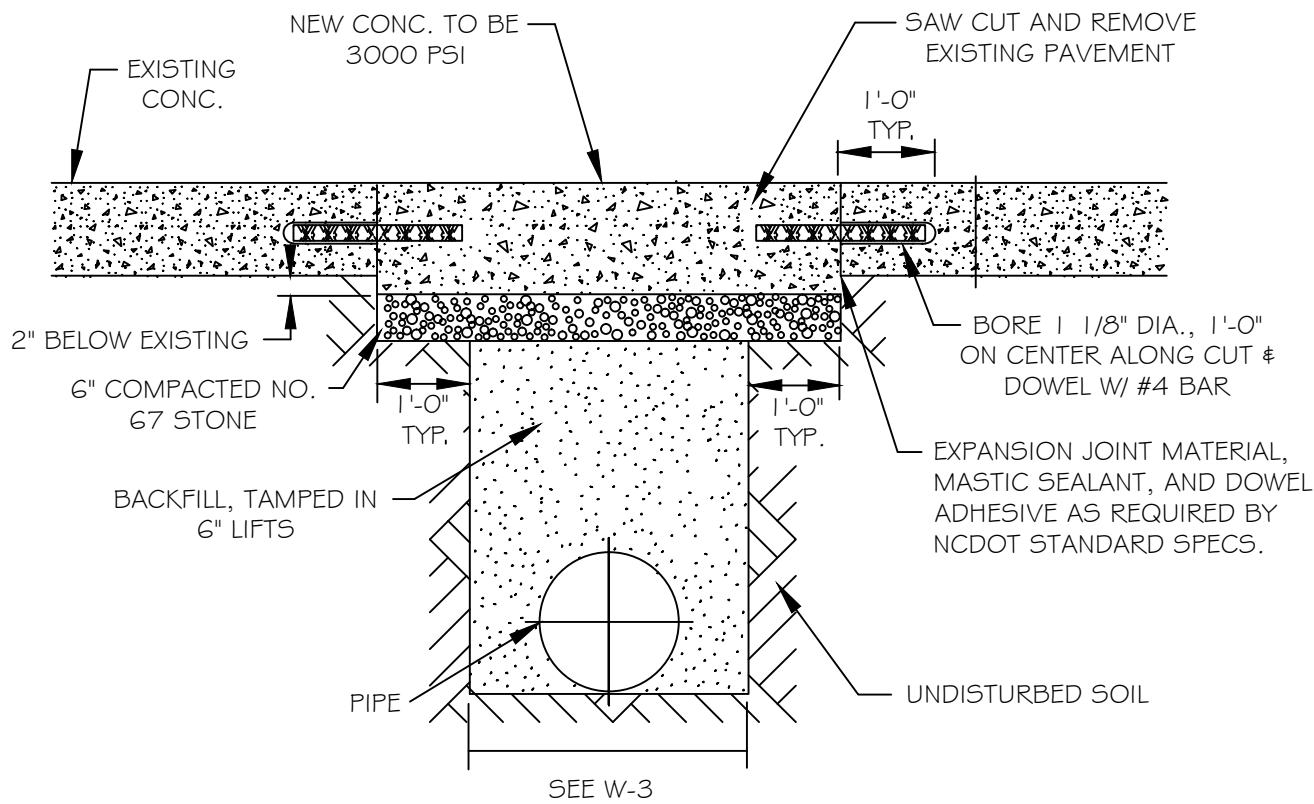


## Standard Water Detail Drawings

- W-1 Standard Concrete Payment Patch
- W-2 Standard Asphalt Pavement Patch
- W-3 Trench Bottom Dimensions & Backfilling Requirements for Ductile Iron Pipe
- W-4 Standard Fire Hydrant Installation (restrained joint)
- W-4a Standard Fire Hydrant Installation (rodding)
- W-5 Standard Fire Hydrant with 5" Storz Pumper Nozzle
- W-6 Hydrant Operating Nut and 2 ½ " Outlet Threads
- W-7 Thrust Blocking Design Data for Water Mains
- W-8 Standard Thrust Block Installation for Valves and Dead End Mains
- W-9 Standard Thrust Blocking Views
- W-10 Thrust Blocking Design Quantity Table
- W-11 Thrust Blocking Design Quantity Table
- W-12 Standard Vertical Bend
- W-13 Standard Main & Valve Markers for Potable & Reuse Water Easements
- W-14 Standard Tapping Sleeve & Valve Assembly (4"-24")
- W-15 Restrained Tee and Valve Installation on Dead Lines (4"-24")
- W-16 Butterfly Valve Manhole (16" & Larger Mains)
- W-17 Valve Box Installation and Extension
- W-18 5 ¼ " Valve Box Drop Lid with 4" Skirt
- W-19 Standard Water Air Release Valve
- W-20 Standard Manhole Cover
- W-21 Temporary Water Main Blow Off Assembly
- W-22 Permanent Water Main Blow Off Assembly
- W-23 Standard ¾" & 1" Water Service Installation
- W-24 Single Family, Residential, New Construction Back flow Prevention/Meter Assembly Installation

## Standard Water Detail Drawings

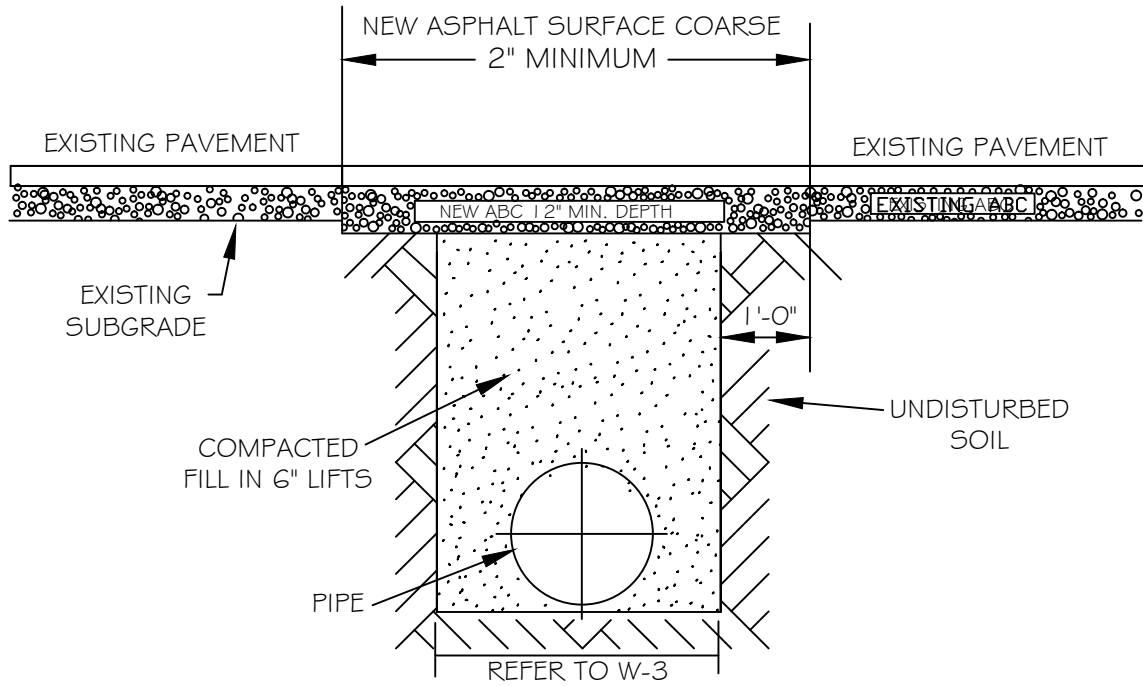
- W-25 Water Meter Box Detail
- W-26 Standard Gang Meter Assembly
- W-27 Gang Meter Addressing Single Story Building
- W-28 Gang Meter Addressing Multi-Story Building
- W-29 Typical 4"-8" Domestic Water Meter Bypass Installation
- W-30 Typical 6"-10" Fire Service & Domestic Service w/ Bypass
- W-31 Typical 1 ½ "- 2" Water Meter Box Installation
- W-32 Typical 4" Water Meter Vault
- W-33 Typical 6" thru 10" Water Meter Vault
- W-34 Fire, Domestic & Irrigation Options Schematic
- W-35 Irrigation Tap on New and Existing Services
- W-35T Termination of Irrigation Meter
- W-36 Reduced Pressure Backflow Preventer
- W-37 Typical Fire Main Double Detector Check Valve Assembly
- W-38 Standard Double Check Valve Assembly
- W-39 Below Ground DDCV & DCV
- W-40 Pipe Alignment Guides (Spiders)
- W-41 Concrete Cradle Protection for Water Line Crossings



- NOTES:
1. SEE CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING W-3 FOR ADDITIONAL DETAILS
  2. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.
  3. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROVED SAW CUT MACHINE.
  4. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT. 5. THE FINAL 6" OF FILL SHALL CONSIST OF ABC MATERAIL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT .

CITY OF RALEIGH  
 DEPARTMENT OF PUBLIC UTILITIES  
 STANDARD CONCRETE  
 PAVEMENT PATCH DETAIL

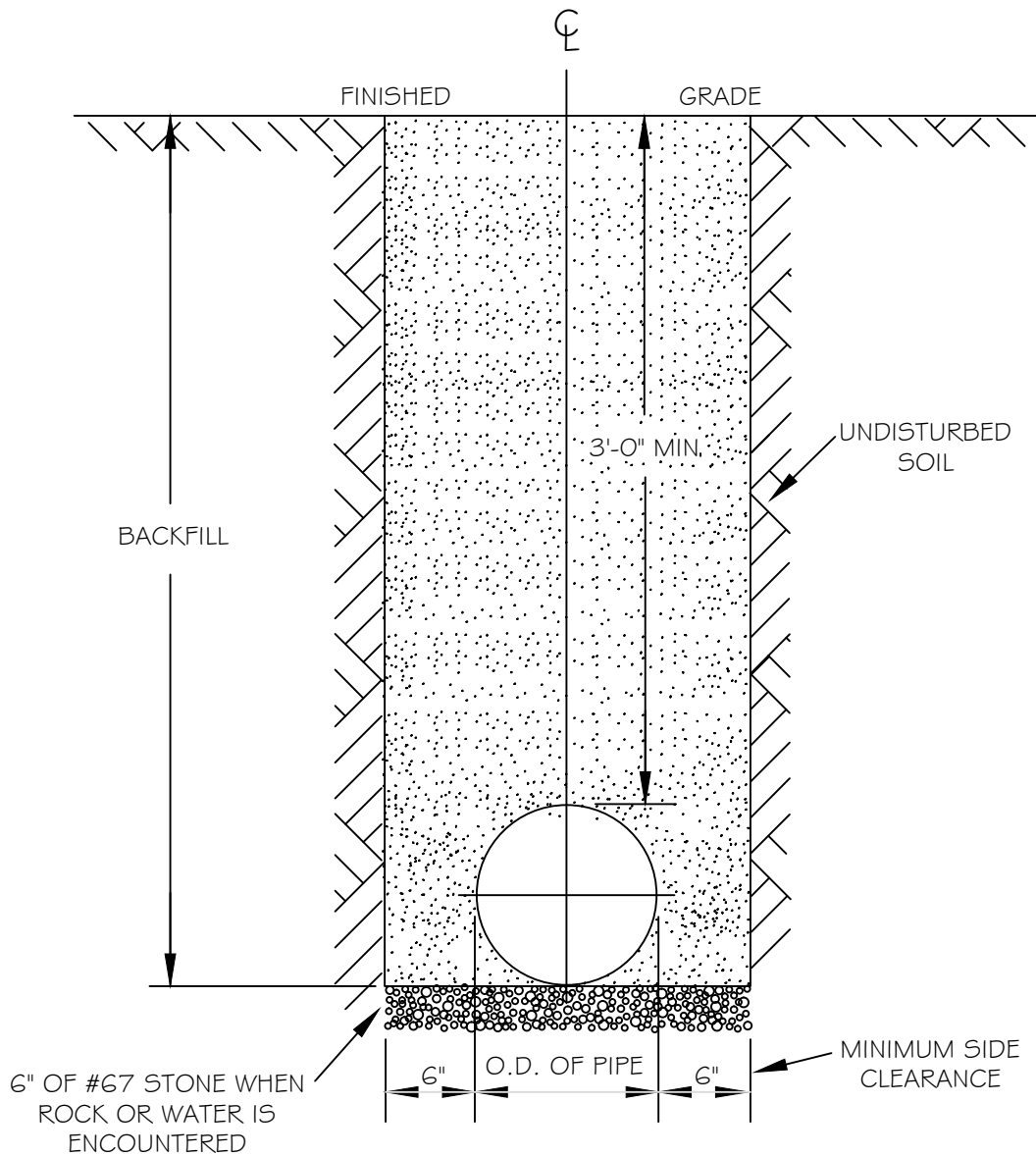
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-1	RRH	3-31-00	A.B.B.	10-29-10
	A.B.B.	2-8-05	MAB	10-31-13



NOTES:

1. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROPRIATE SAW CUT MACHINE.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
3. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT.
4. THE ENTIRE THICKNESS/ VERTICAL EDGE OF CUT SHALL BE TACKED.
5. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 2" THICK.
6. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH LEVEL PATCH.
7. REFER TO CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING, W-3. FOR ADDITIONAL DETAILS.
8. NO HAND PATCHING ALLOWED.
9. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD ASPHALT PAVEMENT PATCH DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-2	RRH	3-31-00	A.B.B.	4-16-04
	D.W.C.	11-1-99	J.P.S.	10-29-10

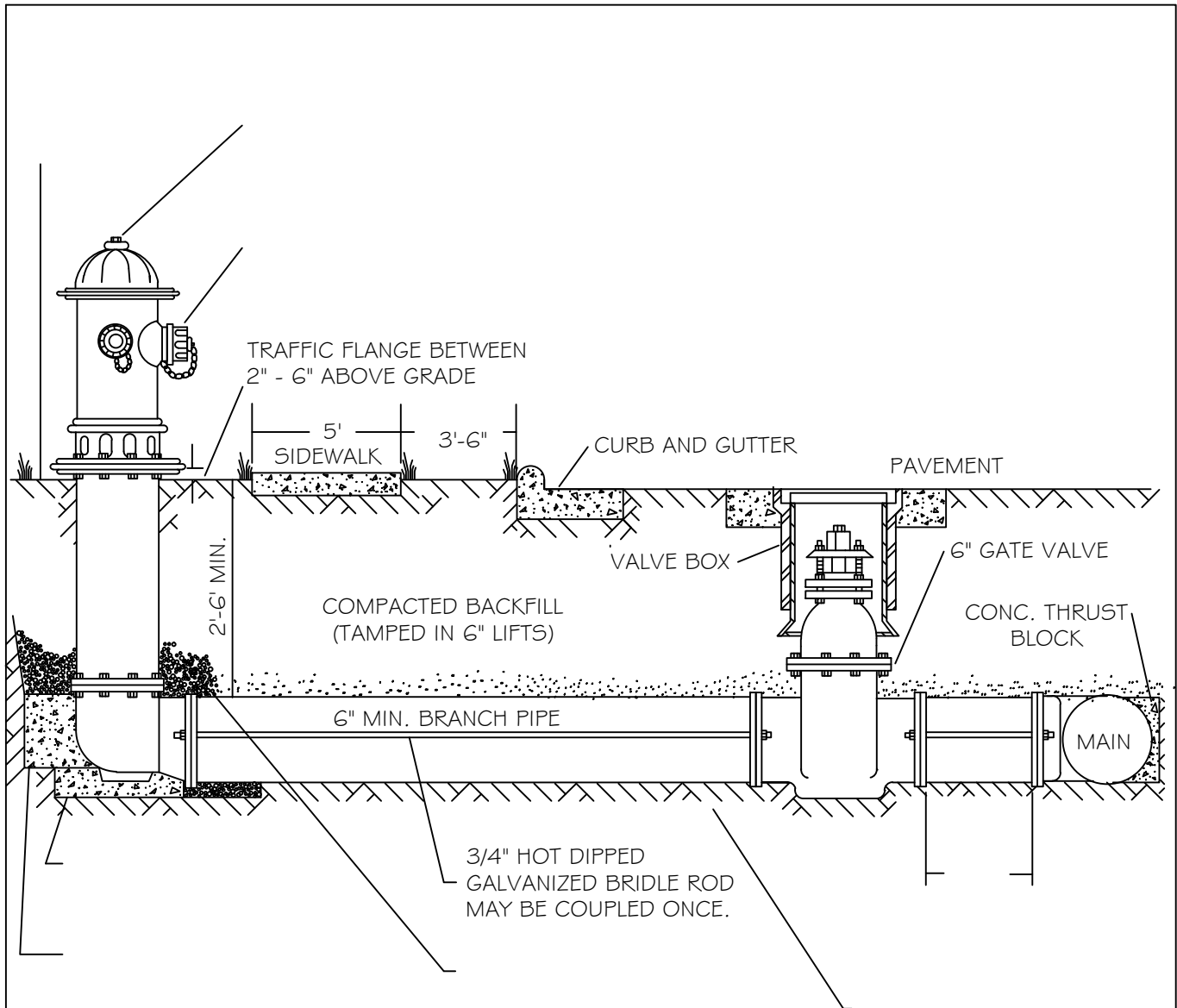


NOTES:

