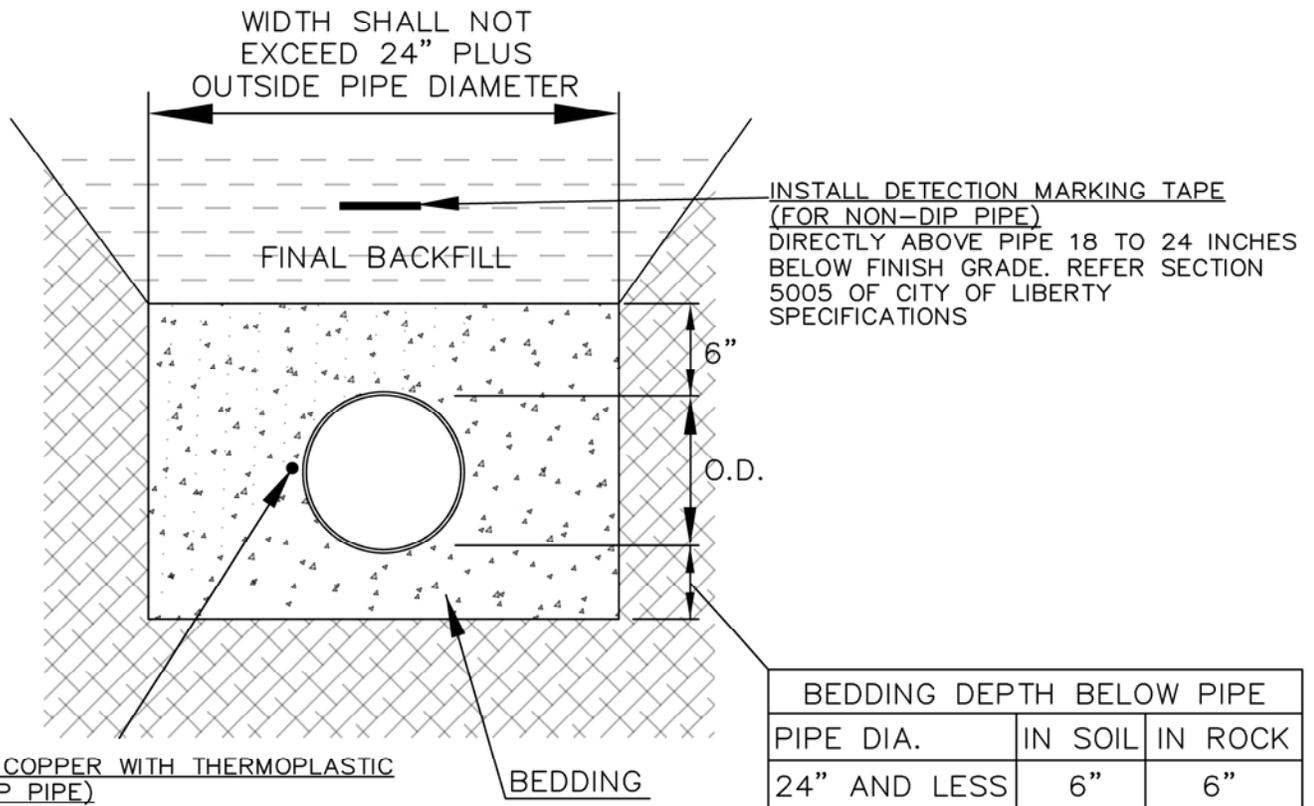


BEDDING

1/2"–3/4" CLEAN AGGREGATE, HAND TAMPED OR MECHANICALLY COMPACTED IN MAX. 4" LIFTS

TRENCH BACKFILL:

- UNDER PAVED AREAS OR WITHIN 4' HORIZONTAL OF PAVED AREAS/BACK-OF-CURB MoDOT TYPE 1 ROCK COMPACTED TO 95% OF STANDARD DENSITY PER ASTM D-698
- OUTSIDE PAVEMENT AND WITHIN R/W ON-SITE OR IMPORTED MATERIAL FREE OF MUCK, FROZEN MATERIAL, EXCESS MOISTURE, ORGANICS, TOPSOIL, RUBBISH, CONSTRUCTION DEBRIS, ROCK OR BRICK, COMPACTED TO 95% OF STANDARD DENSITY PER ASTM D-698
- OUTSIDE R/W ON-SITE OR IMPORTED MATERIAL FREE OF MUCK, FROZEN MATERIAL, EXCESS MOISTURE, ORGANICS, TOPSOIL, RUBBISH, CONSTRUCTION DEBRIS, ROCK OR BRICK, COMPACTED TO 90% OF STANDARD DENSITY PER ASTM D-698



12 GA SOLID COPPER WITH THERMOPLASTIC (FOR NON-DIP PIPE)
INSULATION INSTALLED DIRECT BURIAL ON TOP OF PIPE. TRACER WIRE SHALL BE LAID FLAT AND AFFIXED TO THE PIPE AT 10 FOOT INTERVALS. REFER SECTION 5005 OF CITY OF LIBERTY SPECIFICATIONS

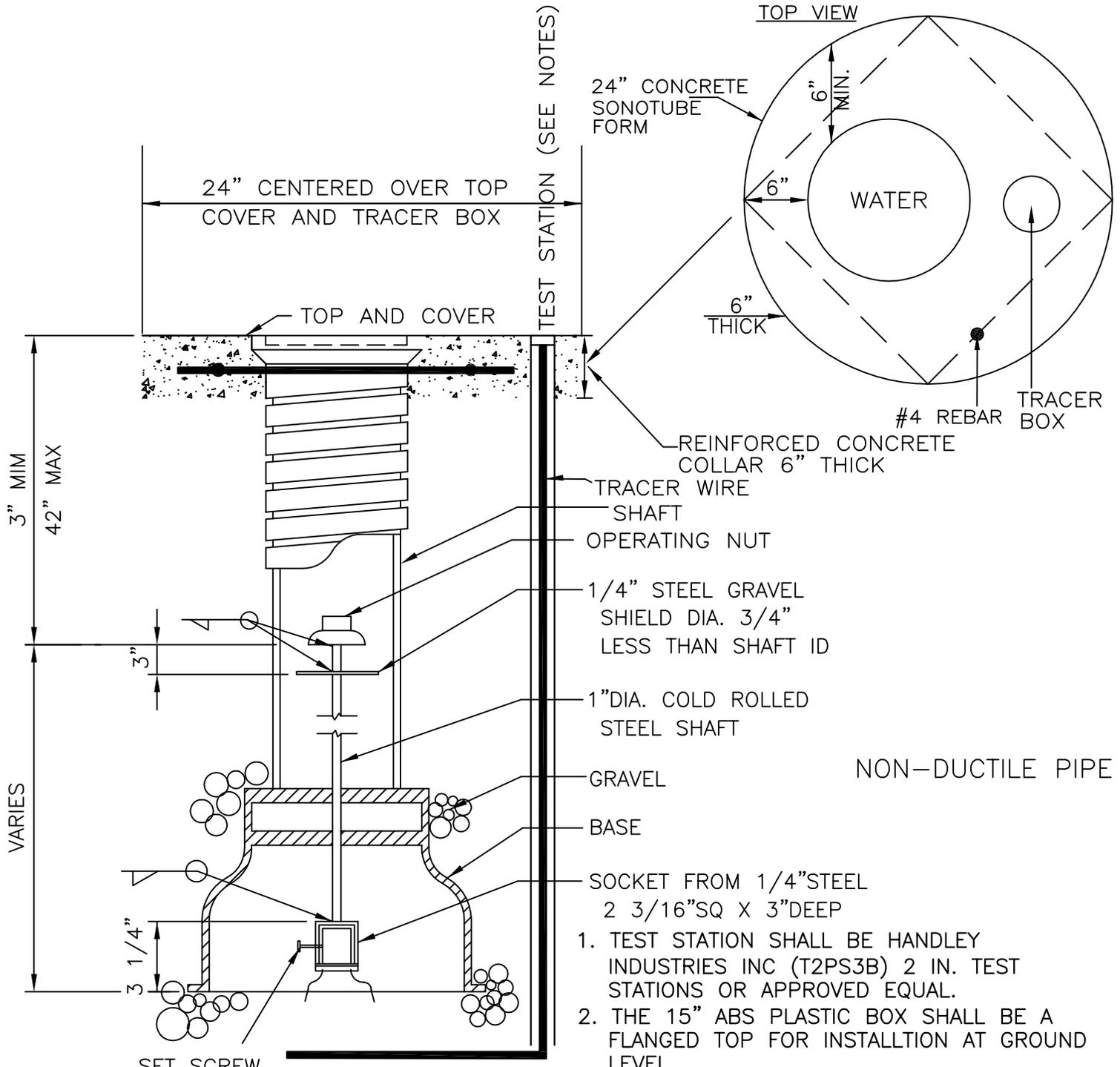
REV 2012



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

**EMBEDMENT
AND BACKFILL FOR
WATERMAINS**

D50-1



NOTE:
 SET STEEL POST 3'-0" ABOVE GRADE
 NEXT TO VALVE BOX LOCATION.
 POST TO REMAIN UNTIL FINAL GRADING
 AND SEEDING OR SOD IS IN PLACE.

