OIL INTERCEPTOR
(320 TO 1060 GALLON CAPACITY)

SS-5



PLAN VIEW

NOTE:
IF DEPTH OF COVER IS
GREATER THAN 48", A
36" ACCESS W/ 24"
COVER IS REQUIRED



SECTION

NOTES:

1. SECONDARY COMPARTMENT HAS VOLUME EQUAL TO 1/3 OF TOTAL CAPACITY.
2. ALL PIPE AND FITTINGS SHALL BE SOLVENT WELDED SCHEDULE 40 P.V.C. MIN. 3" DIA. WITHIN TRAP.
3. WALLS AND BOTTOM REINFORCED THROUGHOUT WITH 2x16 6/10 REMESH.
4. COVERS TO BE REINFORCED LONGITUDINALLY WITH NO. 6 REBAR ON 6" CENTERS, NO. 4 REBAR ON 6" CENTERS WIDTHWISE, AND NO. 8 REBAR DIAGONALLY AROUND ACCESS HOLES.
5. CLEAN OUT SHALL BE A PVC SCREW PLUG.
6. VENT PIPE MAY BE CAST IRON OR PVC, SCHEDULE 40, TO A POINT 6" ABOVE ROOF LINE.
7. MANHOLE RING AND COVER SHALL BE J-MARK #1161 OR EQUAL. SEE 4.02 W THESE SPECIFICATIONS (SEE SM-7).
8. NO BOLT DOWN COVERS ALLOWED WITHOUT PERMISSION FROM HIGHLANDS RANCH METROPOLITAN DISTRICT.

9. GREASE CAPACITY RATED FOR LARGE COMPARTMENT ONLY.
10. CHECK WITH SUPPLIER FOR EXACT DIMENSIONS.
11. SEE SECTION 5.03-E4.
12. ALL BRACING SHALL BE CONSTRUCTED OF STAINLESS STEEL MATERIALS (SEE SM-6).

Water Capacity (Approx. Gallons)	DIMENSIONS INCHES			
	C	D	E	F
1565	40	50	48	62
1800	46	56	54	68
2035	52	62	60	74
2505	64	74	72	86
2975	76	86	84	98
3210	82	92	90	104
3445	88	98	96	110

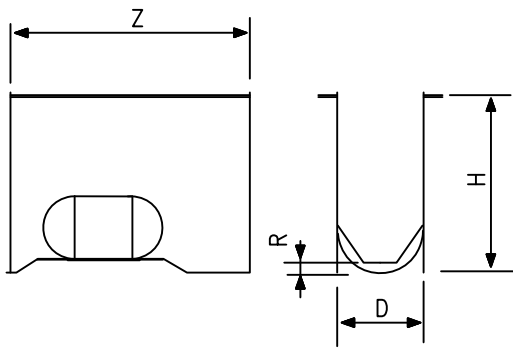
HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:

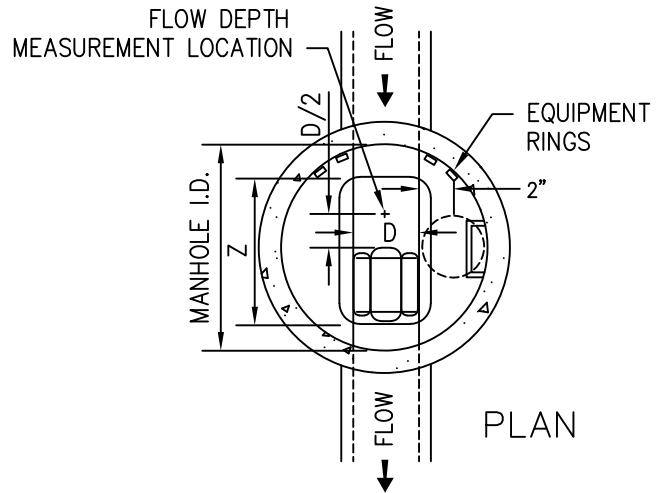
MAY 2020

SAND AND OIL INTERCEPTOR
(1565 TO 3445 GALLON CAPACITY)