1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS.
5. ACHIEVE 95% COMPACTION IN BACKFILL.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR DUCTILE IRON				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-3	D.W.C.	9-3-99	ABB	2-15-05
	RRH	3-31-00	J.P.S.	10-29-10



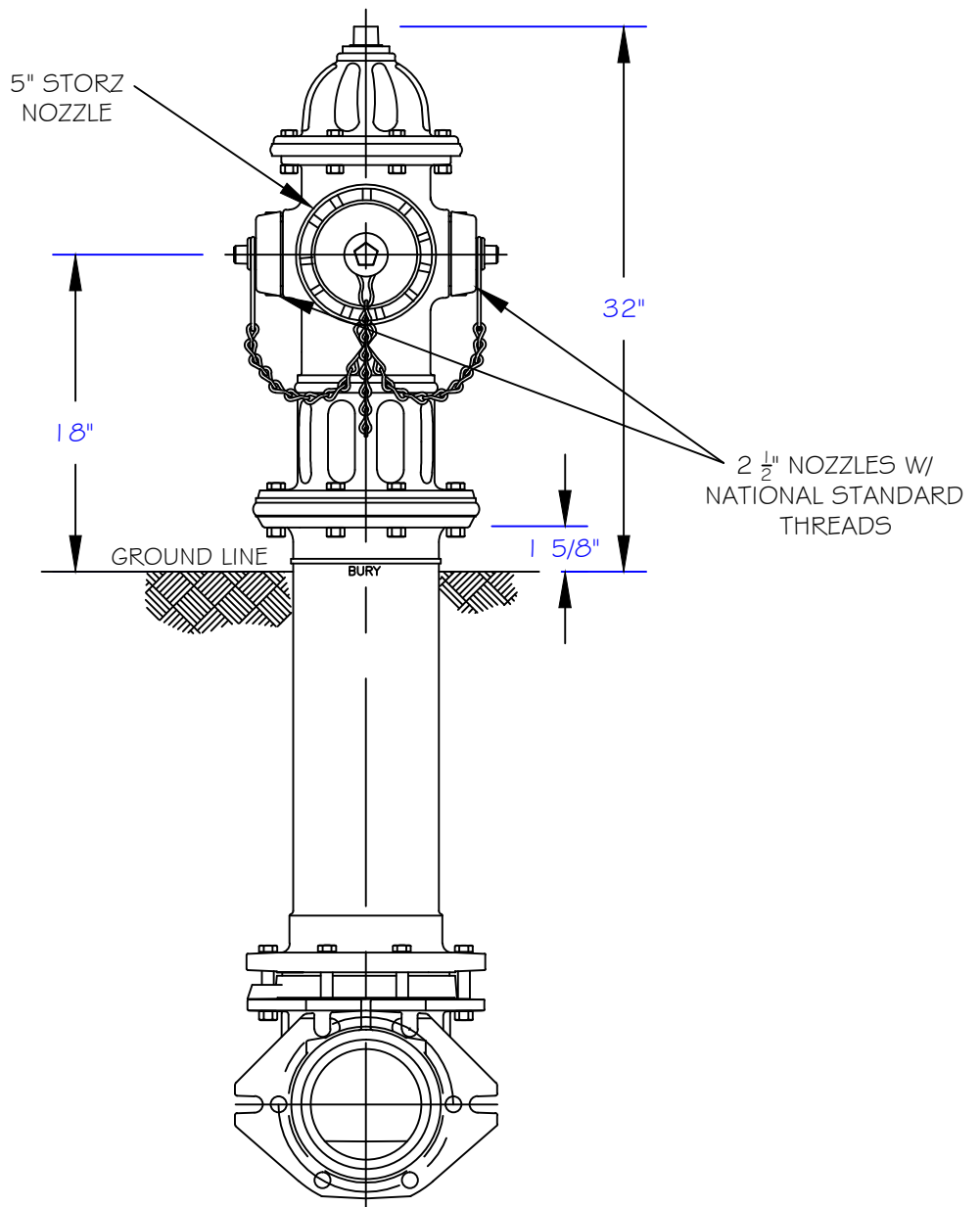


NOTES:

1. FIRE HYDRANT SHALL BE AS MANUFACTURED: MUELLER, AMERICAN DARLING, KENNEDY, M#H, WATEROUS, CLOW, EAST JORDAN IRON WORKS, OR US PIPE.
2. BRANCH PIPE SHALL BE DUCTILE IRON AWWA C150-96
3. 6" GATE VALVE SHALL BE AWWA C500-86 OPEN LEFT
4. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED
5. FIRE HYDRANTS WILL BE INSTALLED IN TRUE VERTICAL POSITION  
RODS SHALL NOT BE COUPLED MORE THAN ONCE. IF THE LENGTH FROM THE VALVE TO THE HYDRANT EXCEEDS 20' THEN A MECHANICAL RESTRAINING GLAND WITH A REBAR CAGE SHALL BE INSTALLED NO MORE THAN 10' FROM HYDRANT AND POURED IN CONCRETE.  
FIRE HYDRANTS TO BE LOCATED IN ROW OR 2 FOOT EASEMENT ADJACENT TO ROW

ANYTIME SITE WORK, CONSTRUCTION, ROAD WORK, OR ANY OTHER WORK CHANGES THE GRADE OF THE FIRE HYDRANT, THE PERSON RESPONSIBLE FOR THE WORK IS RESPONSIBLE FOR ADJUSTING THE FIRE HYDRANT TO STAY WITHIN COMPLIANCE.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD FIRE HYDRANT INSTALLATION DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-4a	ABB	4-6-04		

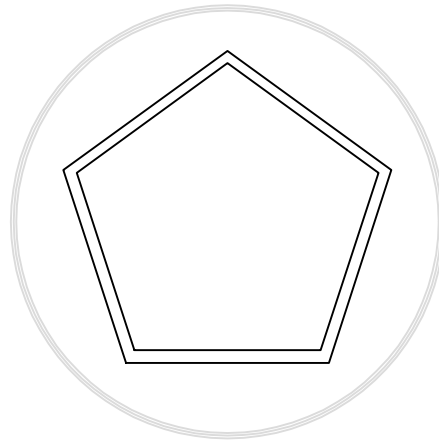


NOTES:

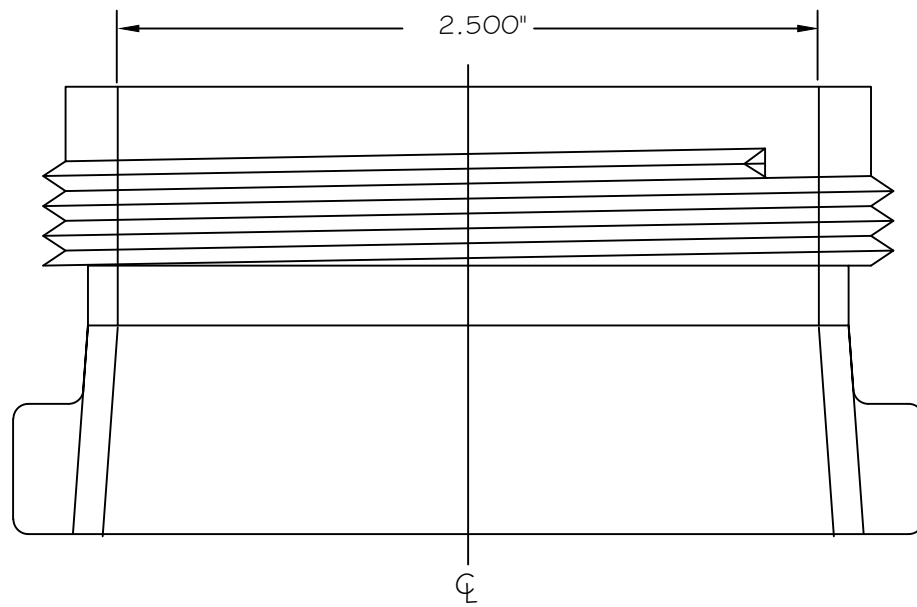
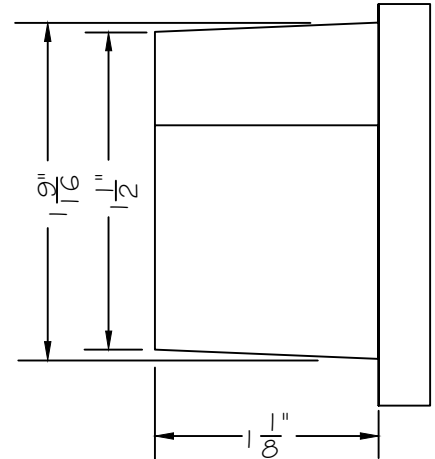
1. RALEIGH PUBLIC HYDRANTS SHALL BE PAINTED SOLID RED.
2. KNIGHTDALE, & ROLESVILLE PUBLIC HYDRANTS SHALL BE PAINTED RED W/SILVER OPERATING NUTS.
3. ZEBULON PUBLIC HYDRANTS SHALL BE PAINTED RED W/ SILVER BONNETS AND OPERATING NUTS.
4. WAKE FOREST AND GARNER, AND WENDELL PUBLIC AND PRIVATE HYDRANTS TO BE PAINTED SAFETY YELLOW W/SILVER CAPS AND OPERATING NUTS.
5. OPERATING NUTS ON HYDRANTS CONNECTED TO PUBLIC MAINS LARGER THAN 12" SHALL BE PAINTED BLACK.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
RALEIGH, GARNER, KNIGHTDALE, ROLESVILLE, WAKE FOREST, WENDELL & ZEBULON				
STANDARD FIRE HYDRANT WITH 5" STORZ PUMPER NOZZLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-5		3-1-87	ABB	7-21-05
	RRH	3-31-00	DHL	2-18-08



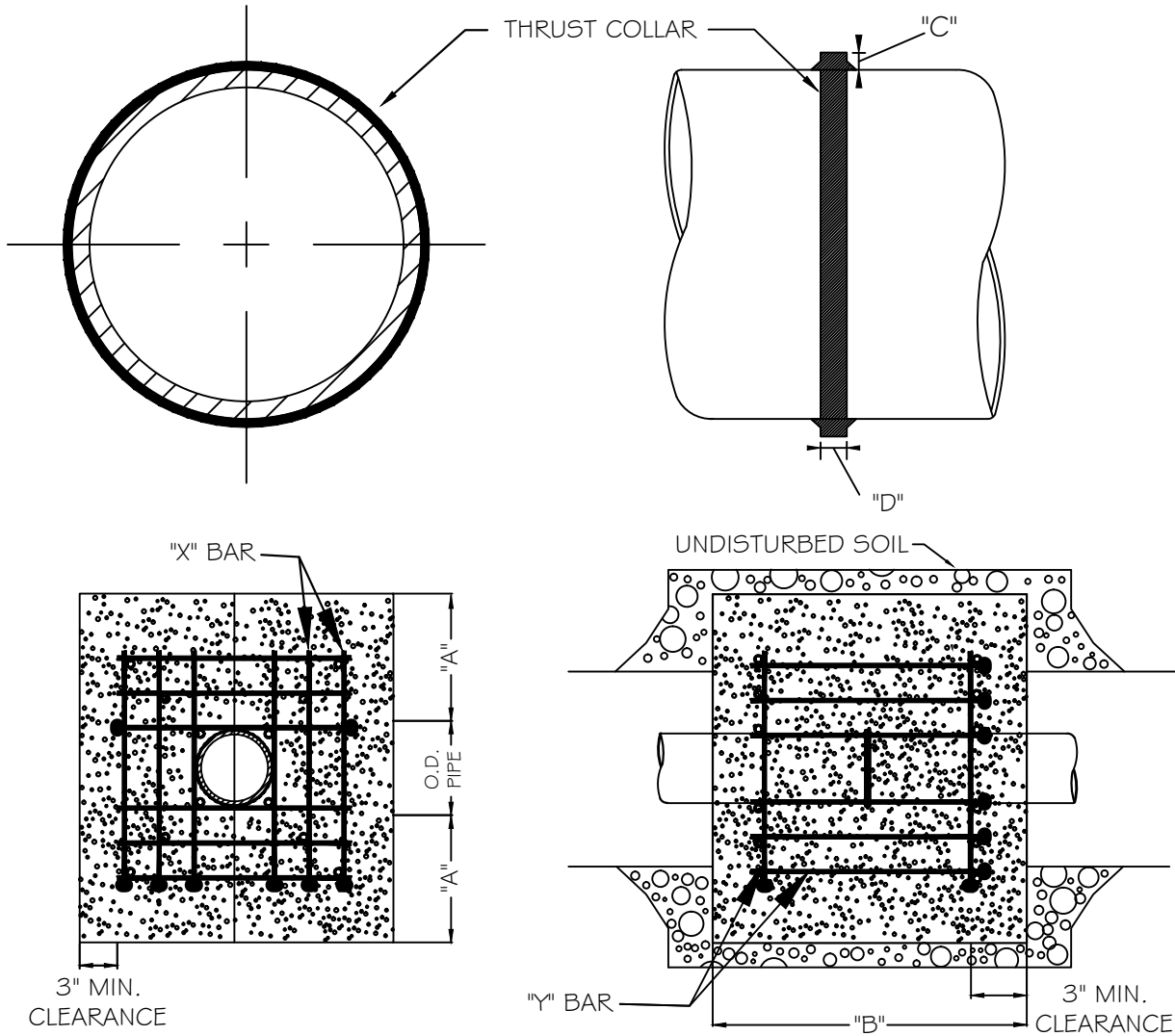


1 9/16" OPERATION NUT



2 1/2" NATIONAL STANDARD  
OUTLET THREADS

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
HYDRANT OPERATING NUT AND 2 1/2" OUTLET THREADS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-6	RRH	3-31-00	DHL	2-18-08
	A.B.B	4-13-04	J.P.S	11-1-10



REINFORCING REQUIREMENTS

I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" - 36"	#5	2'-2"+ O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0"+ O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

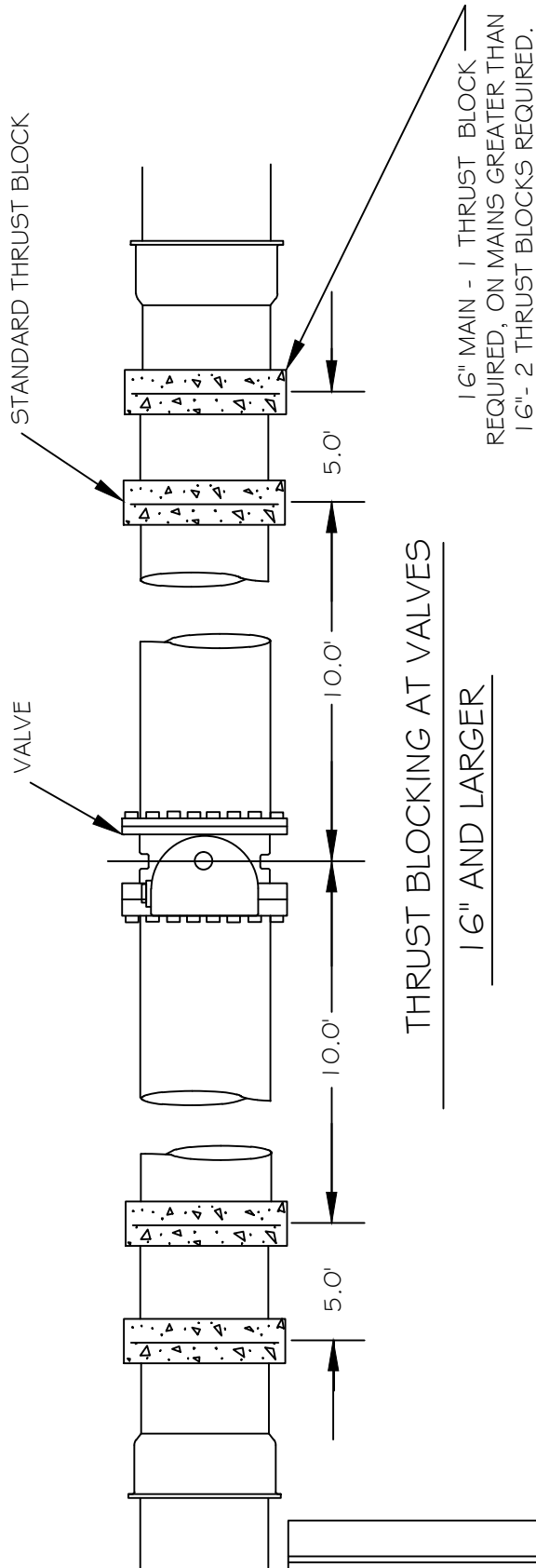
THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" - 16"	1'-4"	1'-7"	2"	3/8"
20" - 24"	1'-4"	1'-7"	3"	1/2"
30" - 36"	1'-4"	1'-7"	4"	5/8"
48" & greater	1'-8"	1'-9"	6"	7/8"