1. TEST STATION SHALL BE HANDLEY INDUSTRIES INC (T2PS3B) 2 IN. TEST STATIONS OR APPROVED EQUAL.
2. THE 15" ABS PLASTIC BOX SHALL BE A FLANGED TOP FOR INSTALLTION AT GROUND LEVEL.
3. ALL TERMINALS ARE TO BE MADE OF SOLID BRASS.
4. CAST IRON LIDS SHALL BE COLOR BLUE AND MARKED "WATER".
5. TEST TERMINALS ARE TO BE INCORPORATED WITH HANDLEY VALVE BOXES.
6. BURY SPLICE SHALL BE 3M DIRECT BURY SPLICE (DBR) OR APPROVED EQUAL.
7. TEST STATIONS SHALL BE INSTALLED AT EACH FIRE HYDRANT VALVE LOCATION.
8. TRACER WIRE PIPE DETECTION SYSTEM SHALL BE PER SECTION 9100.

REV 2017



CITY OF LIBERTY, MO
 DEPARTMENT OF
 PUBLIC WORKS

SCREW SHAFT
 TYPE VALVE BOX
 PVC DETAIL

D50-2A

24" CONCRETE SONOTUBE FORM

TOP VIEW

6" THICK

WATER

#4 REBAR

24" CENTERED OVER TOP AND COVER

TOP AND COVER

REINFORCED CONCRETE COLLAR 6" THICK

SHAFT

OPERATING NUT

1/4" STEEL GRAVEL SHIELD DIA. 3/4" LESS THAN SHAFT ID

1" DIA. COLD ROLLED STEEL SHAFT

GRAVEL

BASE

SOCKET FROM 1/4" STEEL 2 3/16" SQ X 3" DEEP

SET SCREW (1/4" MACHINED BOLT)

3" MIN
42" MAX

VARIES

DUCTILE IRON PIPE

NOTE:

SET STEEL POST 3'-0" ABOVE GRADE
NEXT TO VALVE BOX LOCATION.
POST TO REMAIN UNTIL FINAL GRADING
AND SEEDING OR SOD IS IN PLACE.

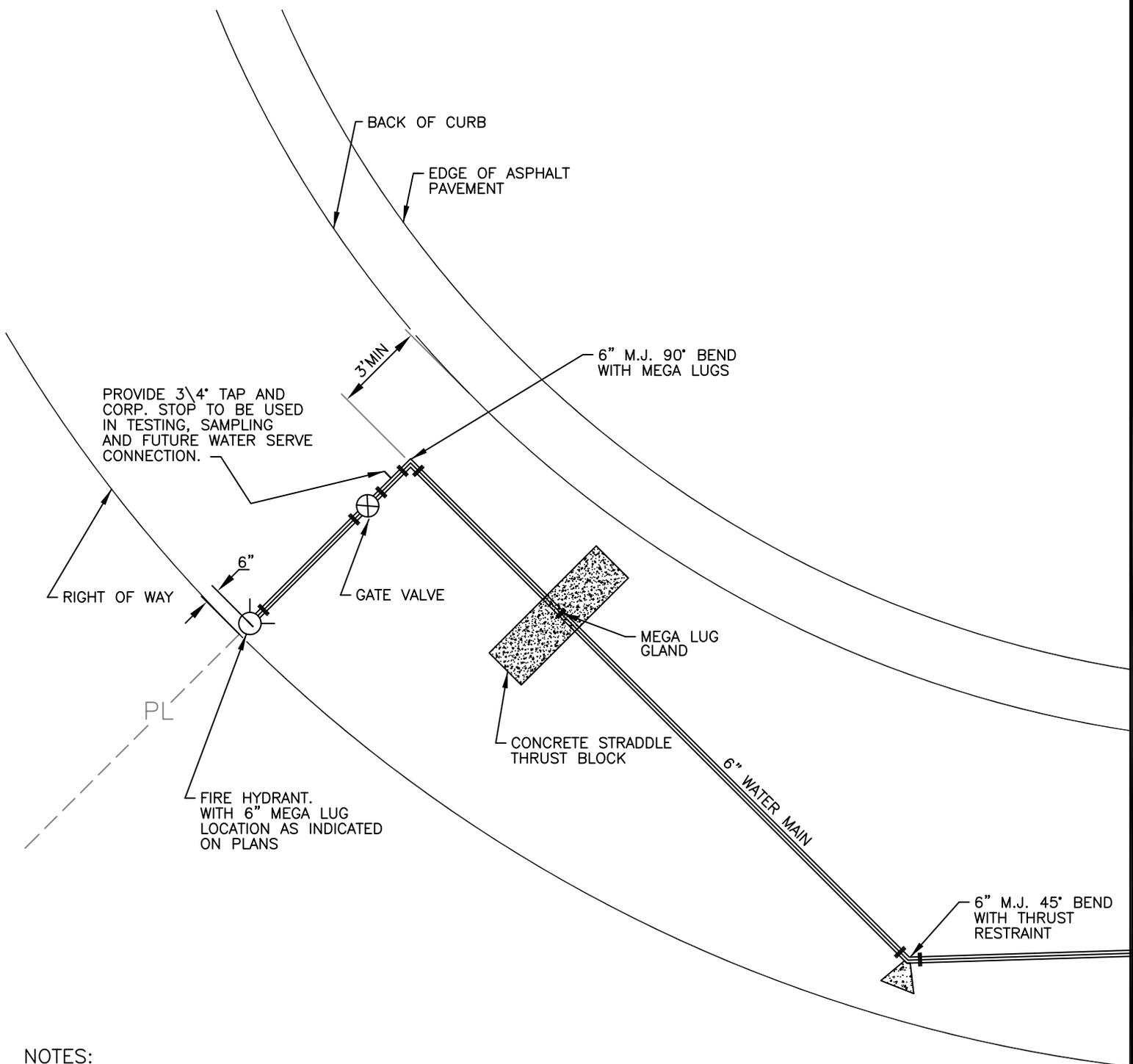
REV 2017



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

SCREW SHAFT
TYPE VALVE BOX
DIP DETAIL

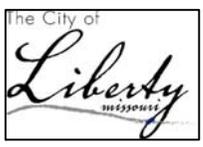
D50-2B



NOTES:

1. USE M.J. ANCHOR PIPE AND FITTINGS BEYOND THE STRADDLE BLOCK.
2. ALIGNMENT OF DIP WATER LINE AROUND CUL-DE-SAC VARIES TO MAINTAIN CLEARANCE FROM SANITARY SEWER.
3. MAIN TO BE EXTENDED TO INSURE DIP WATER LINE IS LOCATED ON PROPERTY LINE FOR FUTURE TAPPING PURPOSES.
4. ALL JOINTS TO BE RETAINED BY MEGALUG.