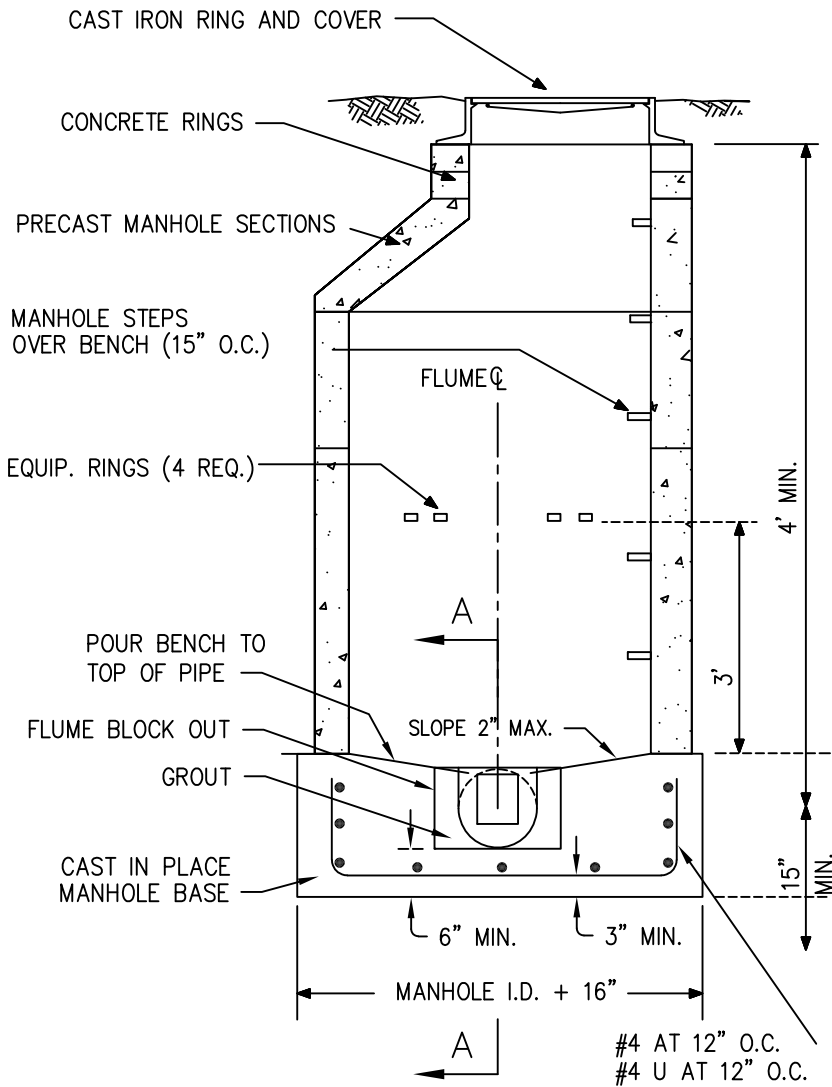
SS-6



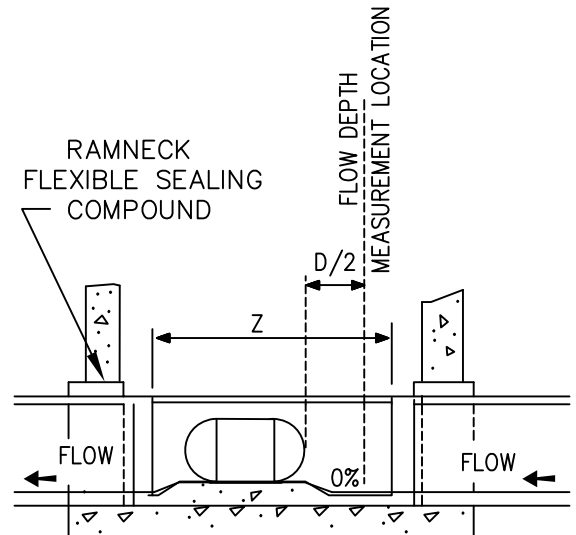
PALMER-BOWLUS FLUME



PLAN



SECTION



SECTION A

HIGHLANDS RANCH METROPOLITAN DISTRICT
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

WASTE METERING MANHOLE
(DETAIL 1 OF 4)

SS-7A

FLUME DESIGN CRITERIA

FLUME										MANHOLE SIZE I.D.	SLOPE UPSTREAM (%)
MAXIMUM DISCHARGE			HEAD	MODEL	DIMENSIONS (INCHES)						
G.P.M.	MGD	CFS	INCHES	—	D	D-2	R	H	Z	MINIMUM	MAXIMUM
52	0.075	0.116	2.90	PBF-4	4	2	0.67	6	17	6' DIA.	2.4
165	0.238	0.368	4.70	PBF-6	6	2	1.0	8	25	6' DIA.	2.2
343	0.494	0.764	6.30	PBF-8	8	3	1.33	10	33	6' DIA.	2.0
603	0.868	1.344	7.90	PBF-10	10	4	1.67	12	41	6' DIA.	1.8
936	1.348	2.085	9.40	PBF-12	12	6	2.0	14	49	6' DIA.	1.6
1648	2.373	3.672	11.80	PBF-15	15	7.5	2.5	17	61	6' DIA.	1.5
2614	3.764	5.824	14.20	PBF-18	18	9	3.0	20	73	7.5' DIA.	1.4