NOTES:

1. SEE STANDARD DETAIL W-9 FOR THRUST BLOCK LOCATIONS.
2. CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
3. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
4. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL W-3.
5. BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL W-3.
6. THRUST COLLAR MUST BE FACTORY WELDED ON BOTH SIDES ALONG BOTH EDGES OF COLLAR AROUND CIRCUMFERENCE.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
THRUST BLOCKING DESIGN DATA FOR WATER MAINS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-7	RRH	1-21-00	J.P.S.	11-1-10
	D.H.L.	6-18-08		

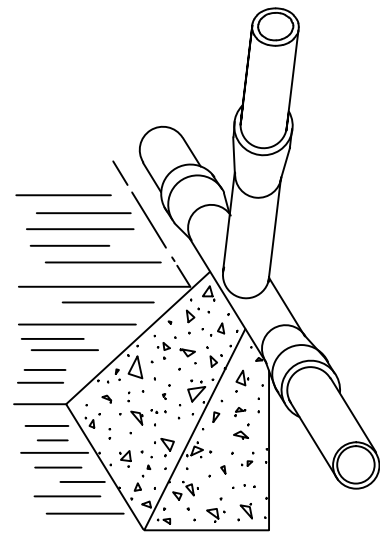


THRUST BLOCKING AT VALVES  
16" AND LARGER

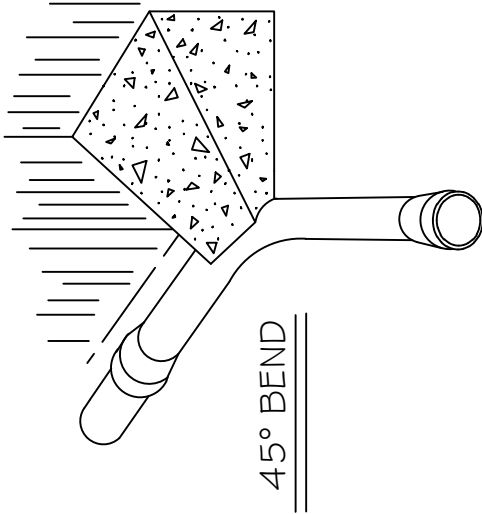
16" MAIN - 1 THRUST BLOCK  
REQUIRED, ON MAINS GREATER THAN  
16" - 2 THRUST BLOCKS REQUIRED.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD THRUST BLOCK INSTALLATION FOR 16" AND LARGER VALVES AND DEAD END MAINS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-8	Y.C.A.	4-12-90	D.W.C.	9-7-99
		6-92	RRH	3-31-00

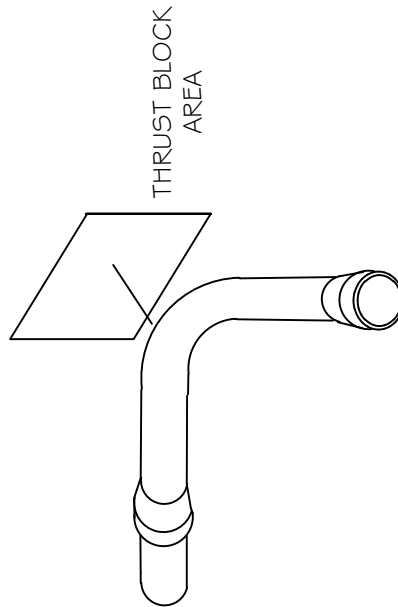
# THRUST BLOCKING



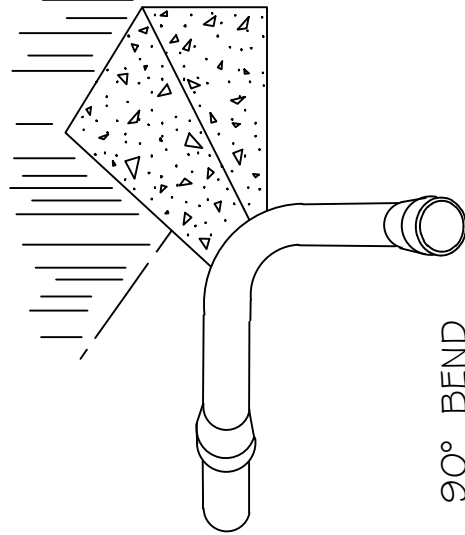
TEE INTERSECTION



45° BEND



THRUST BLOCK  
AREA



90° BEND

NOTES:

1. CONCRETE SHALL BE 3000 PSI
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO STANDARD DETAIL W-3.
4. SEE STANDARD THRUST BLOCK TABLES, W-10 THRU W-11, FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD THRUST BLOCKING VIEWS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-9	D.W.C.	3-1-87	RRH	3-31-00
		9-7-99	D.H.L.	6-18-08

# REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS

BASED ON TEST PRESSURE OF 200 P.S.I.

ALL AREAS GIVEN IN SQUARE FEET.

SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY 4000 LBS/FT <sup>2</sup>	SOFT CLAY 2000 LBS/FT <sup>2</sup>	1600 LBS/FT <sup>2</sup> GRAVEL / COARSE SAND	8000 LBS/FT <sup>2</sup> DRY CLAY - ALWAYS DRY	SAND, COMPACT FIRM 8000 LBS/FT <sup>2</sup>	SAND - CLEAN DRY 4000 LBS/FT <sup>2</sup>	SOIL 1000 LBS/FT <sup>2</sup> QUICKSAND - VERY POOR	ROCK - POOR 10,000 LBS/FT <sup>2</sup>
<b>6"</b>									
1 1/4°	1,108	1	1	1	1	1	2	1	
22 1/2°	2,207	1	2	2	1	1	3	1	
45°	4,328	2	3	3	1	1	5	1	
90°	7,996	2	4	5	1	1	8	1	
PLUG	5,655	2	3	4	1	1	6	1	
<b>8"</b>									
1 1/4°	1,970	1	1	2	1	1	2	1	
22 1/2°	3,922	1	2	3	1	1	4	1	
45°	7,694	2	4	5	1	1	8	1	
90°	14,215	4	8	9	2	2	15	2	
PLUG	10,053	3	5	6	2	2	10	1	
<b>12"</b>									
1 1/4°	4,433	2	3	3	1	1	5	1	
22 1/2°	8,826	3	5	6	2	2	9	1	
45°	17,312	5	9	11	3	3	18	2	
90°	31,983	8	16	19	4	4	32	4	
PLUG	22,619	6	12	14	3	3	23	3	
<b>16"</b>									
1 1/4°	7,881	2	4	5	1	1	8	1	
22 1/2°	15,691	4	8	10	2	2	16	2	
45°	30,779	8	16	19	4	4	31	4	
90°	56,861	15	29	35	8	8	57	6	
PLUG	40,213	10	21	25	5	5	41	5	

REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.

USE 6" - 90 BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

## THRUST BLOCKING DESIGN QUANTITY TABLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-10	D.W.C.	6-23-99		

# REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS

BASED ON TEST PRESSURE OF 200 P.S.I.

ALL AREAS GIVEN IN SQUARE FEET.

SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY 4000 LBS/FT <sup>2</sup>	SOFT CLAY 2000 LBS/FT <sup>2</sup>	GRAVEL/COARSE SAND 1600LBS/FT <sup>2</sup>	8000 LBS/FT <sup>2</sup> DRY CLAY - ALWAYS DRY	SAND, COMPACT FIRM 8000 LBS/FT <sup>2</sup>	SAND - CLEAN DRY 4000 LBS/FT <sup>2</sup>	SOIL 1000 LBS/FT <sup>2</sup> QUICKSAND - VERY POOR	ROCK - POOR 10,000 LBS/FT <sup>2</sup>
<b>24"</b>									
11 1/4°	17,734	5	9	11	3	3	5	18	2
22 1/2°	35,305	9	18	22	5	5	9	36	4
45°	69,252	18	35	42	9	9	18	70	7
90°	127,936	32	64	77	16	16	32	128	13
PLUG	90,478	23	46	55	12	12	23	91	10
<b>30"</b>									
11 1/4°	27,709	7	14	17	4	4	7	2	3
22 1/2°	55,163	14	28	34	7	7	14	56	6
45°	108,206	28	55	65	14	14	28	109	11
90°	199,900	50	100	120	25	25	50	200	20
PLUG	141,372	36	71	85	18	18	36	142	15
<b>36"</b>									
11 1/4°	39,901	10	20	24	5	5	10	40	4
22 1/2°	79,439	20	40	48	10	10	20	30	8
45°	155,816	39	78	94	20	20	39	156	16
90°	287,855	72	144	172	36	36	72	288	29
PLUG	203,575	51	102	122	26	26	51	204	21
<b>48"</b>									
11 1/4°	70,935	18	36	43	9	9	18	71	8
22 1/2°	141,218	36	71	85	18	18	36	142	15
45°	277,007	70	139	166	35	35	70	277	28
90°	511,742	128	256	320	64	64	128	512	52
PLUG	361,911	91	181	217	46	46	91	362	37

REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.

USE 6° - 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

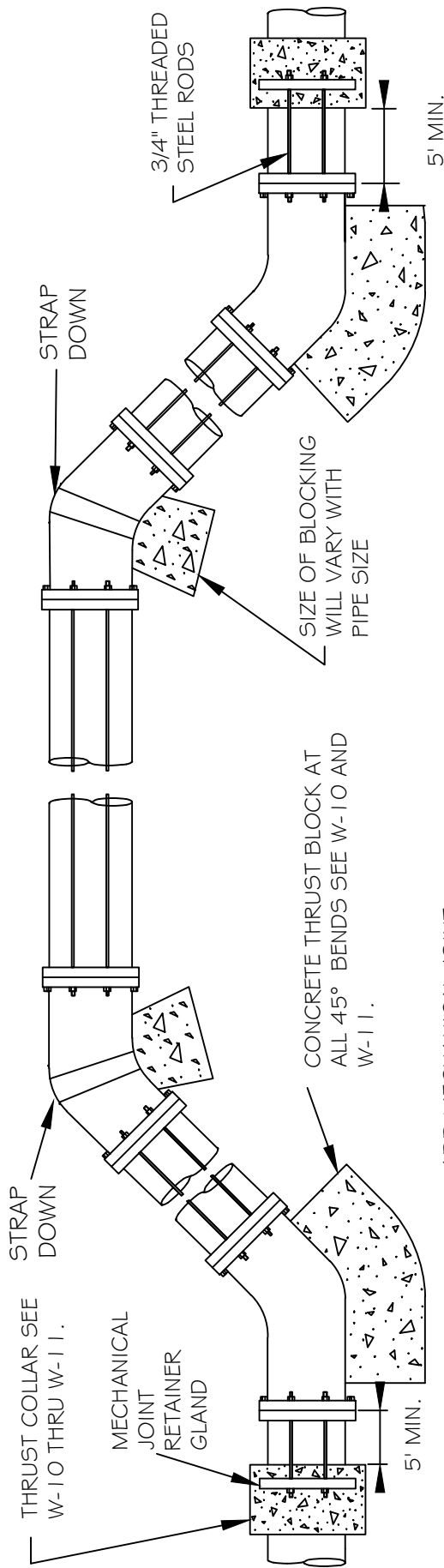
CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

## THRUST BLOCKING DESIGN QUANTITY TABLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-11	D.W.C.	6-23-99		

TOP OF GROUND



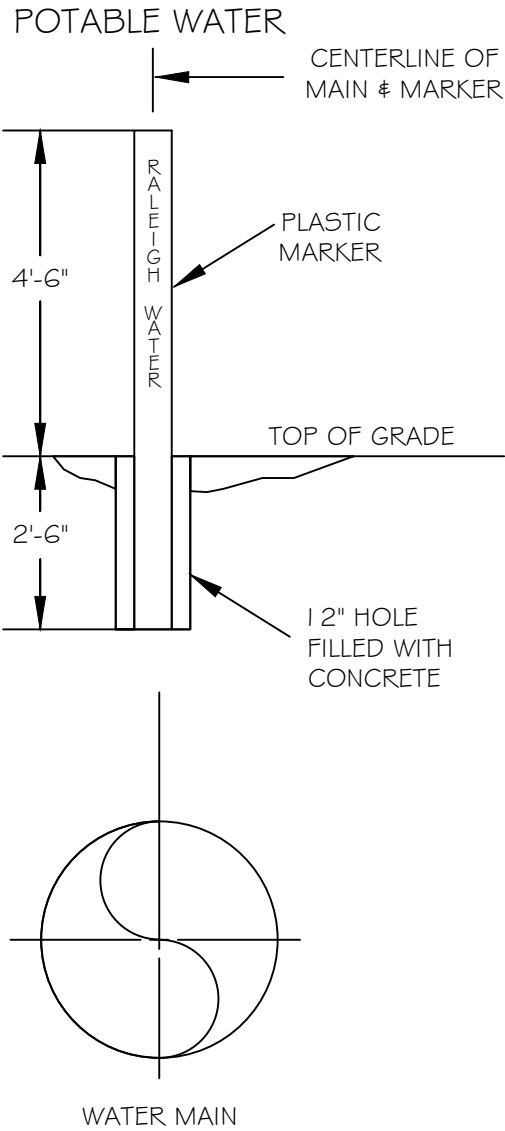
ADD MECHANICAL JOINT RETAINER GLANDS THROUGHOUT ASSEMBLY.