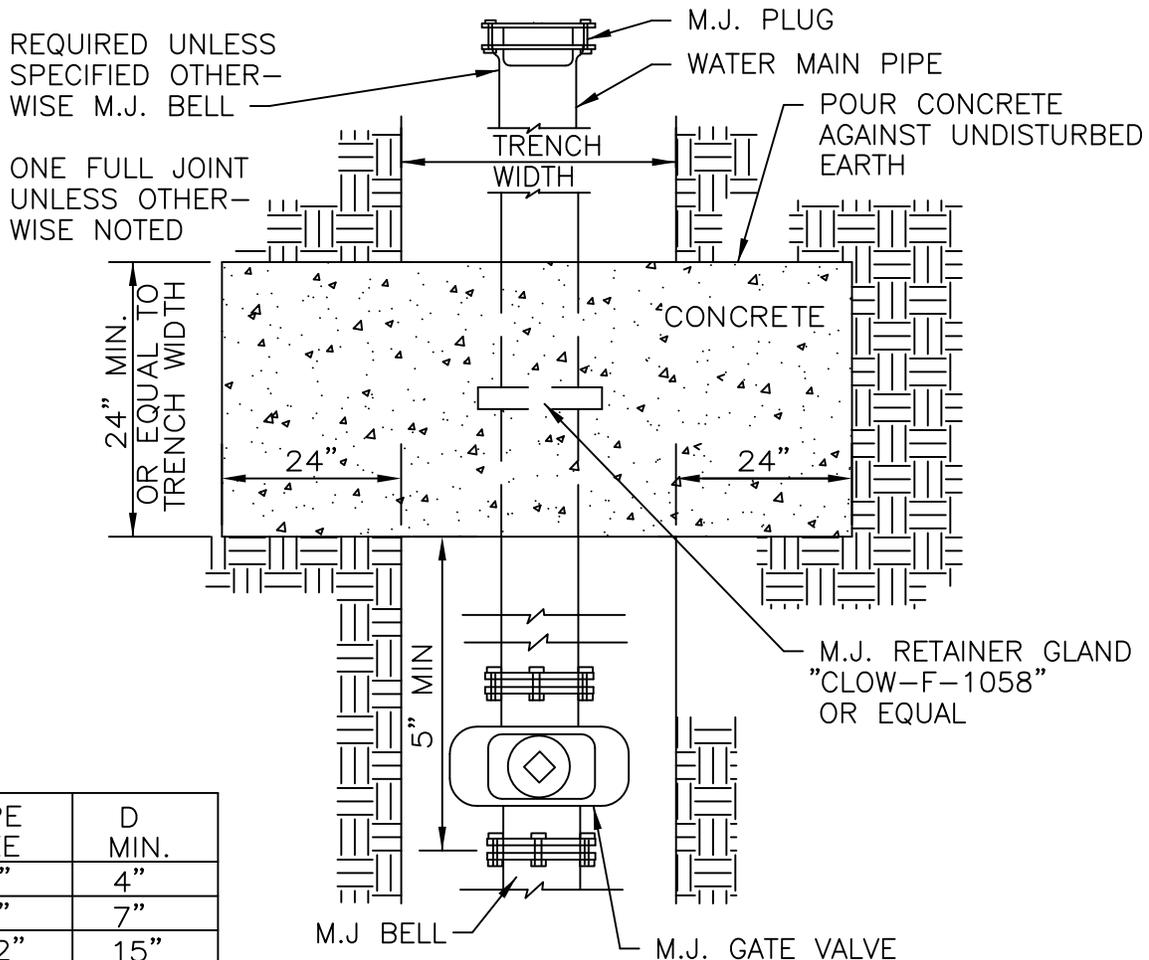
REV 2009



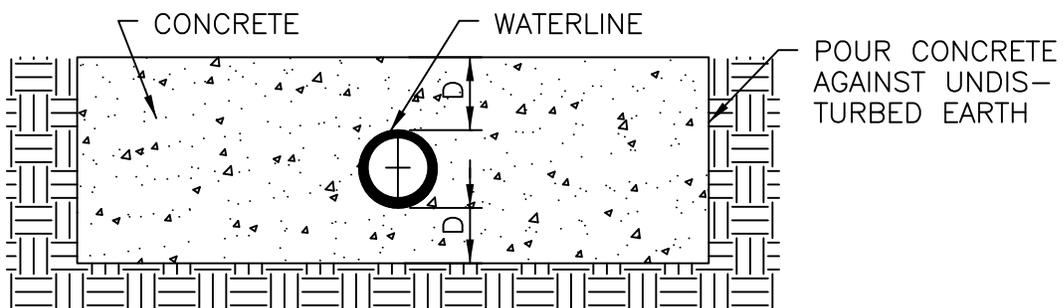
CITY OF LIBERTY, MO.
 DEPARTMENT OF
 PUBLIC WORKS

END OF LINE ON
 CUL-DE-SAC

D50-3

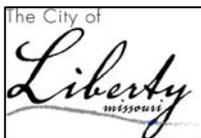


PIPE SIZE	D MIN.
6"	4"
8"	7"
12"	15"
16"	18"