HIGHLANDS RANCH METROPOLITAN DISTRICTS
DOUGLAS COUNTY, COLORADO

APPROVED:
MAY 2020

WASTE METERING MANHOLE
(DETAIL 2 OF 4)

SS-7B

WASTE METERING MANHOLE NOTES

STRUCTURE:

1. Shape and smooth manhole inverts by forming or shaping with cement mortar.
2. All precast manhole sections, bases, flat tops, barrels, reducers, etc., shall conform to ASTM, C-478, and these Standard Specifications.
3. Reinforcing in base is required for 6' & 7.5' diameter manholes. The Owner shall be responsible for structural requirements under the specific loading conditions, (Dead load plus live load or H-20 for Traffic).
4. Manhole ring, cover and leveling rings shall be set in a fill bed of mortar.
5. Eccentric cone sections may be used in lieu of flat top sections, provided cover over top of pipe is greater than 4.5 feet.
6. Flexible plastic sealant is required in all joints.
7. Ventilator may be required; District Engineer shall decide when this is necessary, and approve method of providing ventilation.

FLUME:

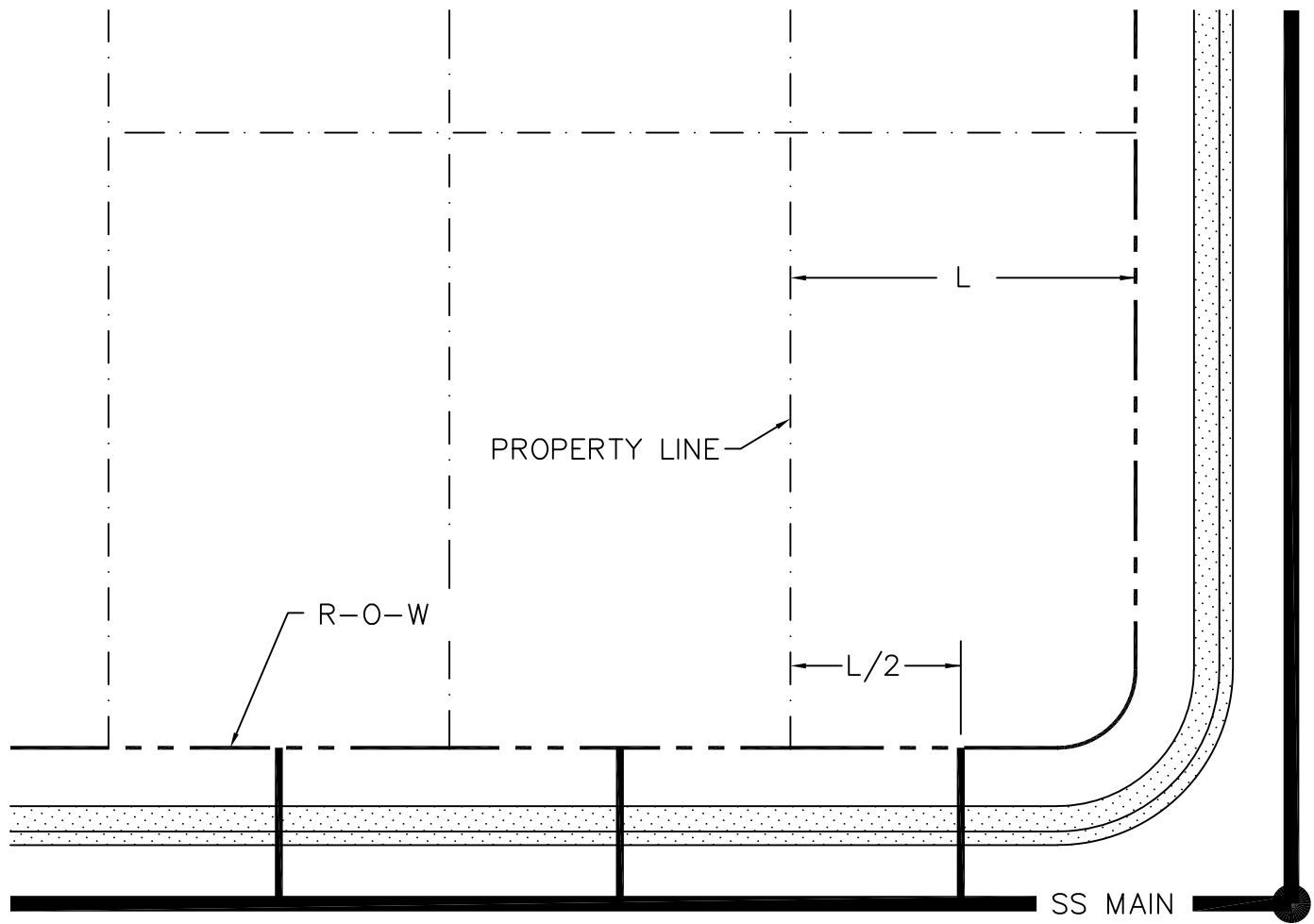
1. The flume shall be a Palmer-Bowlus flume, with integral approach section, or approved equal.
2. It is suggested that the Owner place concrete for manhole bench in two pours.
 - (a) Pour bench, leaving adequate "Block out" area to fit flume.
 - (b) Grout flume into "Block out" at existing or new sewer line slope.
3. Construction of a bypass channel for flume shall be at the Owner's option, this can be accomplished in pour (a). This type of construction will require a larger structure. The design of any bypass channel shall be such as to induce minimum turbulence in normal flume flow channel.
4. Flume selection shall be based upon the flow to be measured and not upon the pipe size.
5. Flume selection calculations will be submitted to District Engineer for concurrence as will flume calibration curves and data.
6. A mounting bracket shall be provided to support the District's flow recording transducer. The bracket shall be installed so that the transducer face is over the center of the channel.