ROD REQUIREMENTS

SIZE OF 45 BEND	STATIC THRUST IN POUNDS	NO. OF RODS REQUIRED
6"	4,328	2
8"	7,694	4
12"	17,312	4
16"	30,779	8
24"	69,252	8

- GENERAL NOTES:
1. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
  2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT BENDS.
  3. RESTRAINED MECHANICAL GLANDS TO BE USED AT ALL FITTINGS.
  4. MUST USE DUCTILE IRON EYE BOLTS WHERE NECESSARY.
  5. 3' MINIMUM COVER MUST BE MAINTAINED ON ALL WATER MAINS

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD VERTICAL BEND				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-12	ABB	4-6-04	J.P.S.	11-1-10
	D.H.L.	6-18-08		

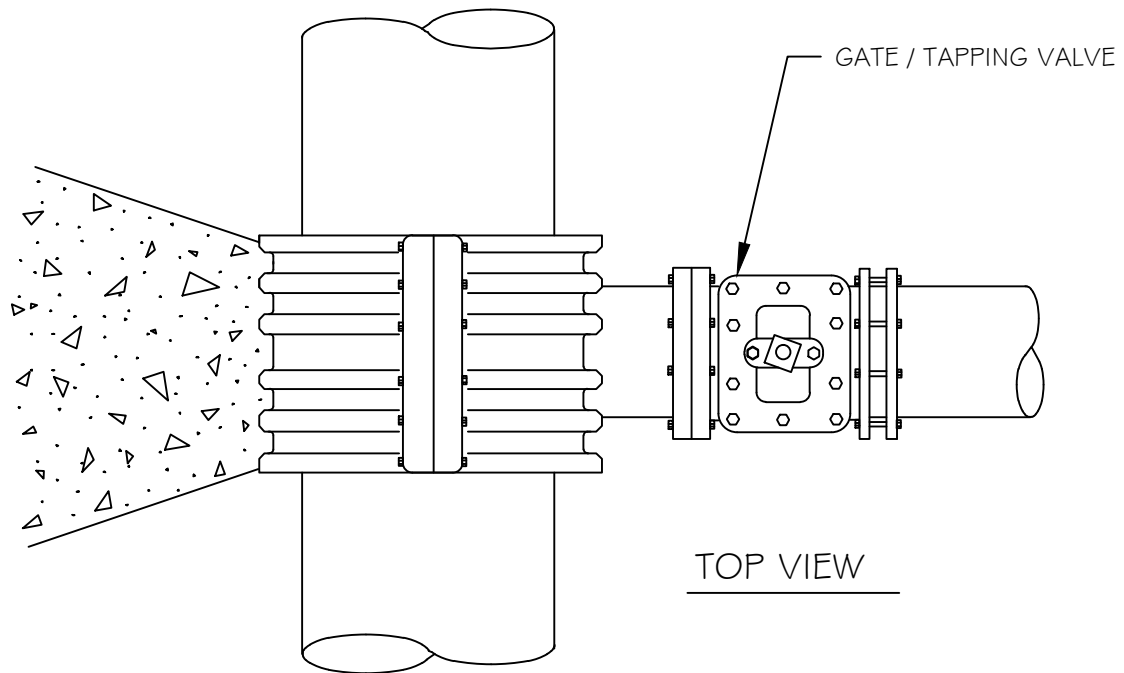


NOTES

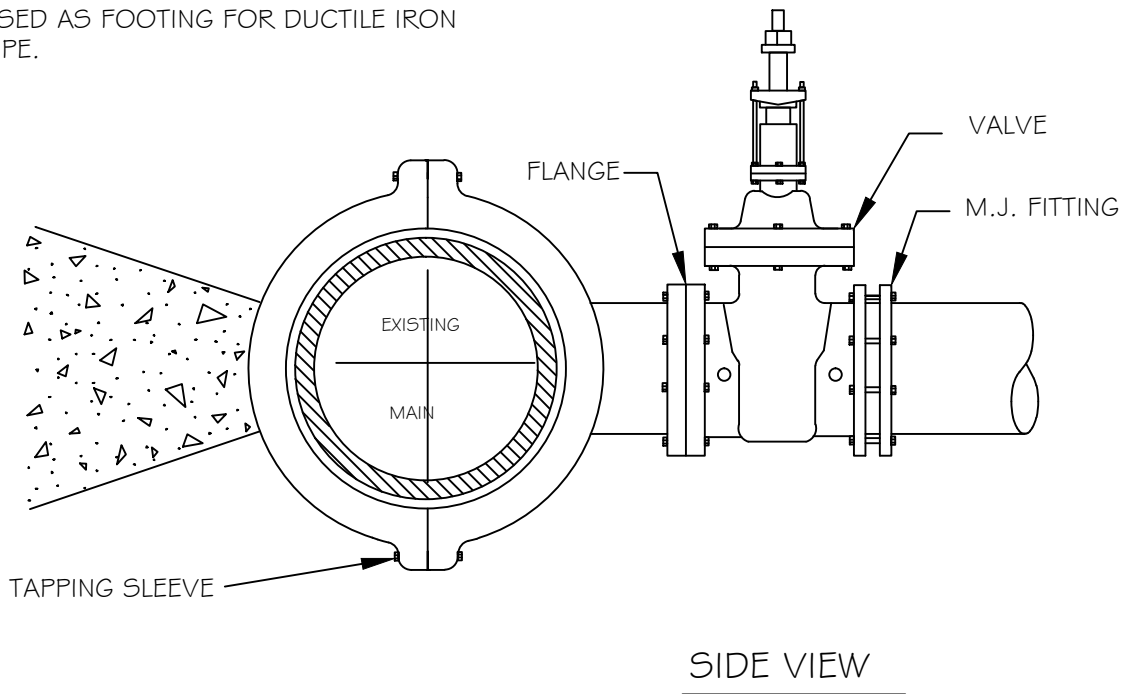
1. POTABLE WATER MARKER TO BE BLUE IN COLOR.
2. POTABLE WATER MARKER TO BE LABELED "RALEIGH WATER".
3. TO BE SPACED ALONG CENTERLINE OF MAIN EVERY 300 FEET.
4. MARKERS TO BE ROUND AND 4" IN DIAMETER.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MAIN & VALVE MARKERS FOR POTABLE & REUSE WATER IN EASEMENTS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-13	D.W.C.	9-7-99	DHL	8-16-07
	RRH	3-31-00	J.P.S.	11-1-10





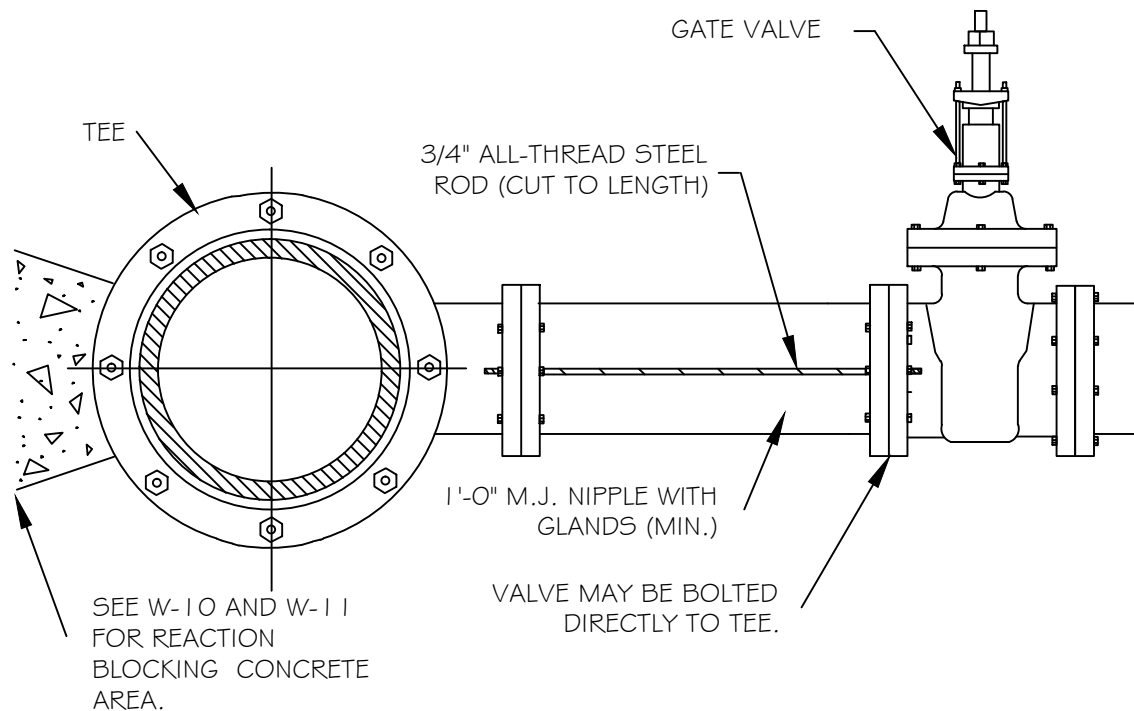
3000 PSI SOLID CONCRETE SHALL BE USED AS FOOTING FOR DUCTILE IRON PIPE.



NOTES:

1. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
2. SEE STANDARD REACTION BLOCK TABLES, W-10 AND W-11 FOR AREA OF CONCRETE REQUIRED.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
4" - 24" STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-14	Y.C.A.	12-31-91	RRH	3-31-00
	D.W.C.	9-7-99	J.P.S.	11-1-10



ROD REQUIREMENTS	
NO. OF RODS	BRANCH SIZE
4"	2
6"	2
8"	4
12"	4
16"	6
24"	6
30"	8
36"	8

NOTES:

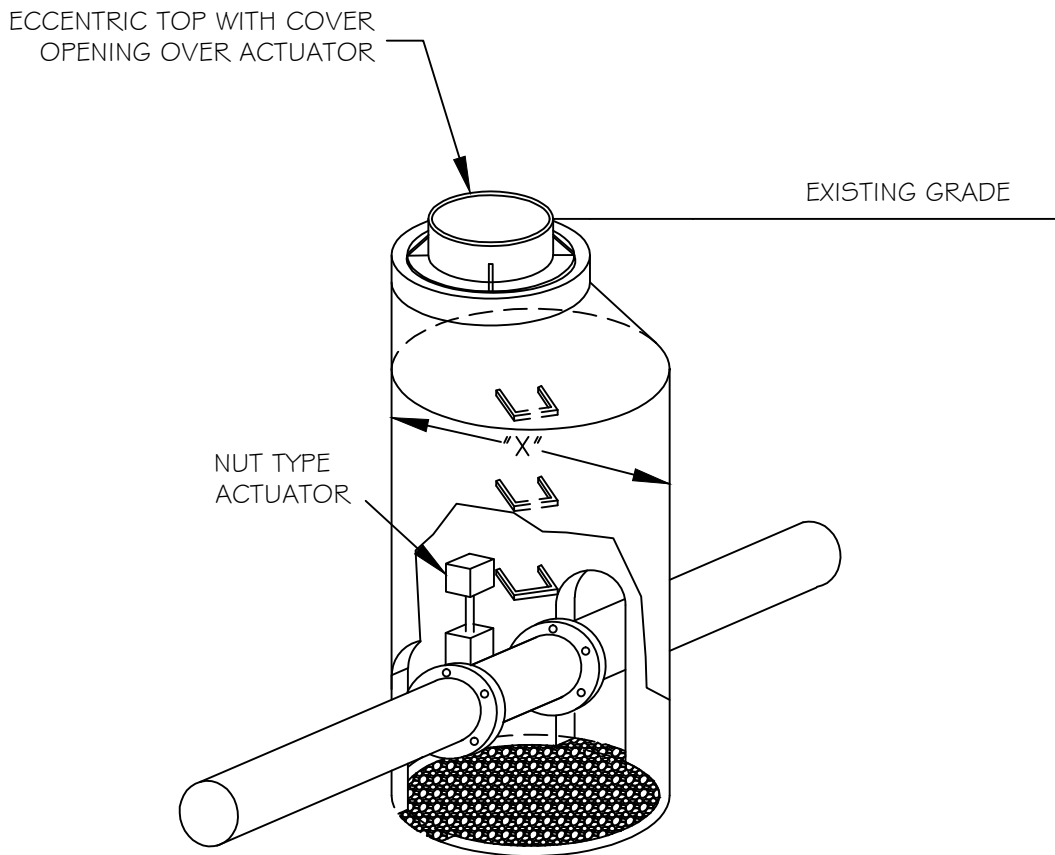
1. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
2. SEE STANDARD THRUST BLOCK. TABLES W-10 AND W-11 FOR CONCRETE.
3. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL FITTINGS.
4. THIS RODDING REQUIREMENT DOES NOT APPLY TO FIRE HYDRANTS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
VALVE RESTRAINT AT TEES AND CROSSES FOR LINES (4"-24")				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-15	RRH	3-31-00	D.H.L.	6-16-08
	A.B.B.	4-19-04	J.P.S.	11-1-10

NOTES:

VALVE SIZE	"X"
16"	5' M.H.
24"	6' M.H.
30" OR GREATER	8' M.H.

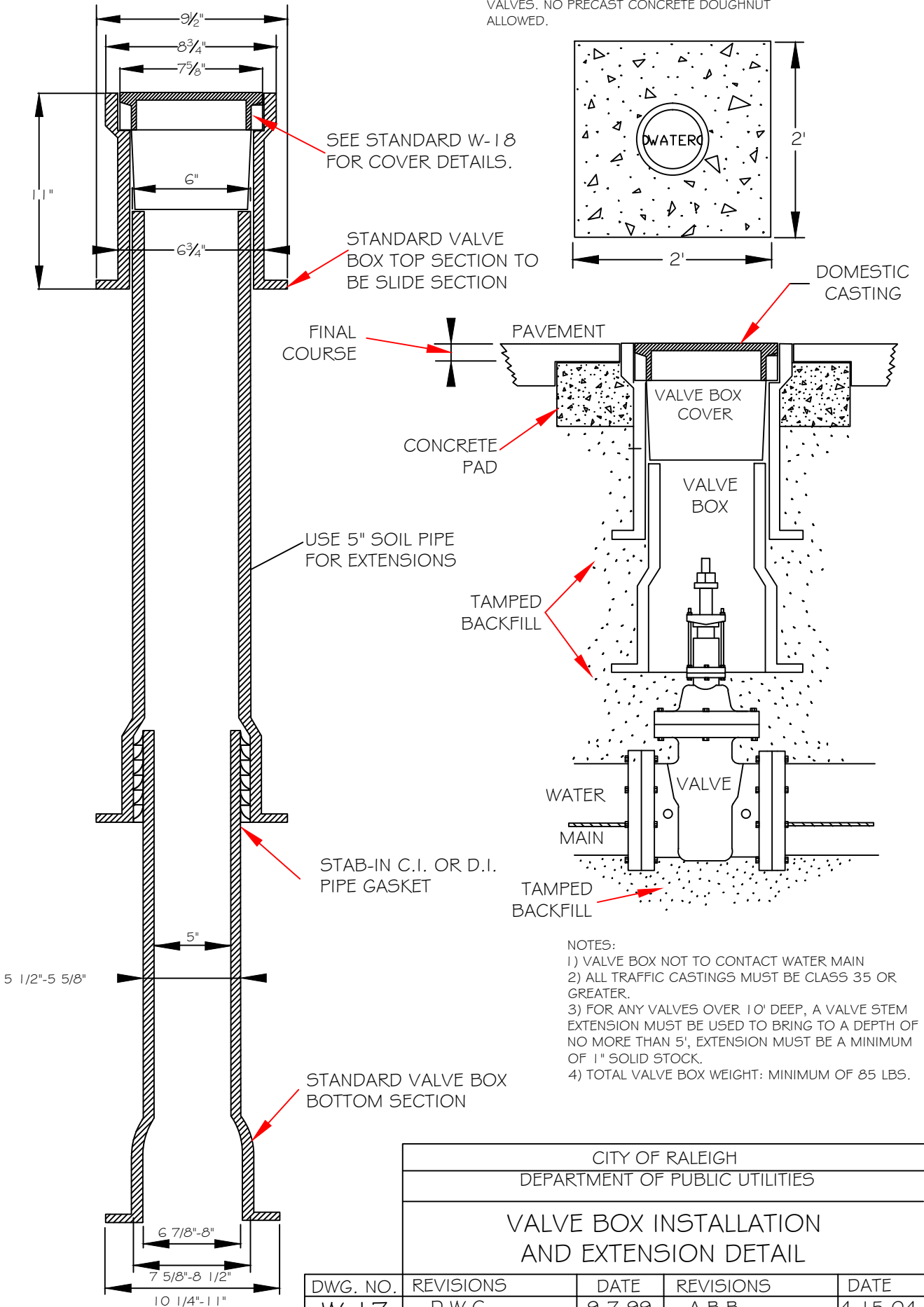
1. USE STANDARD PRECAST ECCENTRIC TOP.
2. BASE SECTION SHALL BE OF "DOG HOUSE" TYPE TO FIT OVER MAIN.
3. PROVIDE A MIN. OF 12" OF #67 STONE FOR POSITIVE DRAINAGE IN BOTTOM OF MANHOLE.
4. GROUT RISER/BASE SECTION AS NECESSARY.
5. MANHOLE LID SHALL SAY "WATER".
6. FLAT TOP MAY BE USED IN NON-PAVED AREAS WHEN NECESSARY TO MATCH GRADE.



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
BUTTERFLY VALVE MANHOLE DETAIL FOR 16" & LARGER MAINS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-16	RRH	3-31-00	D.H.L.	6-18-08
	ABB	3-14-05	J.P.S.	10-20-10

APPROVED METHOD FOR EXTENSION OF VALVE BOX

NOTE: 2'x 2'x 6" CONCRETE PAD REQUIRED ON ALL VALVES. NO PRECAST CONCRETE DOUGHNUT ALLOWED.



SEE STANDARD W-18 FOR COVER DETAILS.