DEAD END LINE ASSEMBLY

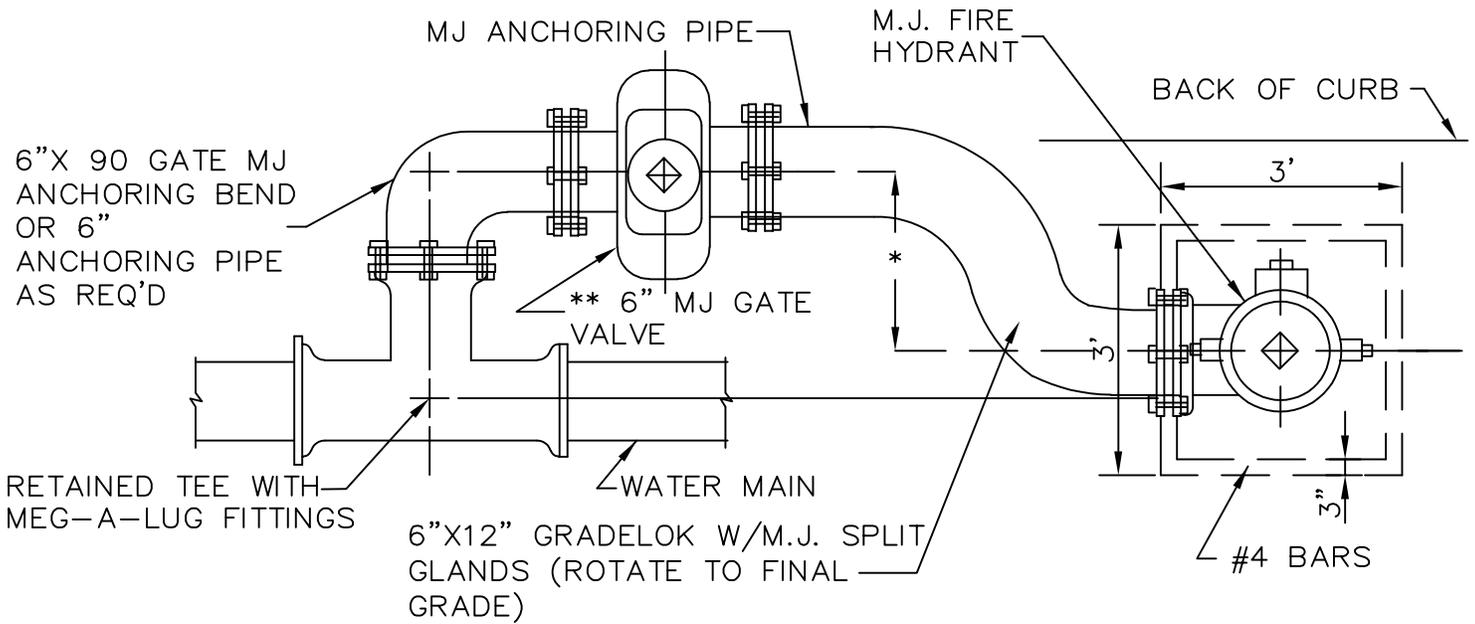
REV 2009



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

DEAD END
LINE ASSEMBLY

D50-4

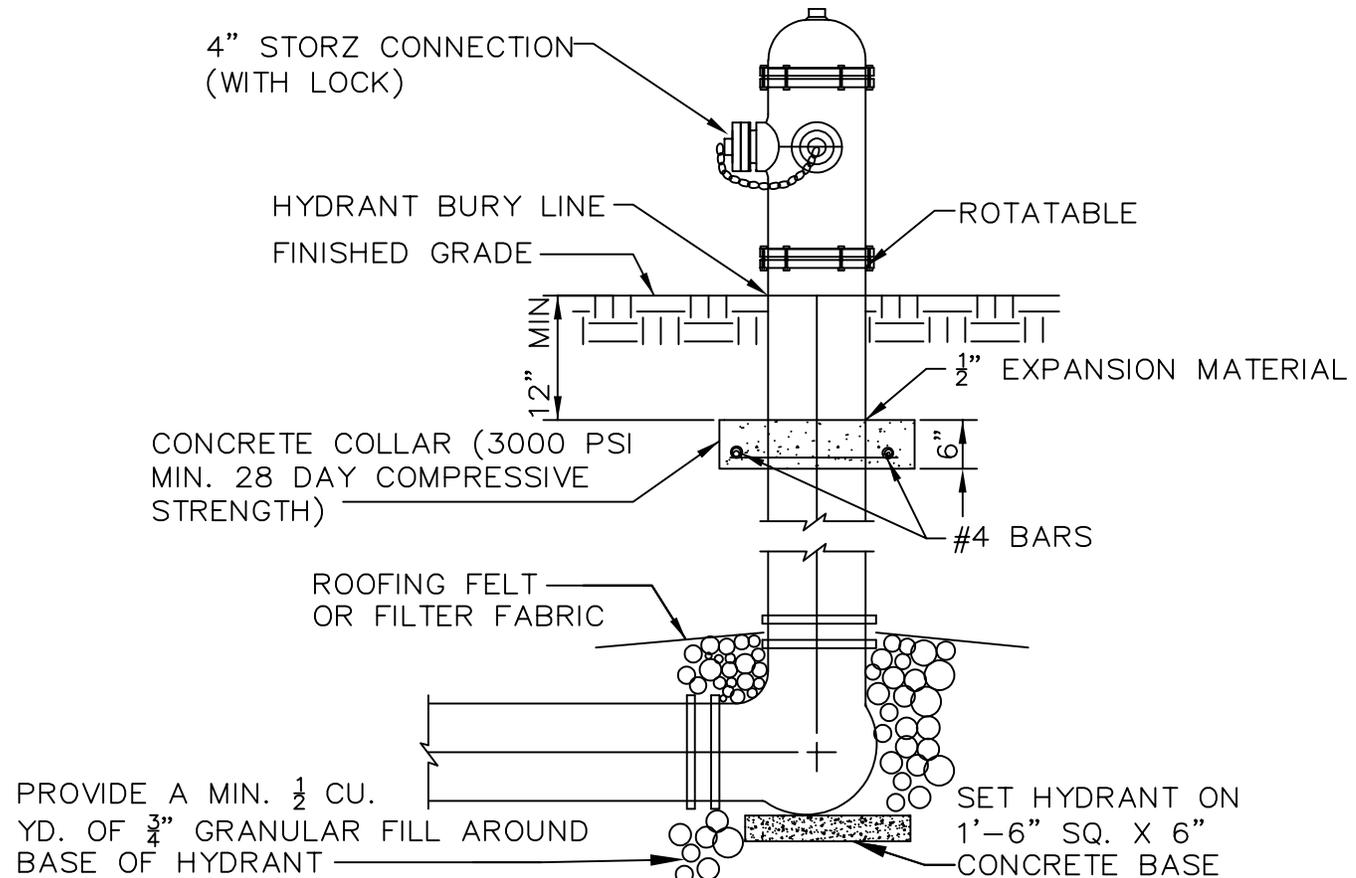


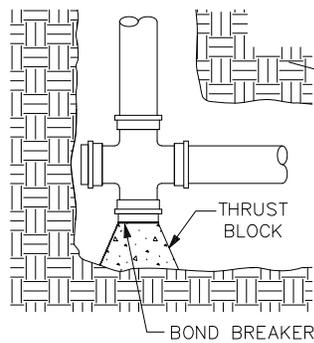
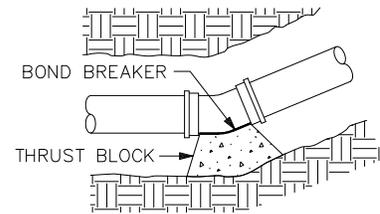
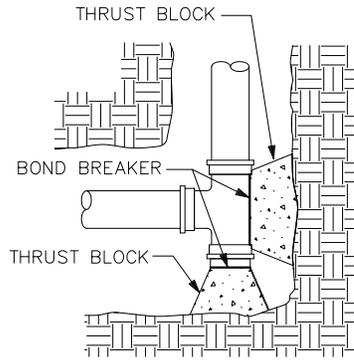
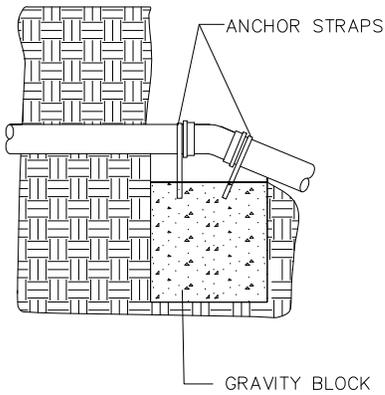
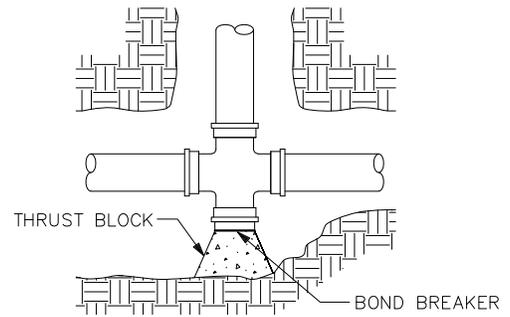
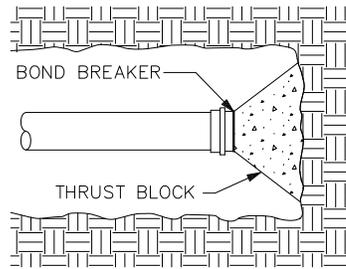
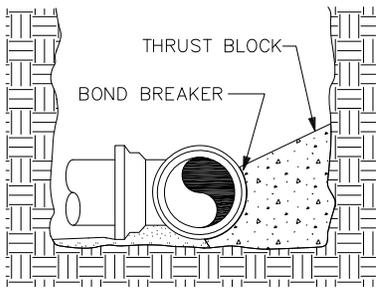
* SEE DETAIL 50-2A

* VARIES 6" TO 24" WITH OFFSET 18" STANDARD. ROTATE OFFSET TO ACCOMODATE ELEVATION.

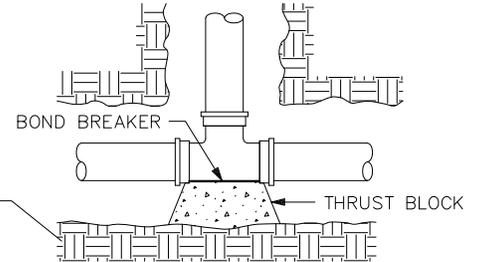
** NON-DUCTILE MAIN: TRACER WIRE PIPE DETECTION SYSTEM AND TEST STATION SHALL BE INSTALLED AT THE GATE VALVE PER DETAIL D50-2A AND SECTION 9100.

*** HYDRANT PAINT: SHERWIN WILLIAMS INDUSTRIAL YELLOW NO. B54-Y37





UNDISTURBED EARTH (TYPICAL)



Note Restrained joints may be used in lieu of blocking with prior approval of this Engineering Office.