APPROVED: MAY 2020	HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO	SS-7C
	WASTE METERING MANHOLE (DETAIL 3 OF 4)	

ELECTRICAL CONTROL PANEL

1. SHALL BE A MILLTRONICS OCM III – NON-CONTACTING ULTRASONIC FLOW METER, TWO-WAY COMMUNICATIONS – DATA LOG WITH 2 YEAR HISTORY.
2. CHART RECORDER – FOXBORO 740 SERIES, OR APPROVED EQUAL, WITH 100 PROPERLY SCALED CHARTS FOR THE SIZE OF FLUME UTILIZED.
3. THE TRANSDUCER MOUNTING HARDWARE SHALL BE FIBERGLASS UNISTRUT WITH STAINLESS STEEL ANCHORS & BOLTS. THE MOUNT SHOULD BE DESIGNED TO ALLOW LEVELING OF TRANSDUCER FACE AND OFFERING SOME LATERAL ADJUSTMENTS.
4. CONDUIT FROM MANHOLE TO PANEL SHALL BE PVC JACKETED GRC, (USING ONLY WIDE RADIUS BENDS).
 REQUIRED (1) 3/4" FOR TRANSDUCER CABLE
 (1) 1" FOR ISCO SAMPLE LINE
 (1) 3/4" SPARE
5. EQUIPMENT ENCLOSURE SHALL BE A NEMA 4, WITH DOUBLE DOOR ACCESS, MOUNTED ON A CONCRETE PAD.
 PANEL SHOULD INCLUDE THE FOLLOWING:
 - ELECTRICAL DISTRIBUTION BOX WITH (6) 20 AMP GFI CIRCUIT BREAKERS.
 - HEATER WITH THERMOSTAT.
 - EXHAUST FAN WITH LOUVERS.
 - LIGHT
 - UTILITY OUTLETS
 - SIZED ACCORDINGLY TO ACCOMMODATE AN ISCO SAMPLER, MODEL #3700
6. FLUME LENGTH FOR 8" PALMER-BOWLUS WITH APPROACH SECTION,
 (4 x DIAMETER) + 1" e.i. 32"+ 1" = 33"

APPROVED: MAY 2020	HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO	
	WASTE METERING MANHOLE (DETAIL 4 OF 4)	SS-7D



NOTE:

1. SEWER SERVICE LINES (INDIVIDUAL TRENCH) SHALL BE LOCATED A MAXIMUM OF 1.5' ON EITHER SIDE OF THE CENTER LINE OF THE LOT.
2. FOR JOINT TRENCH INSTALLATIONS, SEWER SERVICE LINES SHALL BE LOCATED IN ACCORDANCE WITH WS-2.

<p>APPROVED: MAY 2020</p>	<p>HIGHLANDS RANCH METROPOLITAN DISTRICT DOUGLAS COUNTY, COLORADO</p>	<p>SS-8</p>
	<p>TYPICAL SANITARY SEWER SERVICE LOCATION</p>	