STANDARD VALVE BOX TOP SECTION TO BE SLIDE SECTION

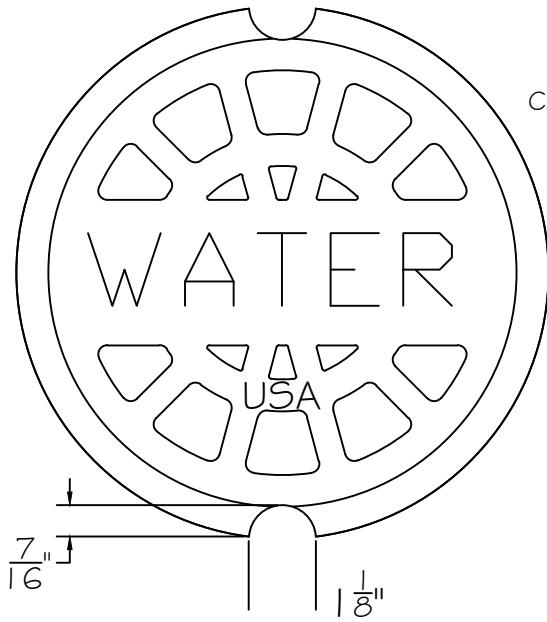
USE 5" SOIL PIPE FOR EXTENSIONS

STAB-IN C.I. OR D.I. PIPE GASKET

STANDARD VALVE BOX BOTTOM SECTION

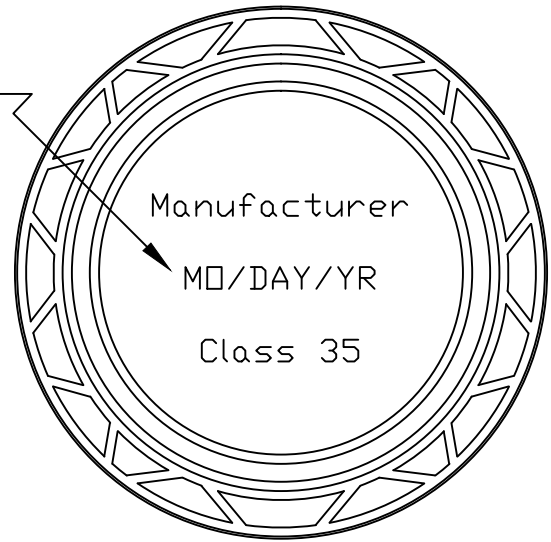
- NOTES:
- 1) VALVE BOX NOT TO CONTACT WATER MAIN
  - 2) ALL TRAFFIC CASTINGS MUST BE CLASS 35 OR GREATER.
  - 3) FOR ANY VALVES OVER 10' DEEP, A VALVE STEM EXTENSION MUST BE USED TO BRING TO A DEPTH OF NO MORE THAN 5', EXTENSION MUST BE A MINIMUM OF 1" SOLID STOCK.
  - 4) TOTAL VALVE BOX WEIGHT: MINIMUM OF 85 LBS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
<b>VALVE BOX INSTALLATION AND EXTENSION DETAIL</b>				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-17	D.W.C.	9-7-99	A.B.B.	4-15-04
	RRH	3-31-00	DHL	8-16-07

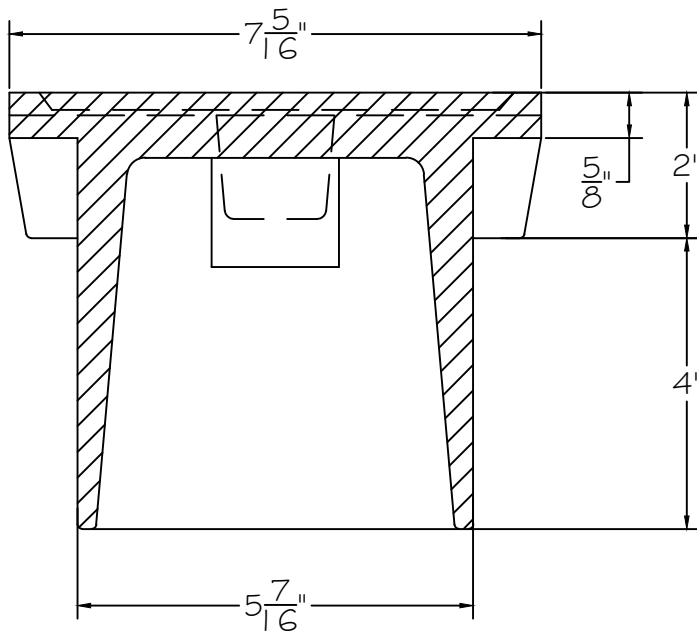


PLAN VIEW

CAST DATE



BOTTOM VIEW



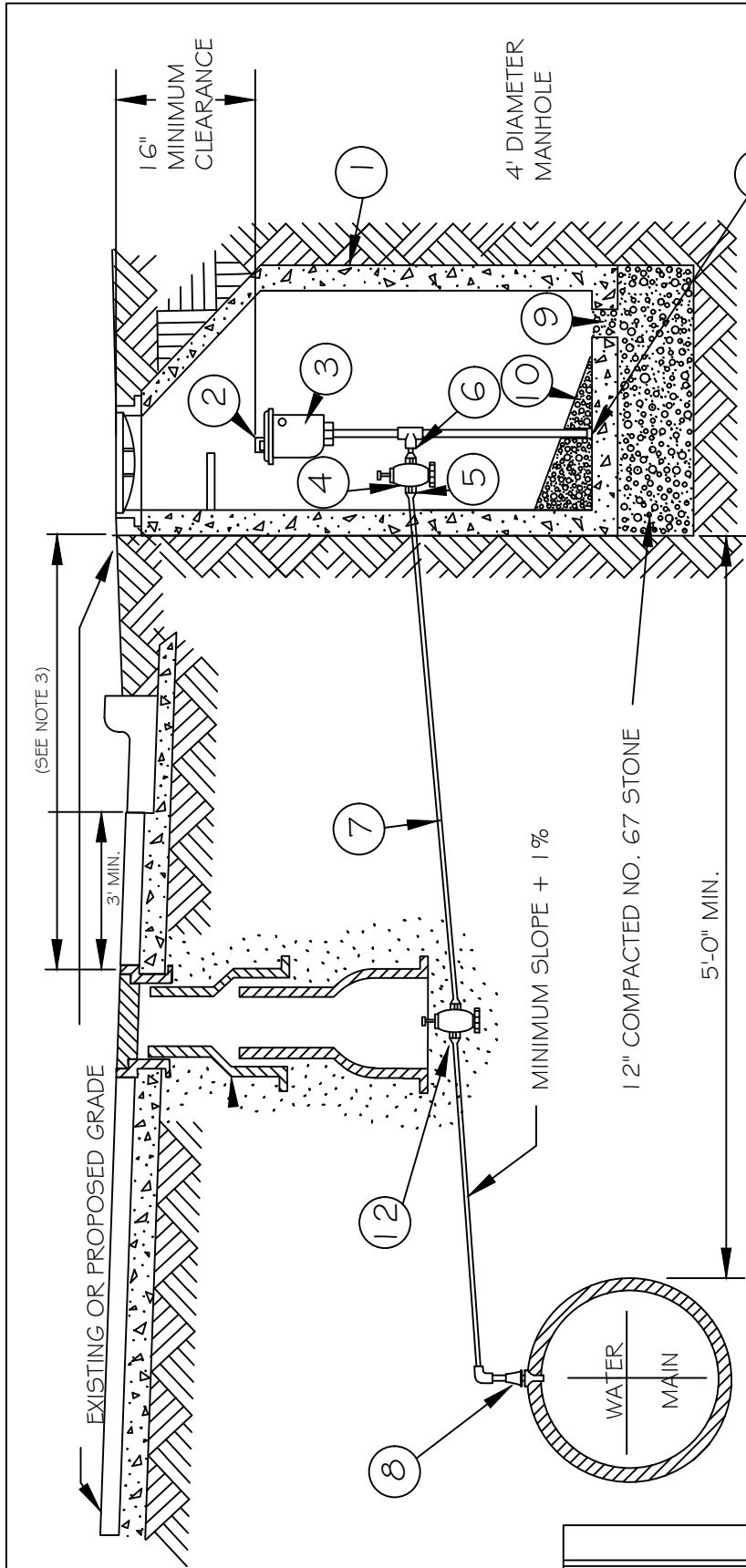
SECTION VIEW

- NOTE 1 - "WATER" LETTERING MUST BE 1" RAISED (RECESSED FLUSH)
- NOTE 2 - VALVE COVER SHALL BE DOMESTICALLY CAST.
- NOTE 3 - COVER MUST HAVE A MINIMUM WEIGHT OF 25 POUNDS.
- NOTE 4 - COVER MUST BE CLASS 35 OR GREATER.
- NOTE 5 - COVER MUST MEET OR EXCEED AASHTO H-20 LOAD REQUIREMENTS.

CITY OF RALEIGH  
DEPARTMENT OF PUBLIC UTILITIES

5 1/4" VALVE BOX DROP LID  
WITH 4" SKIRT

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-18				



NOTE:

1. AIR VALVE TO BE P-20 WITH VACUUM CHECK BY CRISPIN OR VALMATIC VM 45.
2. THE AIR RELEASE MANHOLE SHALL BE INSTALLED IN THE SHOULDER OR AS DIRECTED BY THE ENGINEER.
3. FOR MAINS LOCATED OUTSIDE OF STREET RIGHT-OF-WAYS THE MAXIMUM DISTANCE BETWEEN THE MANHOLE AND THE VALVE BOX SHOULD BE THREE (3) FEET.
4. MAIN SHALL BE DEEP ENOUGH TO ACCOMMODATE INSTALLATION AS SHOWN

BILL OF MATERIALS

1	PRECAST MANHOLE, SEE STANDARD DETAIL S-20
2	TRASH HOOD
3	2" AIR RELEASE VALVE
4	2" CURB STOP BALL VALVE
5	ADAPTER
6	2" MECHANICAL JOINT BRASS PIPE AND FITTINGS
7	2" TYPE "K", SOFT COPPER WITH FLARED ELBOW
8	CORPORATION COCK
9	6" DIAMETER DRAIN
10	GROUT, 1/8" TO 1'-0" MIN. SLOPE TO DRAIN
11	PIPE CAP
12	2"-GATE VALVE

SEE STANDARD DETAIL W-3 TO INSURE PROPER BACKFILL.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

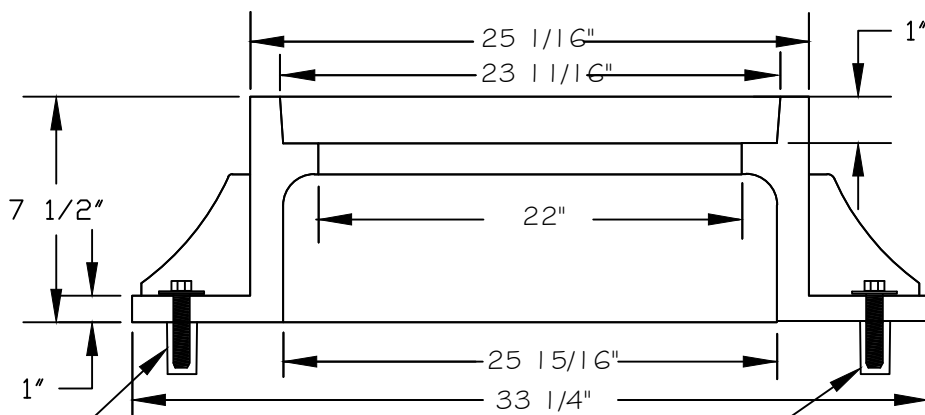
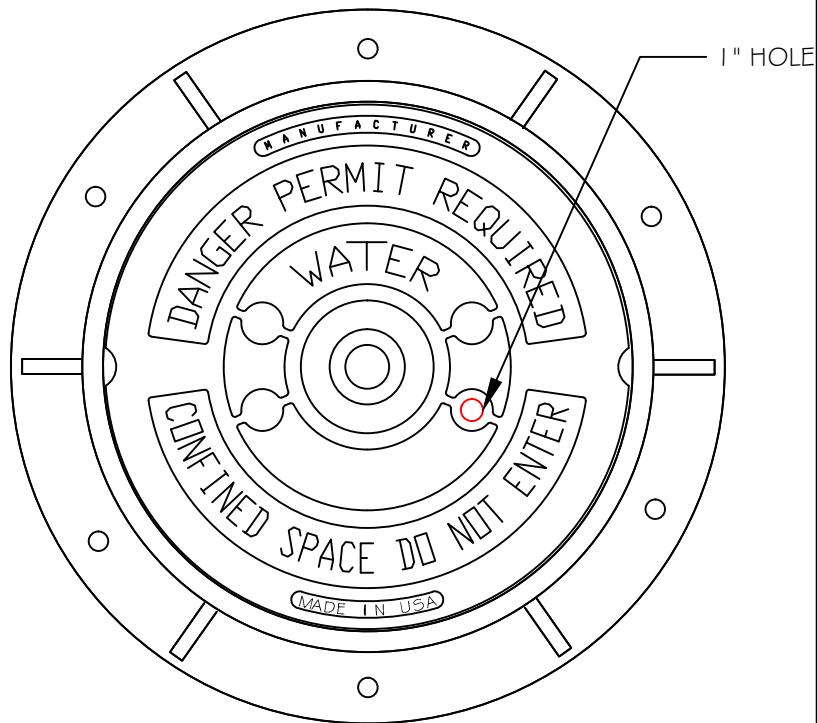
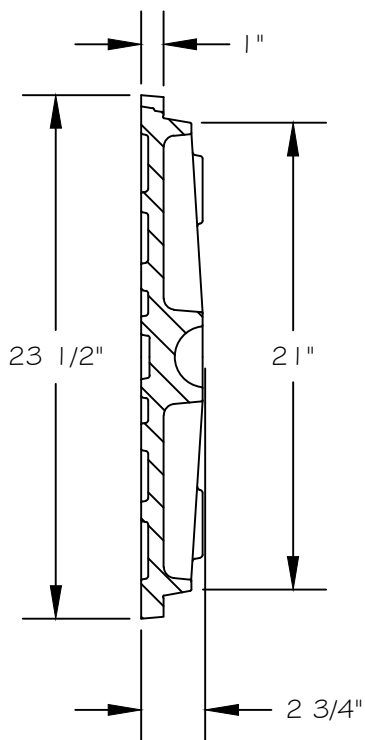
STANDARD WATER AIR

RELEASE VALVE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-19	ABB	10-4-04		2-31-91
	J.P.S.	11-1-10	RRH	6-7-00

# MANHOLE FRAME AND COVER

COVER 120 LBS. MINIMUM



LAGSHIELDS MAY ONLY BE USED IN ROADWAY APPLICATIONS.