SIZE OF PIPE	MINIMUM BEARING SURFACE (IN SQ. FT.)				TEE OR DEAD END
	B E N D S				
	11 1/4°	22 1/2°	45°	90°	
6"	1.00	1.25	2.25	4.50	3.00
8"	1.00	2.00	4.00	7.90	5.25
12"	2.00	4.25	8.25	18.00	11.00
16"	8.00	15.25	28.00	48.00	35.00
20"	8.50	16.50	32.00	57.00	40.00
24"	9.00	18.00	35.00	65.00	45.00

STANDARD CONCRETE THRUST BLOCKS
Not to Scale

SIZE OF PIPE	VOLUME IN CUBIC YARDS			
	B E N D S			
	11 1/4°	22 1/2°	45°	90°
4"	.16	.43	.90	1.35
6"	.16	.43	.90	1.35
8"	.30	.76	1.57	2.33
12"	.65	1.63	3.33	4.92
16"	1.16	2.85	5.80	8.56
20"	1.78	4.37	8.91	13.14
24"	2.47	6.17	12.63	18.64
30"	3.82	9.51	19.43	28.66

VOLUME OF GRAVITY BLOCK
Not to Scale

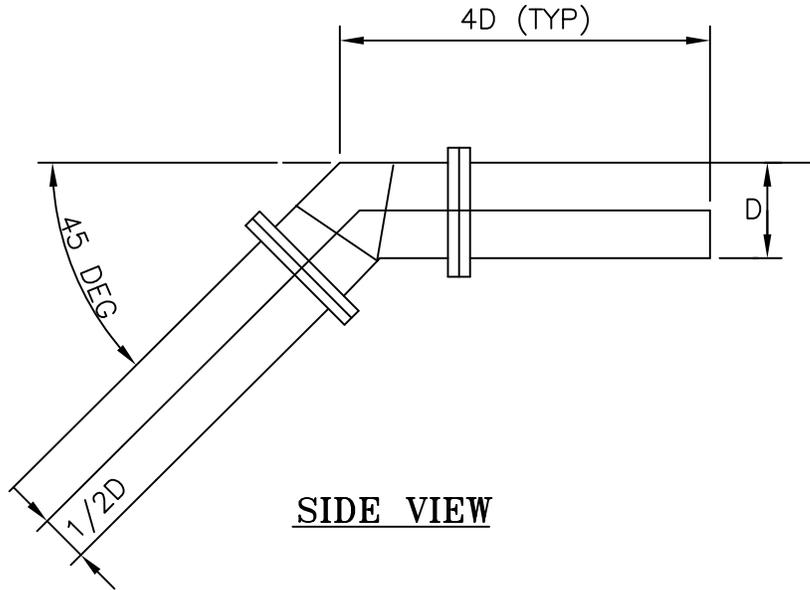
REV 2012



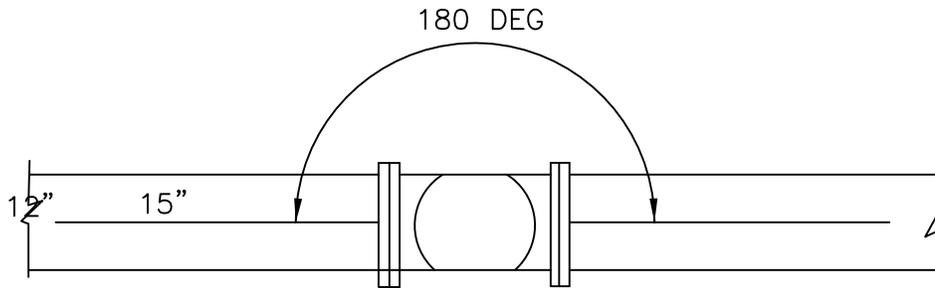
CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

THRUST
BLOCK
DETAIL

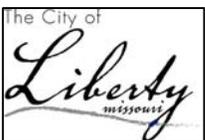
D50-7



NOTE: RETAINER GLANDS WILL BE USED
ON ALL VERTICAL BENDS.
ALL JOINTS WITHIN 120' OF A VERTICAL
BEND SHALL BE RESTRAINED TYPE



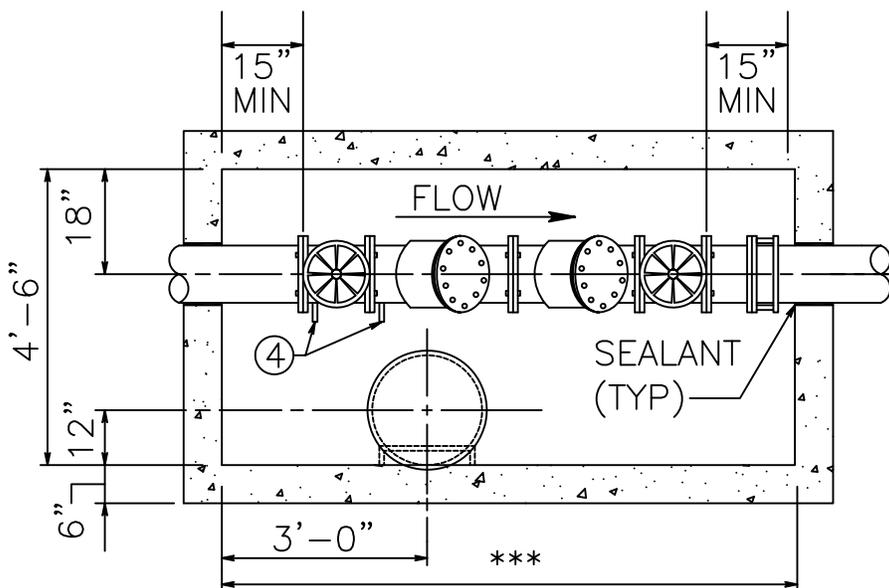
REV 2009



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

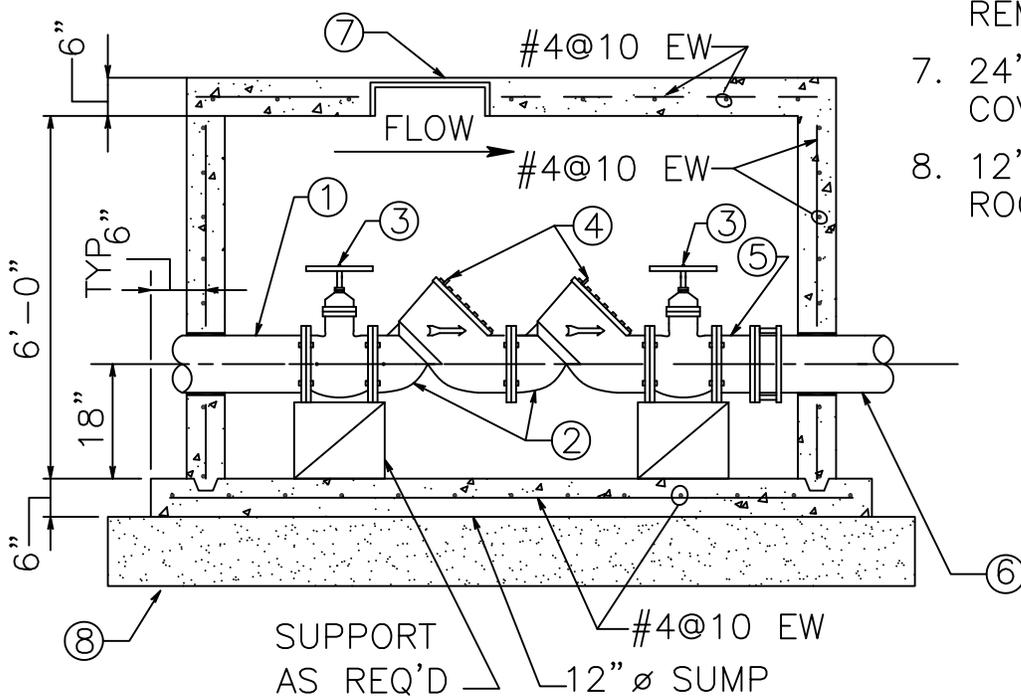
VERTICAL BEND
BLOCKING DETAIL

D50-8



LEGEND

1. PIPE SPOOL (FLANGE DUCTILE IRON PIPE).
2. APPROVED DOUBLE CHECK VALVE ASSEMBLY.
3. RESILIENT SEATED WHEEL GATE VALVE.
4. TEST COOKS (4 REQ'D WITH BRASS PLUGS)
5. STEEL FLANGED COUPLING ADAPTER.
6. PLAIN END DUCTILE IRON (ALLOW 1" GAP FOR ASSEMBLY REMOVAL).
7. 24" CLAY & BAILEY RING AND COVER #2213
8. 12" OF 1/2"-3/4" CRUSHED ROCK.



*** = 8'-0" (3", 4", & 6" WATERLINE)
 *** = 10'-0" (8" & 10" WATERLINE)

NOTES:

1. ALL BACKFLOW PREVENTATION ASSEMBLIES SHALL BE APPROVED BY THE CITY OF LIBERTY, BUILDING DEPARTMENT.
2. ALL BACKFLOW PREVENTATION ASSEMBLIES SHALL BE INSTALLED HORIZONTALLY
3. ALL FERROUS-BODIED BACKFLOW ASSEMBLIES SHALL BE FITTED WITH REPLACEABLE VALVE SEATS.

REV 2009



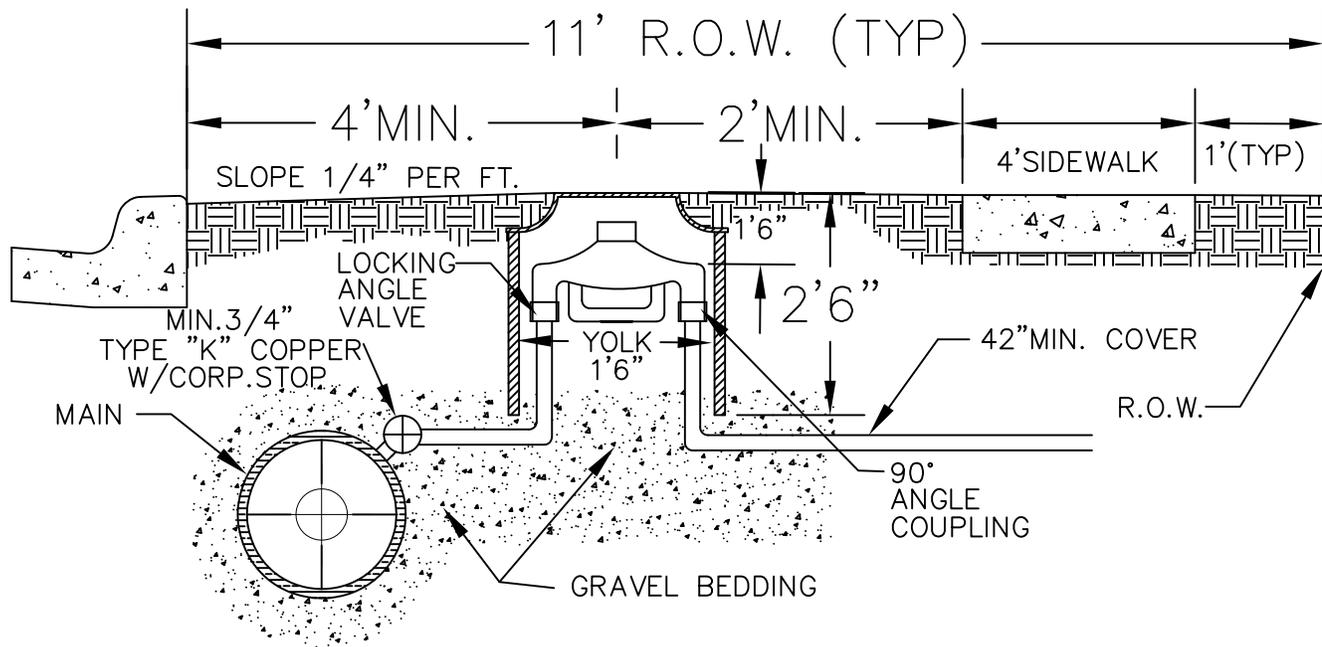
CITY OF LIBERTY, MO
 DEPARTMENT OF
 PUBLIC WORKS

BACKFLOW
 PREVENTATION ASSY
 AND VAULT

D50-9

NOTES:

1. Inspection by the City of Liberty Building Inspection Department is required.
2. No street cuts are to be done without prior notification and issuance of permits.
3. Alternate locations must have prior approval by the City Engineer.
4. Meter wells shall not be located in driveways, walkways or cast-in concrete without prior approval. Traffic model rings and lids shall be installed when required for these instances.
5. All meter wells shall be set plumb, backfilled and compacted with earth.
6. Each meter well shall be centered directly over the meter which it serves.
7. The top of the meter well cover shall be flush with the finished grade.
8. In cases where the sidewalk is located (or is to be located) adjacent to the curb, the centerline of the meter well shall be a minimum of 2' 0" from the back edge of the sidewalk.
9. The City of Liberty Utilities Maintenance Department (439-4763) requires 24 hours notice for scheduling of water tap.
10. First 3' of service line on customer side of meter coming out of meter pit must be Type "K" copper.



NOT TO SCALE

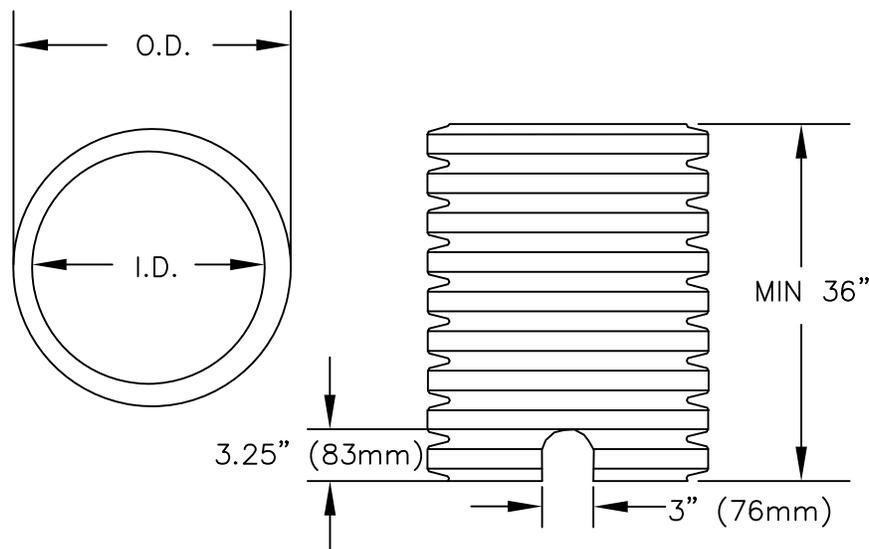
REV 2017



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

WATER METER WELL
INSTALLATION DETAIL

D50-10

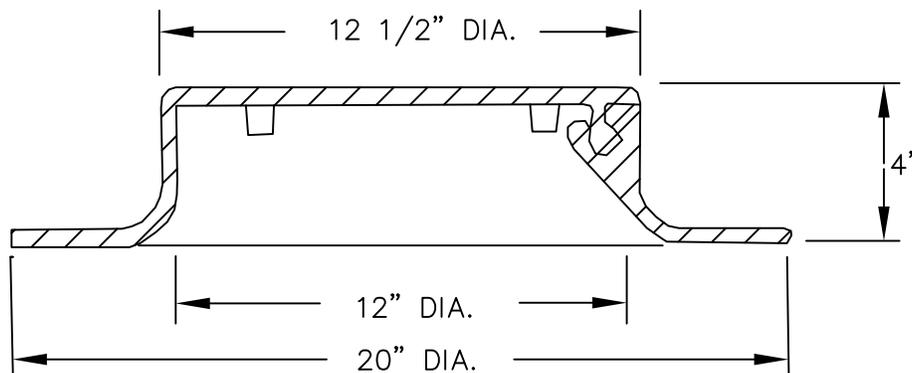


- * 18", 21" & 24" METER PIT FOR USE AS METER ENCLOSURES
- * ADS METER PITS SHALL BE WHITE IN COLOR. METER PITS SHOULD HAVE A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS.
- * BASED ON ASTM D2412 AT 5% DEFLECTION THE PIPE STIFFNESS FOR 18", 21" & 24" METER PITS SHALL BE 40 pii, 34 pii & 34 pii RESPECTIVELY.
- * THE PITS SHALL BE AVAILABLE IN A MINIMUM LENGTH OF 36"
- * METER PITS SHALL BE NOTCHED AT 0 AND 180 DEGREES AT THE BASE TO ACCOMMODATE INLET AND OUTLET PIPES.
- * MATERIAL – METER PITS SHALL BE HIGH DENSITY POLYETHYLENE CONFIRMING WITH THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 424420 B AS DEFINED AND DESCRIBED IN THE LATEST VERSION OF ASTM D3350.
- * INSTALLATION – SHALL BE IN ACCORDANCE WITH ADS INSTALLATION INSTRUCTIONS OR THOSE ISSUED BY REGIONAL, STATE OR LOCAL AGENCIES.