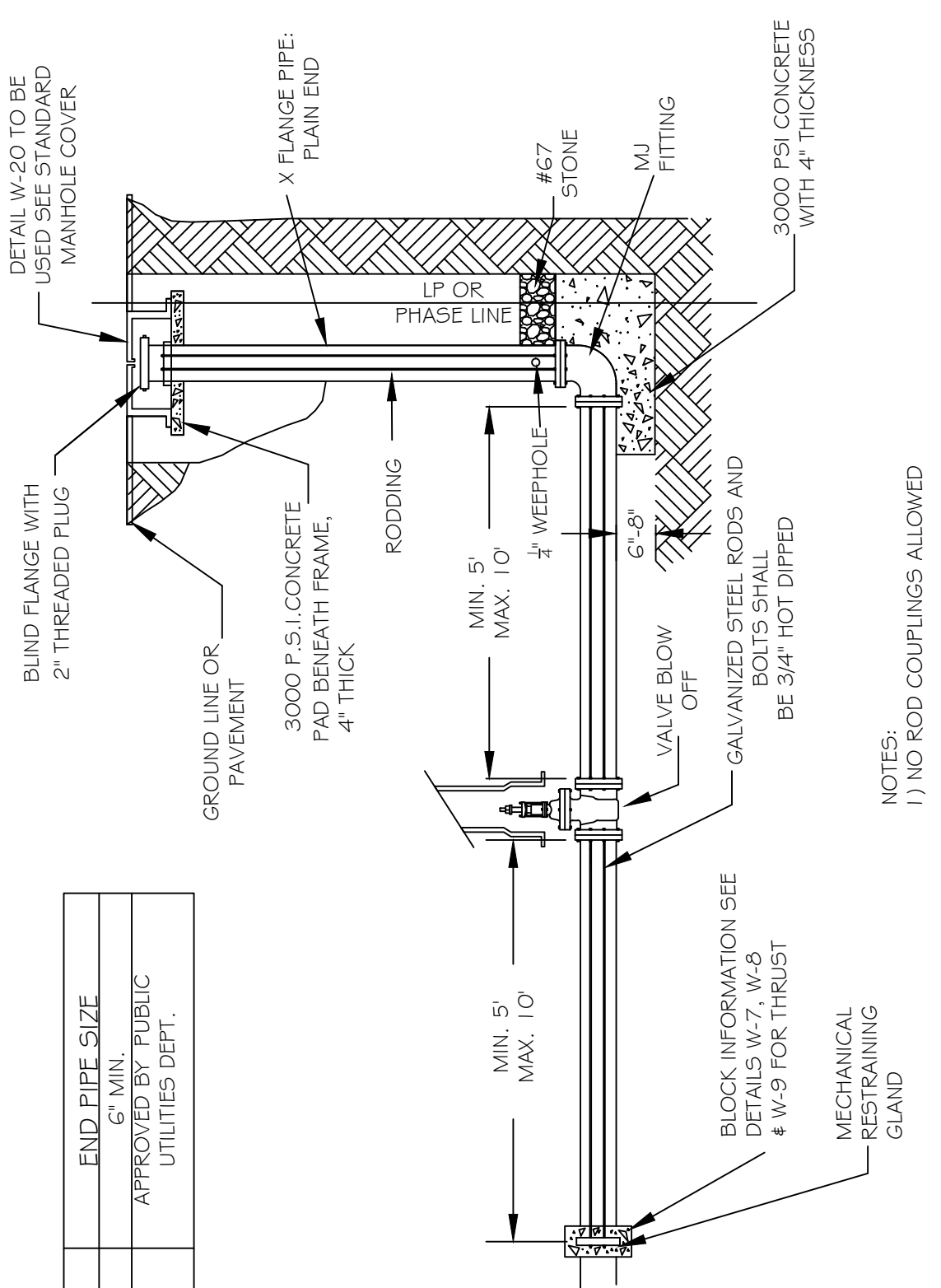
5/8"X3" LAGSHIELD IN HOLE DRILLED INTO CONE OR RING WITH ANCHOR SUNK TO DEPTH RECOMMENDED BY MANUFACTURER, AND 3/8"X3" HOT DIPPED GALVANIZED LAG BOLT AND WASHER.

NOTES:

- 1) ALL MANHOLE FRAMES SHALL BE BE DOMESTICALLY CAST
- 2) FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS.
- 3) COVER SHALL WEIGH A MIN. OF 120 LBS.
- 4) MANHOLES WITHIN PAVED SURFACES SHALL BE CONSTRUCTED IN ACCORDANCE WITH S-29.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE COVER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-20	A.B.B.	4-8-04		
	D.H.L.	6-18-08		

MAIN SIZE	END PIPE SIZE
16" & GREATER	6" MIN.
	APPROVED BY PUBLIC UTILITIES DEPT.
6" - 12"	

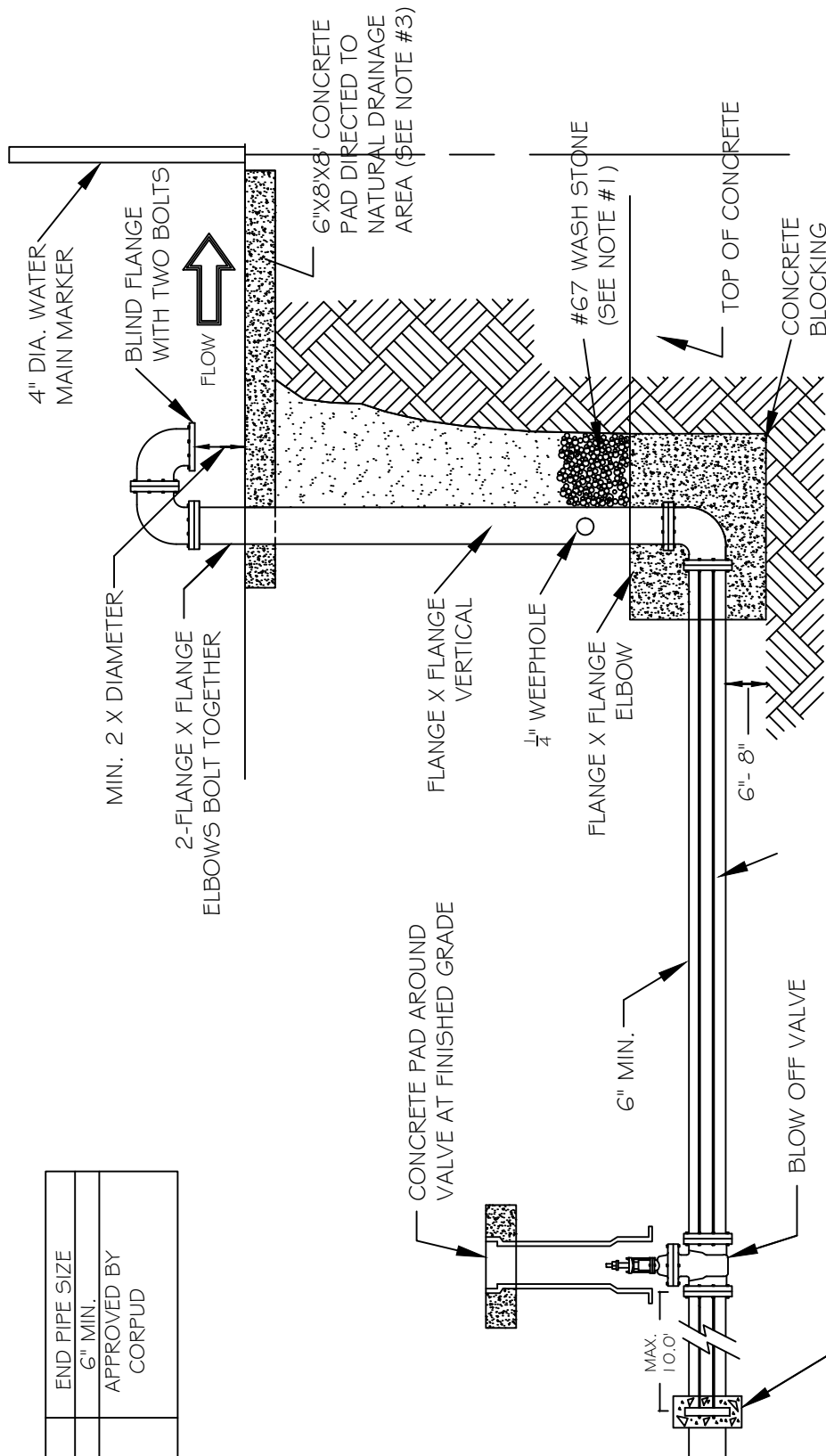


NOTES:  
1) NO ROD COUPLINGS ALLOWED

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TEMPORARY WATER MAIN BLOW OFF ASSEMBLY				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-21	D.W.C.	12-28-99	A.B.B.	4-12-04
	RRH	3-31-00	DHL	8-16-07



MAIN SIZE	END PIPE SIZE
6" - 12"	6" MIN.
16"+	APPROVED BY CORPUD



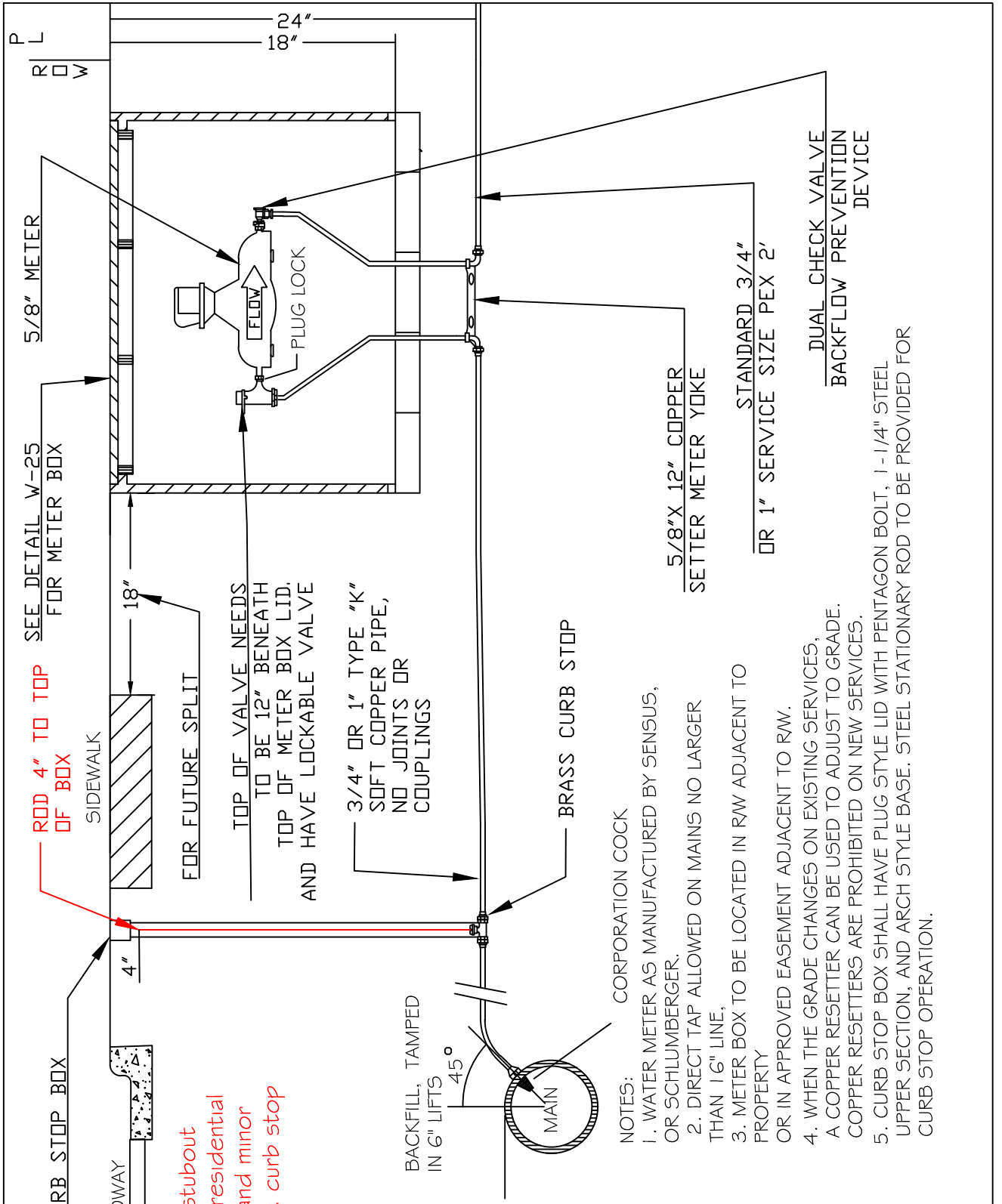
- NOTES:
1. DRILL 1/4" WEEP HOLE FOR STACK DRAINAGE INTO STONE.
  2. DOUBLE 3/4" BRIDLE RODS ON BOTH SIDES.
  3. A RIP-RAP SWALE FROM CONCRETE SPLASH PAD TO POSITIVE DRAINAGE AREA IS REQUIRED.
  4. BOTTOM 90 ELBOW SHALL HAVE BLIND FLANGE ATTACHED WITH TWO BOLTS.
  5. INSTALL WATER MAIN MARKER AT RAW OR P/L TO LOCATE MAIN.
  6. 3/4" RODS AND BOLTS TO BE HOT DIPPED GALVANIZED.
  7. END PIPE SIZE 6" MIN. OR AS APPROVED BY PUBLIC UTILITIES.

SEE DETAILS W-8 & W-9 FOR THRUST BLOCK INFORMATION

CITY OF RALEIGH  
DEPARTMENT OF PUBLIC UTILITIES

PERMANENT WATER MAIN  
BLOW OFF ASSEMBLY

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-22	D.W.C.	12-28-99	DHL	8-16-07
	A.B.B.	4-13-04		



**\*\* service stubout length on residential property and minor text edits. curb stop added**

**NOTES:**

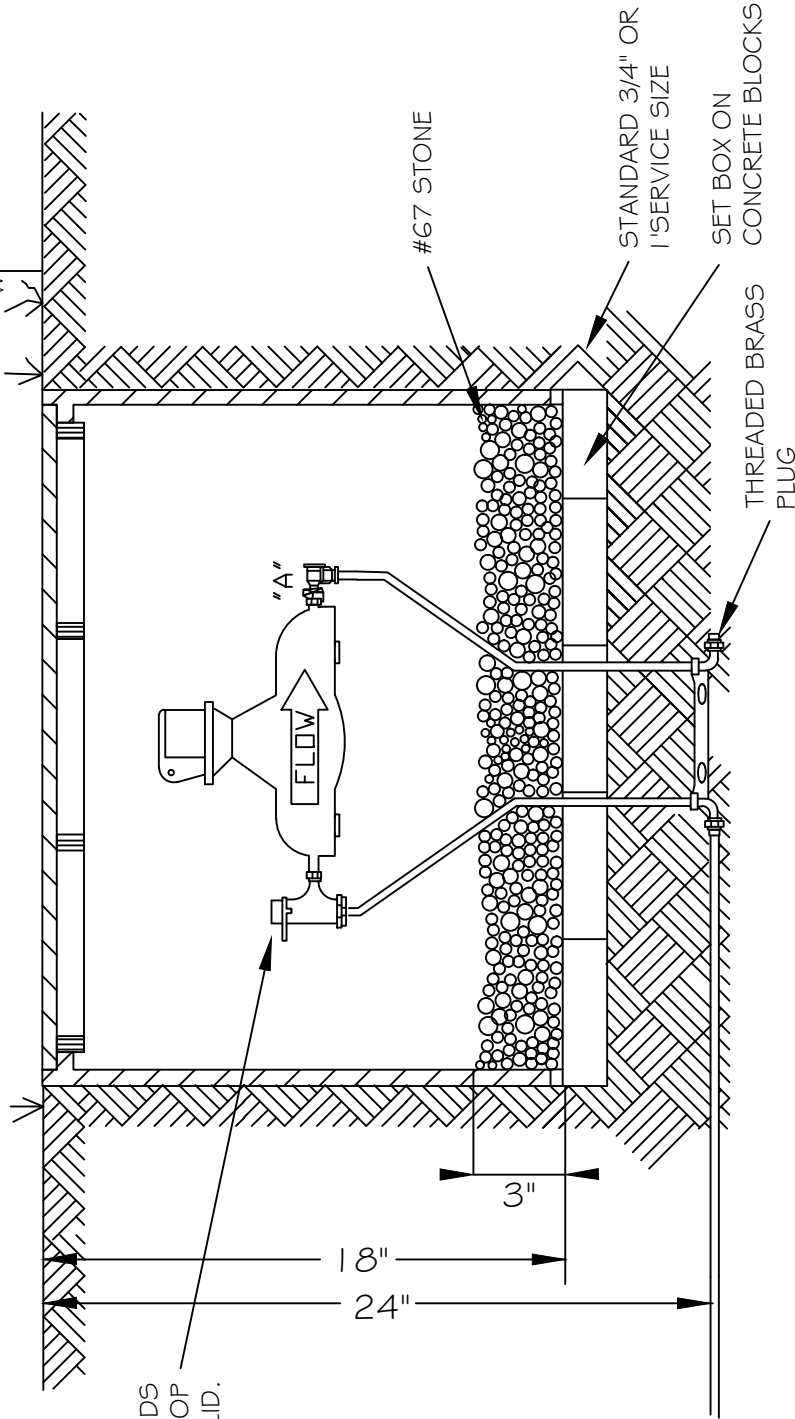
1. WATER METER AS MANUFACTURED BY SENSUS, OR SCHLUMBERGER.
2. DIRECT TAP ALLOWED ON MAINS NO LARGER THAN 16" LINE.
3. METER BOX TO BE LOCATED IN RW ADJACENT TO PROPERTY OR IN APPROVED EASEMENT ADJACENT TO RW.
4. WHEN THE GRADE CHANGES ON EXISTING SERVICES, A COPPER RESETER CAN BE USED TO ADJUST TO GRADE. COPPER RESETTERS ARE PROHIBITED ON NEW SERVICES.
5. CURB STOP BOX SHALL HAVE PLUG STYLE LID WITH PENTAGON BOLT, 1-1/4" STEEL UPPER SECTION, AND ARCH STYLE BASE. STEEL STATIONARY ROD TO BE PROVIDED FOR CURB STOP OPERATION.