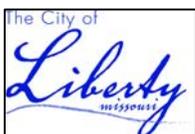
NOMINAL DIMENSIONS

- INNER DIAMETER (mm) 18", 21" & 24"
- OUTER DIAMETER (mm) 21.5", 25" & 28.4"

- * P2350 LID 21" (18" TILE) & 24" (21" TILE) P2355
- * LOCKING LIDS



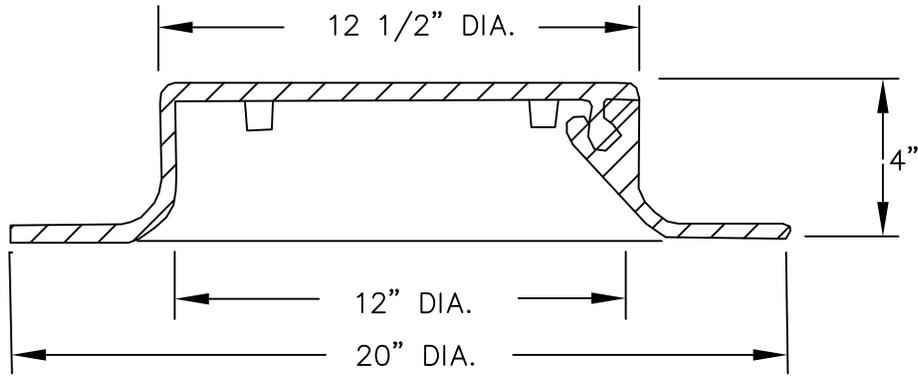
REV 2013



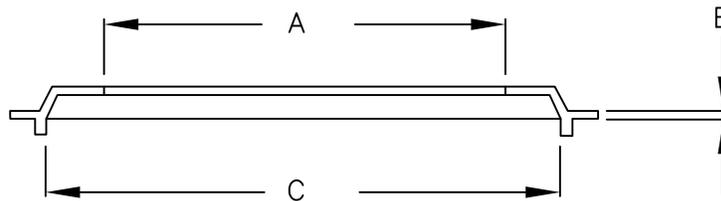
CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

WATER METER WELL
INSTALLATION DETAIL

D50-10A

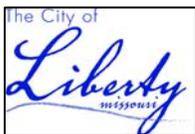


- * P2350 LID 21" (18" TILE) & 24" (21" TILE) P2355
- * LOCKING LIDS



		"A"	"B"	"C"	
2424	- 18" to 24" ADAPTOR for 24" Tile.....Wt.	17 1/2"	5/16"	25 7/8"	25 lbs
2436	- 18" to 36" ADAPTOR for 36" Tile.....Wt.	18 1/4"	3/4"	37 1/8"	110 lbs

REV 2013



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

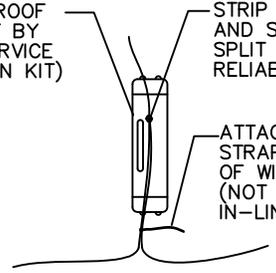
WATER METER WELL
INSTALLATION DETAIL

D50-10B

ENCASE SPLICE IN WATERPROOF SPLICING KIT. (SCOTCHCAST BY 3M - No. 3832 BURIED SERVICE WIRE SPLICE ENCAPSULATION KIT)

STRIP ENDS OF WIRE AND SPLICE W/ BRASS SPLIT BOLT - 8F BY RELIABLE OR EQUAL.

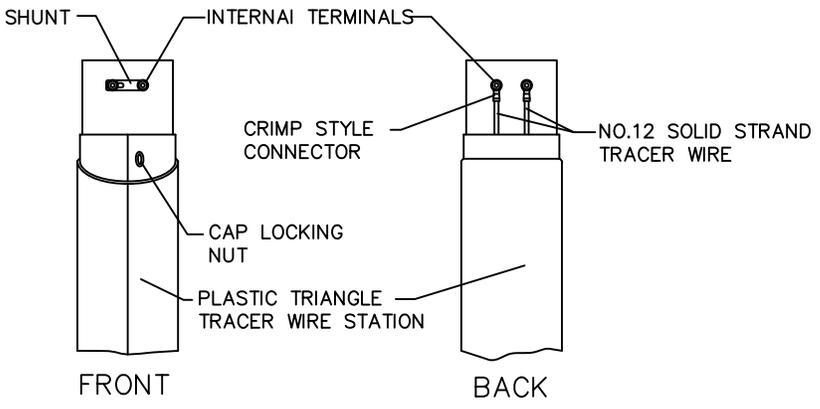
ATTACH PLASTIC TIE STRAP JUST OUTSIDE OF WIRE SPLICING KIT. (NOT REQUIRED ON IN-LINE SPLICES)



*SPLICES PERMITTED ONLY WITH APPROVAL OF ENGINEER

TRACER WIRE SPLICE DETAIL

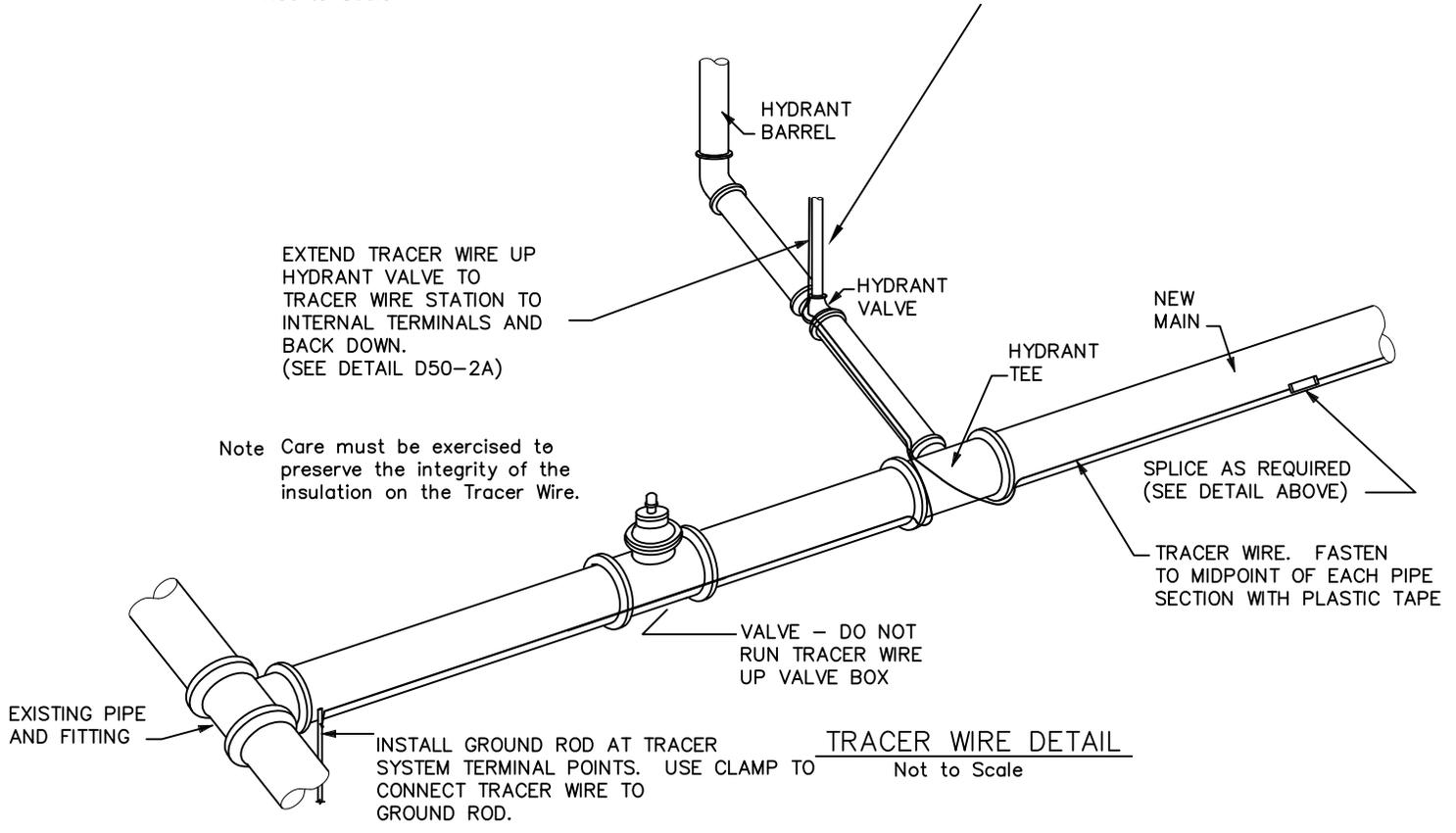
Not to Scale



TRACER WIRE RECEPTACLE DETAIL

Not to Scale

NOTE:
SET STEEL POST 3'-0" ABOVE GRADE NEXT TO HYDRANT VALVE LOCATION. POST TO REMAIN UNTIL FINAL GRADING AND SEEDING OR SOD IS IN PLACE.



EXTEND TRACER WIRE UP HYDRANT VALVE TO TRACER WIRE STATION TO INTERNAL TERMINALS AND BACK DOWN. (SEE DETAIL D50-2A)

Note Care must be exercised to preserve the integrity of the insulation on the Tracer Wire.

TRACER WIRE DETAIL

Not to Scale

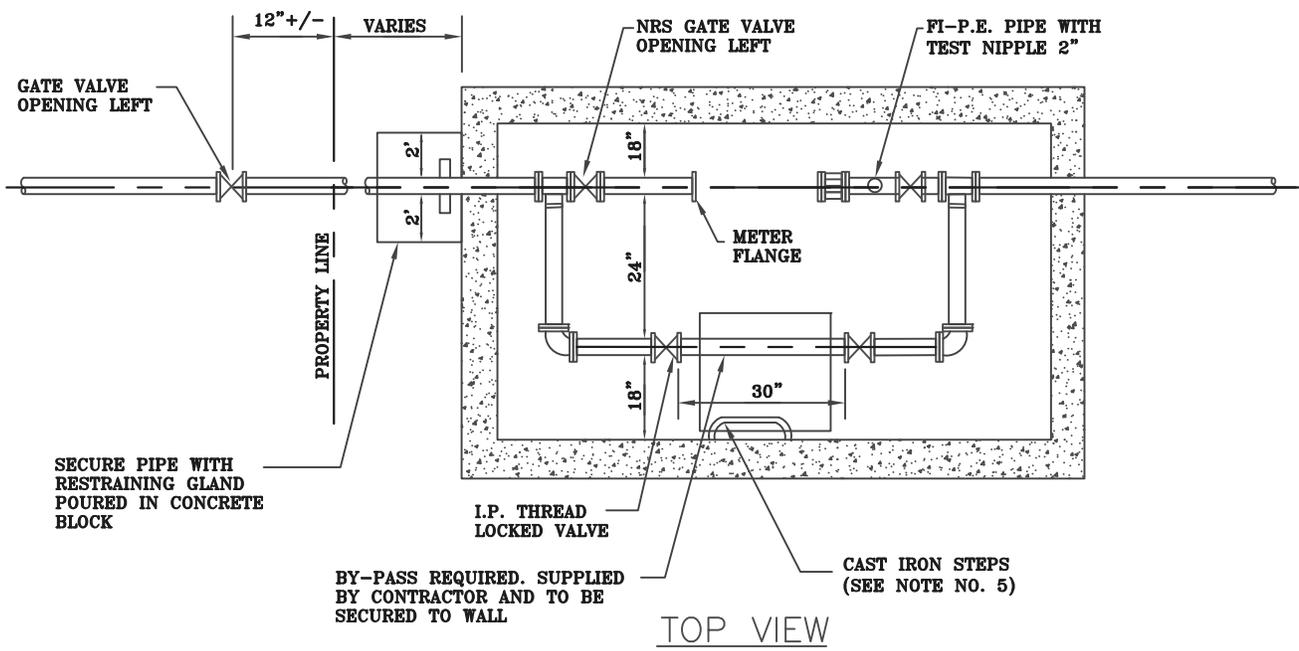
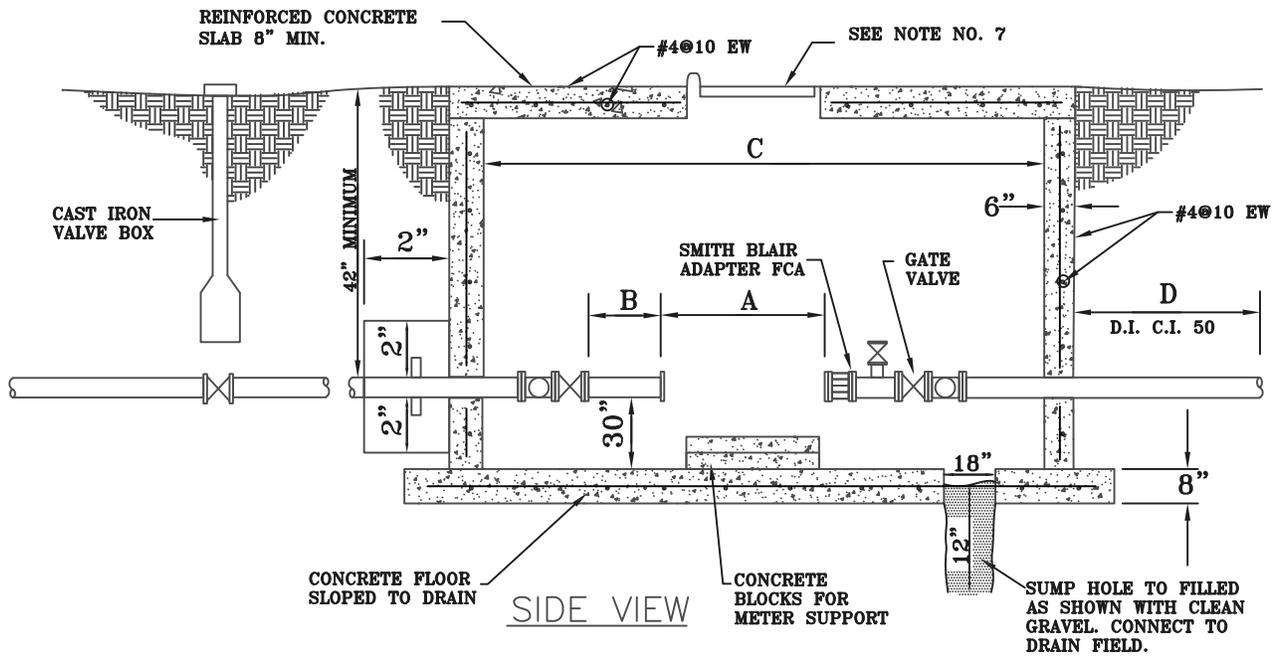
REV 2015



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

TRACER
WIRE
DETAIL

D50-11



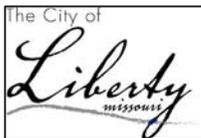
GENERAL RULES:

1. METER VAULT WALLS TO BE POURED CONCRETE, CONCRETE BLOCK OR PRECAST CONCRETE.
2. METER VAULT ROOF TO BE REINFORCED CONCRETE.
3. METER VAULT TO BE LOCATED, WHEN POSSIBLE, OUTSIDE TRAFFIC AREA AND WHERE SURFACE WATER WILL NOT DRAIN INTO IT. VAULT MUST BE KEPT FREE OF WATER.
4. DUCTILE IRON CLASS 50.
5. CAST IRON STEPS CLAY & BAILEY 2104 OR APPROVED EQUAL TO BE ON 16" CENTERS.
6. FLANGED VALVES ON EACH SIDE OF METER MUST BE ADEQUATELY SECURED TO WITHSTAND WATER THRUST WITH METER REMOVED.
7. IN TRAFFIC: CLAY & BAILEY 2215, RING, INNER LID (WITH HANDLE) AND OUTER LID OR APPROVED EQUAL.
NON TRAFFIC: BILCO "K-1" SINGLE LEAVE ALUMINUM, CLAY & BAILEY 2213 OR APPROVED EQUAL.
8. CONCRETE FLOOR REQUIRED. SLOPE TO DRAIN.
9. CONTACT THE BUILDING INSPECTION DEPARTMENT (816-439-4541) BEFORE INSTALLING THE VAULT.

METER SIZE	A	B	C	D	BY-PASS (*)
4"	23-3/4"	33"	157"	72"	2"
6"	27-3/4"	41"	191"	72"	3"

(* IF HIGH CONTINUOUS RATE OF FLOW IS REQUIRED. A LARGER BY-PASS MAY BE PERMITTED, BUT NOT LARGER THAN DOMESTIC SERVICE.

REV 2019



CITY OF LIBERTY, MO
DEPARTMENT OF
PUBLIC WORKS

WATER METER VAULT
FOR 3"-6" SERVICE
LINES

D50-12