CITY OF RALEIGH  
DEPARTMENT OF PUBLIC UTILITIES

**STANDARD 3/4" & 1" WATER SERVICE INSTALLATION**

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-23	ABB	4-6-04	RKV	7/23/13
	D.H.L.	6/18/08		

STANDARD METER BOX

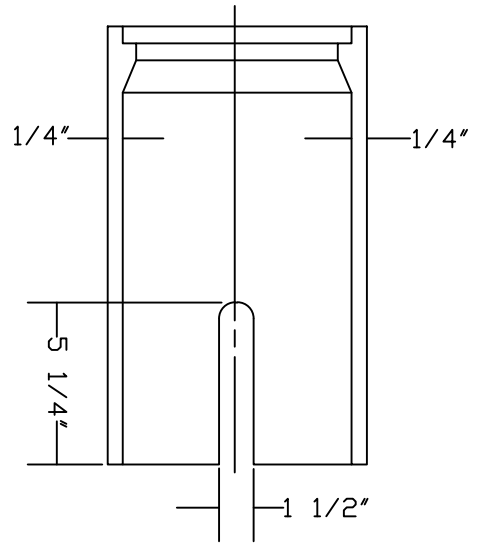
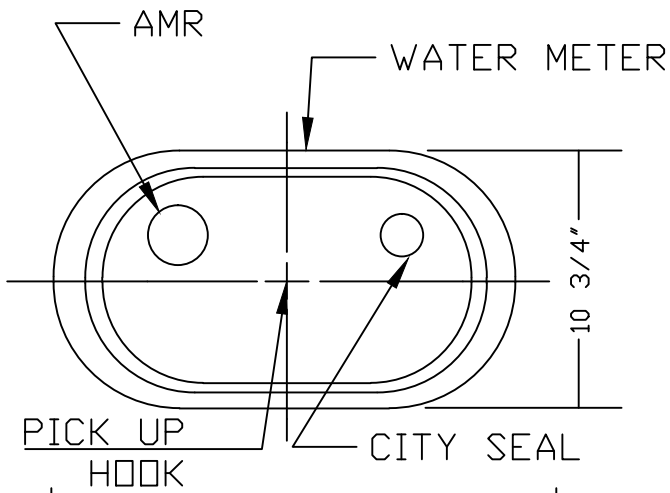


TOP OF VALVE NEEDS TO BE 12" BENEATH TOP OF METER BOX LID.

THE BACKFLOW PREVENTER LOCATION IS DEPENDENT ON THE TYPE DEVICE PROPOSED FOR USE AS FOLLOWS:

DEVICE	LOCATION	DEVICE	LOCATION
"A"	FORD ANGLE CHECK OR OTHER APPROVED DUAL CHECK VALVES	"A"	BACKFLOW PREVENTION SHALL BE DETERMINED BY OCCUPANCY & APPROVED BACKFLOW LIST.
	ONE OR TWO FAMILY RESIDENTIAL		COMMERCIAL

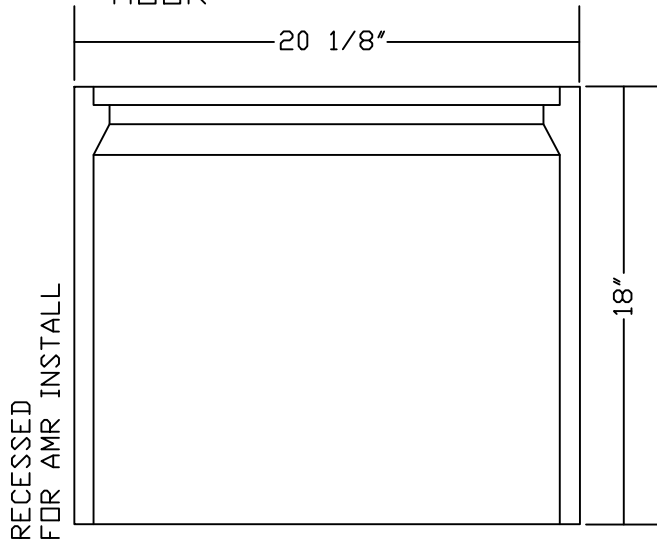
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
ONE OR TWO FAMILY DWELLINGS BACKFLOW PREVENTION/ METER ASSEMBLY INSTALLATION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-24	Y.C.A.	12-31-91	D.H.L.	6/18/08
	A.B.B.	4-7-04	J.P.S.	11/4/10



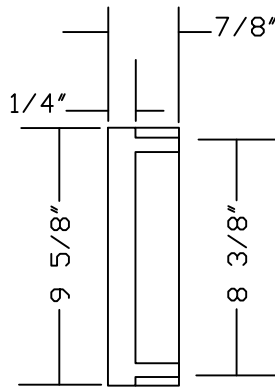
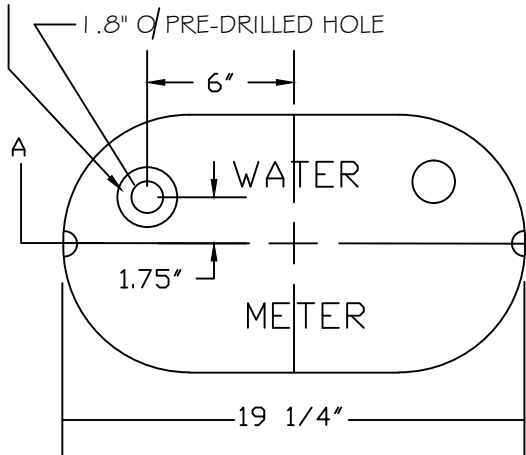
SECTION C-C

NOTES:

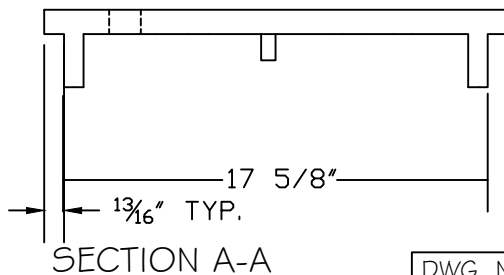
1. COVER WEIGHT: 13 LBS +/- 5%
2. LIDS TO BE COATED WITH BITUMINOUS COAL TAR COATING
3. BOXES AND LIDS MUST BE MANUFACTURED FROM SAME DOMESTIC FOUNDRY.



RECESSED FOR AMR INSTALL



SECTION B-B

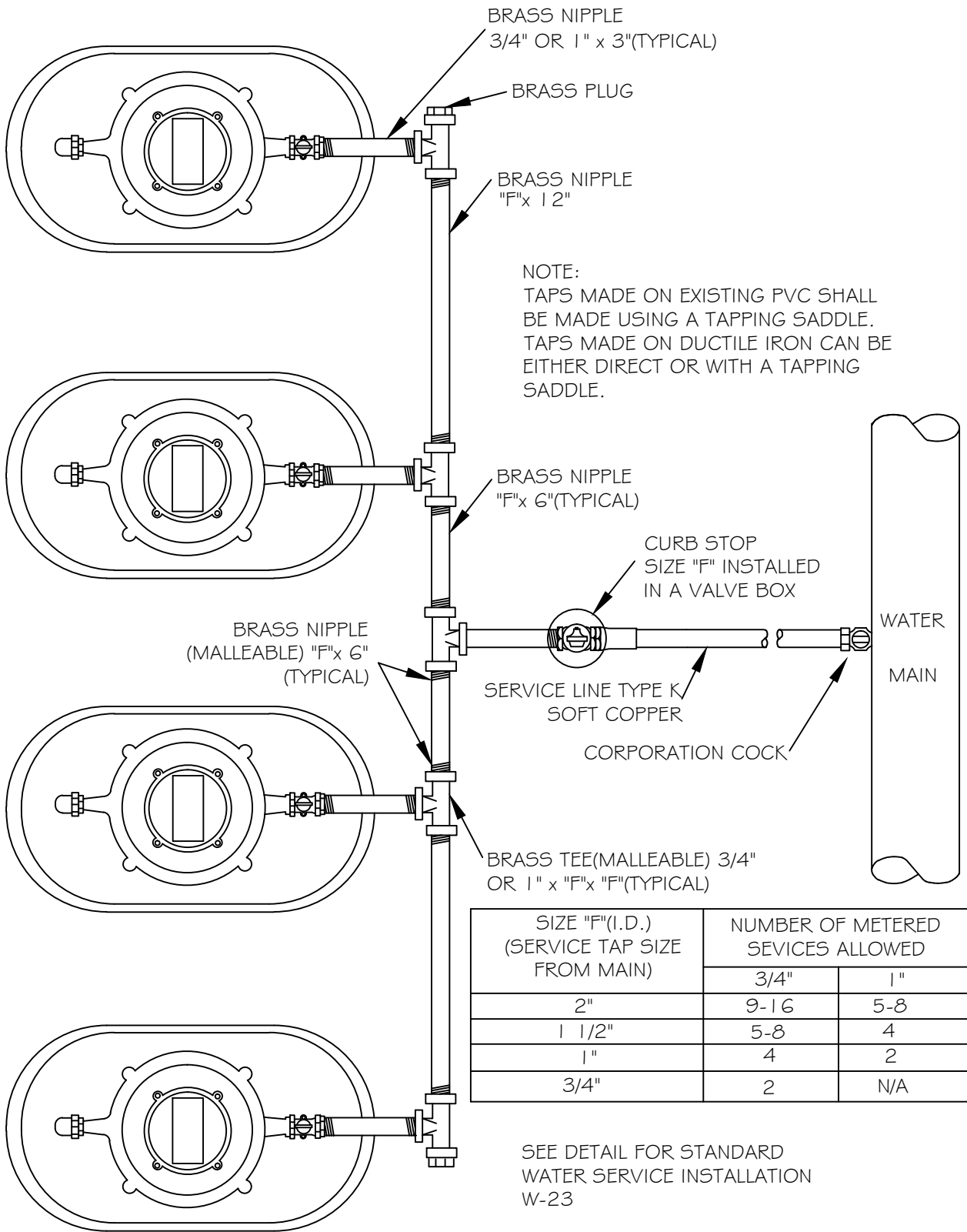


SECTION A-A

CITY OF RALEIGH  
DEPARTMENT OF PUBLIC UTILITIES

WATER METER BOX DETAIL

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-25			ABB	1-20-05
	R.K.V.	8-20-13	J.P.S	11-4-10



NOTE:  
 TAPS MADE ON EXISTING PVC SHALL  
 BE MADE USING A TAPPING SADDLE.  
 TAPS MADE ON DUCTILE IRON CAN BE  
 EITHER DIRECT OR WITH A TAPPING  
 SADDLE.

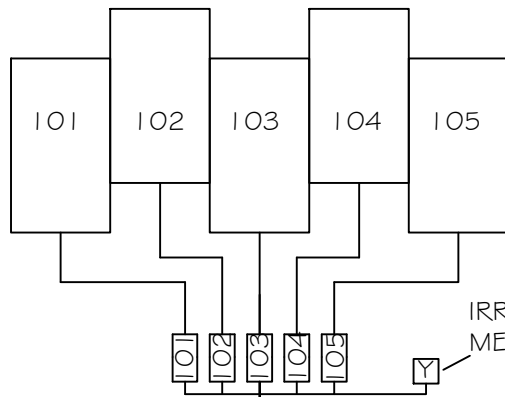
SIZE "F"(I.D.) (SERVICE TAP SIZE FROM MAIN)	NUMBER OF METERED SERVICES ALLOWED	
	3/4"	1"
2"	9-16	5-8
1 1/2"	5-8	4
1"	4	2
3/4"	2	N/A

SEE DETAIL FOR STANDARD  
 WATER SERVICE INSTALLATION  
 W-23

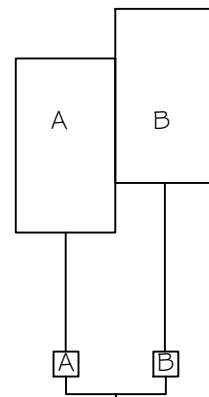
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
<b>STANDARD GANG METER ASSEMBLY</b>				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-26	METERED SERV.	4-1-82	D.W.C.	11-18-99
	Y.C.A.	12-31-91	J.P.S.	11-4-10

ODD NUMBERED ADDRESS

3601



3605

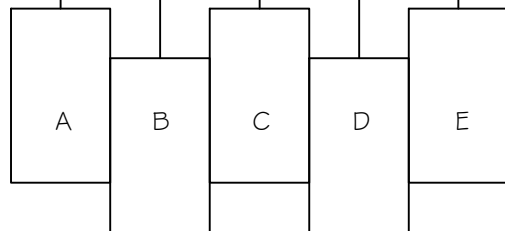


WATER MAIN

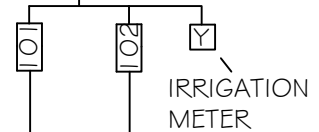
STREET OR PARKING LOT EDGE

STREET OR PARKING LOT EDGE

A B C D E



3600



3604

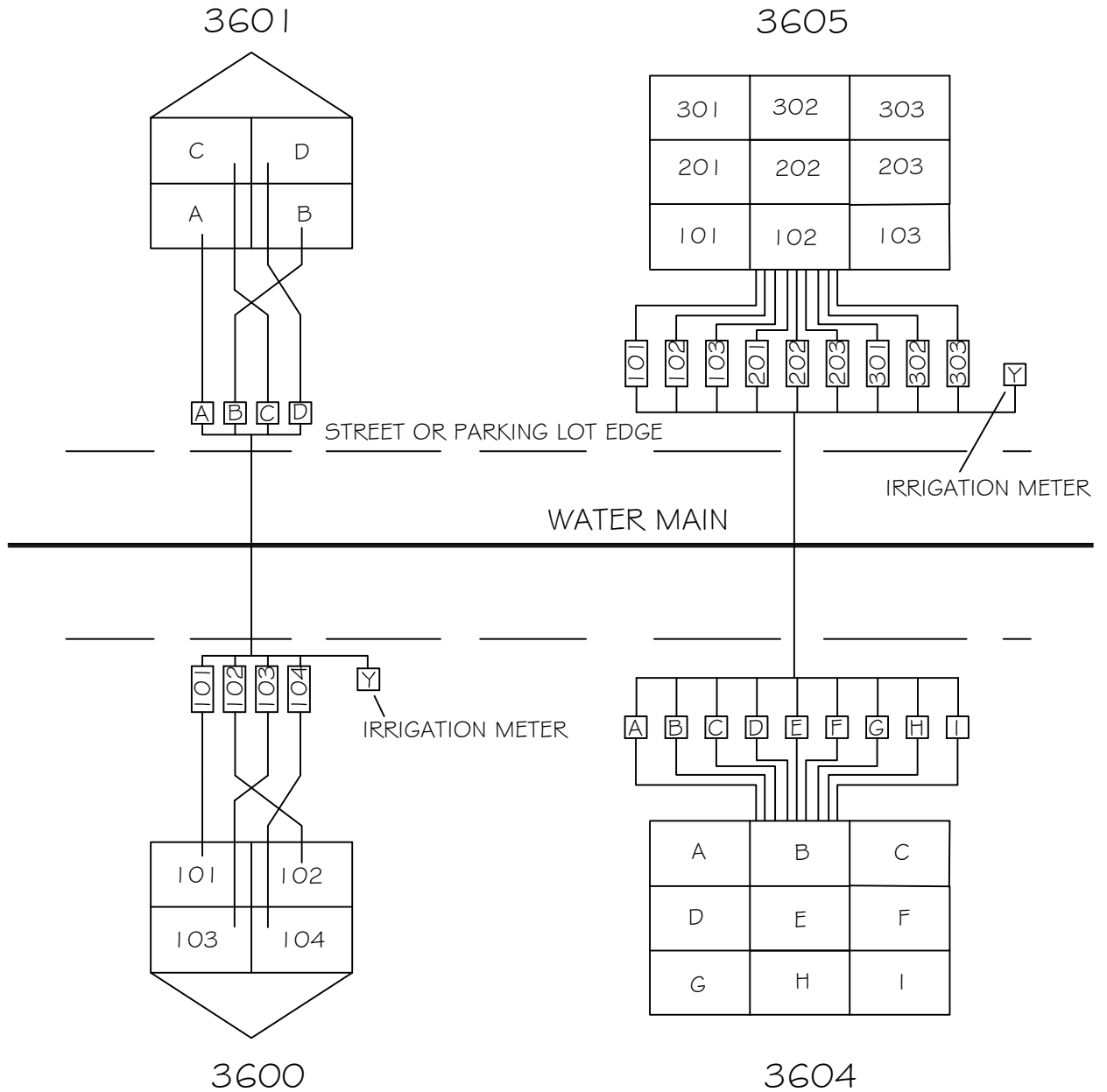
EVEN NUMBERED ADDRESS

NOTES:

1. EVEN NUMBERED UNITS' METERS SHALL BE SET TO BE READ RIGHT TO LEFT (WHEN FACING BUILDING)
2. ODD NUMBERED UNITS' METERS SHALL BE SET TO BE READ LEFT TO RIGHT (WHEN FACING BUILDING)
3. IF IRRIGATION METER IS INCLUDED, IT SHALL BE THE LAST METER IN NUMBERING SEQUENCE.
4. UNIT 'Y' (FOR YARD METER) SHALL BE USED TO INDICATE IRRIGATION METER.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
GANG METER ADDRESSING SINGLE STORY BUILDING				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-27	RRH	3-31-00		
	ABB	6-17-04		

ODD NUMBERED ADDRESS

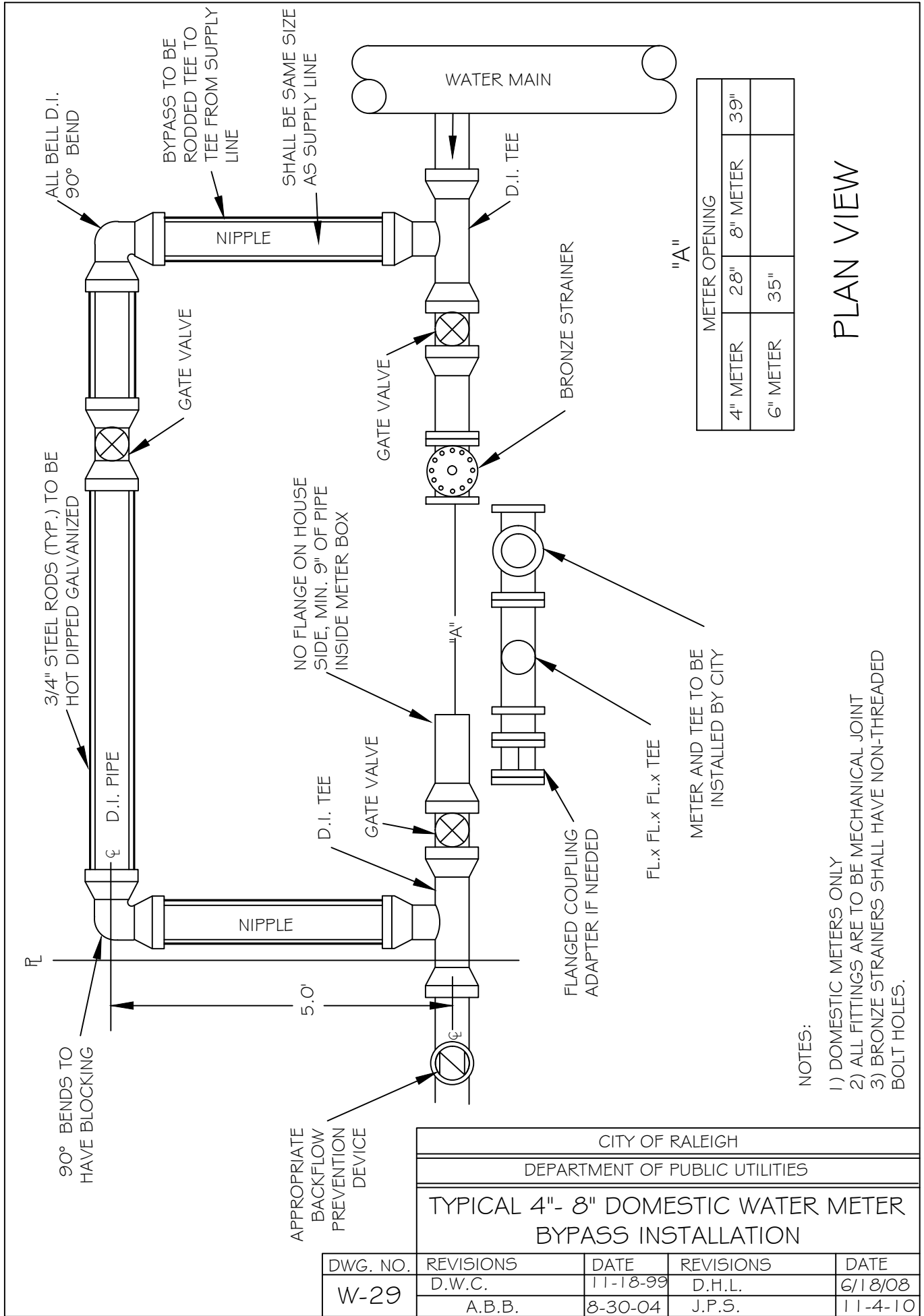


NOTES:

EVEN NUMBERED ADDRESS

1. EVEN NUMBERED UNITS' METERS SHALL BE SET TO BE READ RIGHT TO LEFT (WHEN FACING BUILDING)
2. ODD NUMBERED UNITS' METERS SHALL BE SET TO BE READ LEFT TO RIGHT (WHEN FACING BUILDING)
3. IF IRRIGATION METER IS INCLUDED, IT SHALL BE THE LAST METER IN NUMBERING SEQUENCE.
4. UNIT 'Y' (FOR YARD METER) SHALL BE USED TO INDICATE IRRIGATION METER.

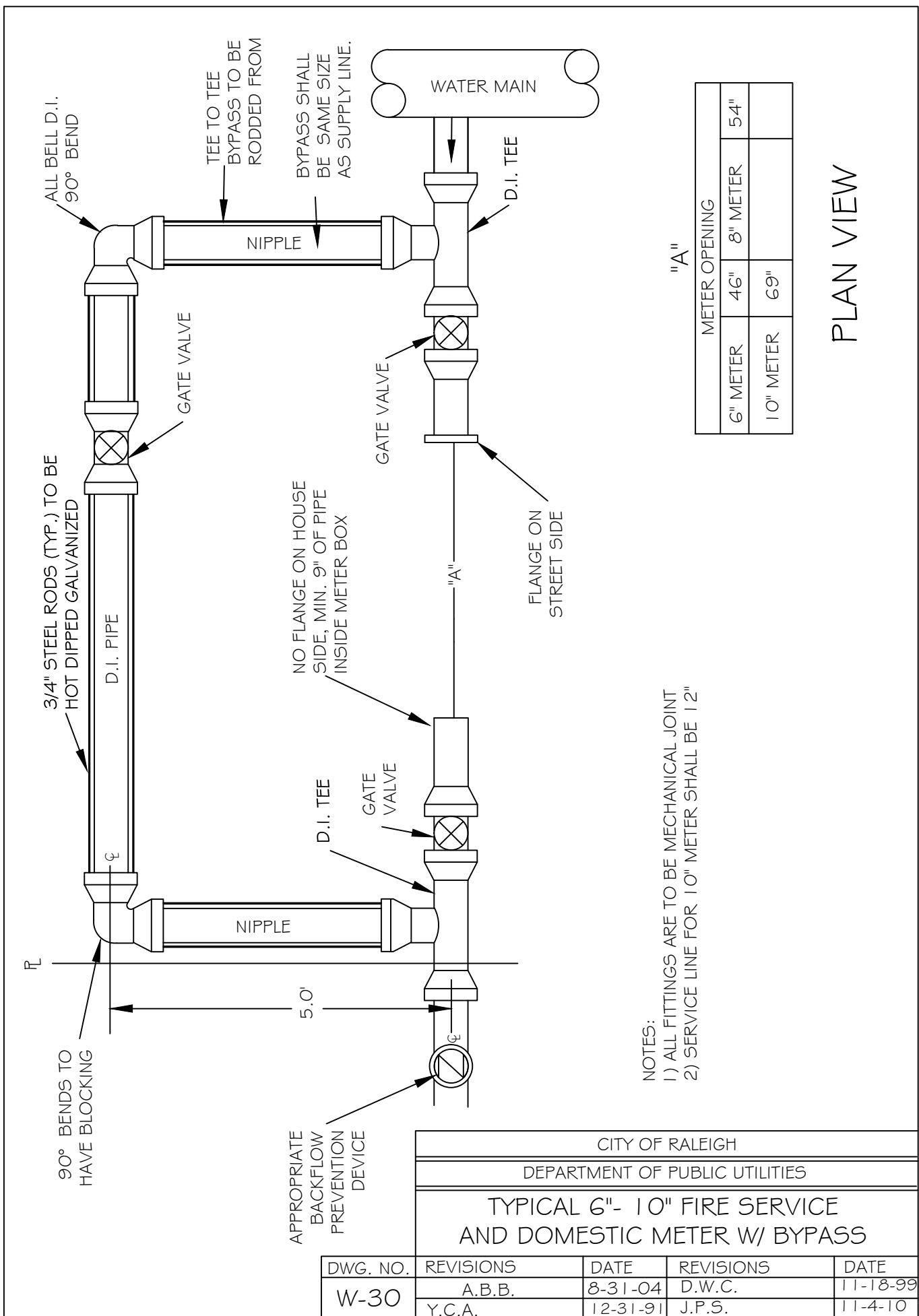
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
GANG METER ADDRESSING MULTI-STORY BUILDING				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-28	ABB	6-17-04	RRH	3-31-00



PLAN VIEW

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL 4"- 8" DOMESTIC WATER METER BYPASS INSTALLATION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-29	D.W.C.	11-18-99	D.H.L.	6/18/08
	A.B.B.	8-30-04	J.P.S.	11-4-10





"A"

METER OPENING	
6" METER	46" 8" METER 54"
10" METER	69"

PLAN VIEW

- NOTES:
- 1) ALL FITTINGS ARE TO BE MECHANICAL JOINT
  - 2) SERVICE LINE FOR 10" METER SHALL BE 1 2"

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL 6"- 10" FIRE SERVICE AND DOMESTIC METER W/ BYPASS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-30	A.B.B.	8-31-04	D.W.C.	11-18-99
	Y.C.A.	12-31-91	J.P.S.	11-4-10

APPROPRIATE BACKFLOW PREVENTION DEVICE

90° BENDS TO HAVE BLOCKING

NO FLANGE ON HOUSE SIDE, MIN. 9" OF PIPE INSIDE METER BOX

3/4" STEEL RODS (TYP.) TO BE HOT DIPPED GALVANIZED

ALL BELL D.I. 90° BEND

TEE TO TEE BYPASS TO BE RODDED FROM

BYPASS SHALL BE SAME SIZE AS SUPPLY LINE.

FLANGE ON STREET SIDE

WATER MAIN

GATE VALVE

GATE VALVE

D.I. TEE

GATE VALVE

NIPPLE

D.I. TEE

NIPPLE

D.I. PIPE

"A"

5.0'

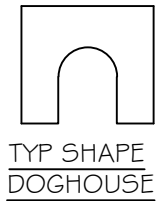
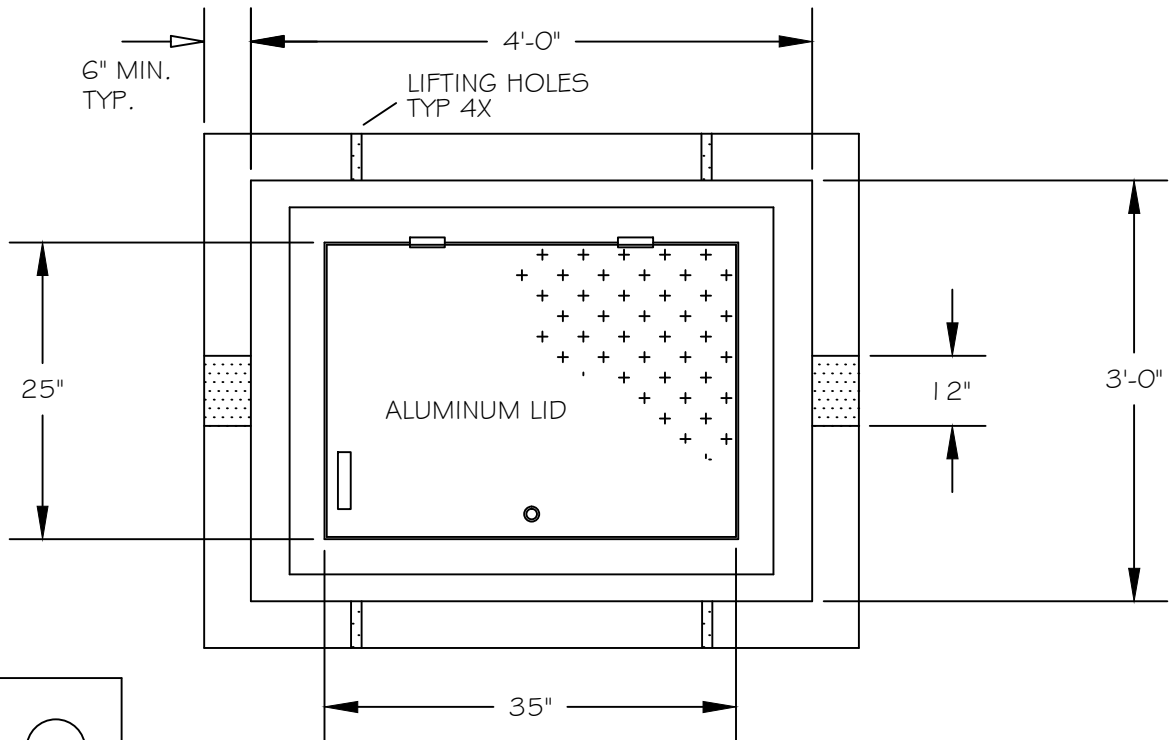
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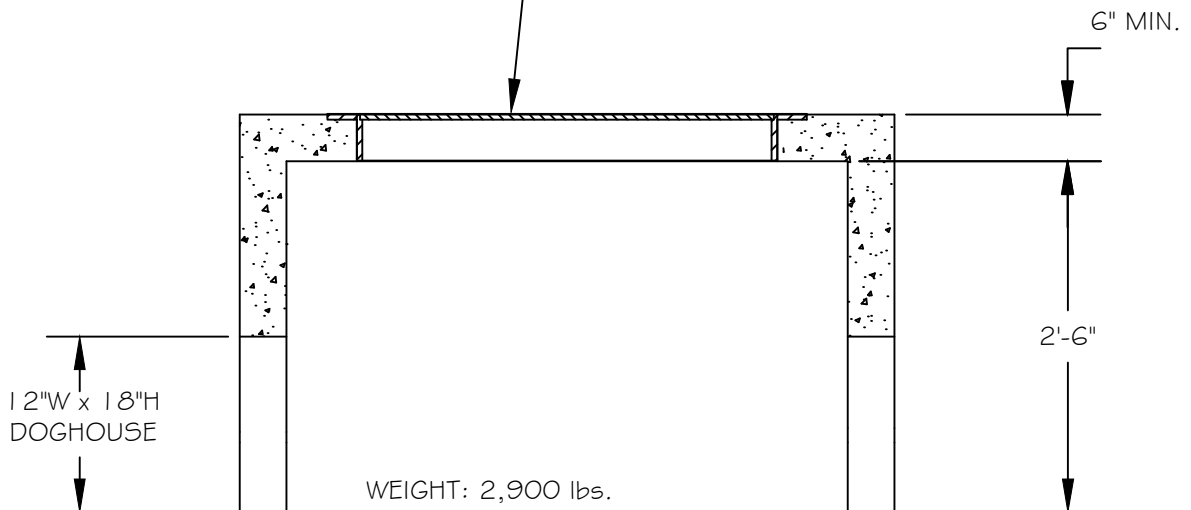
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W-30





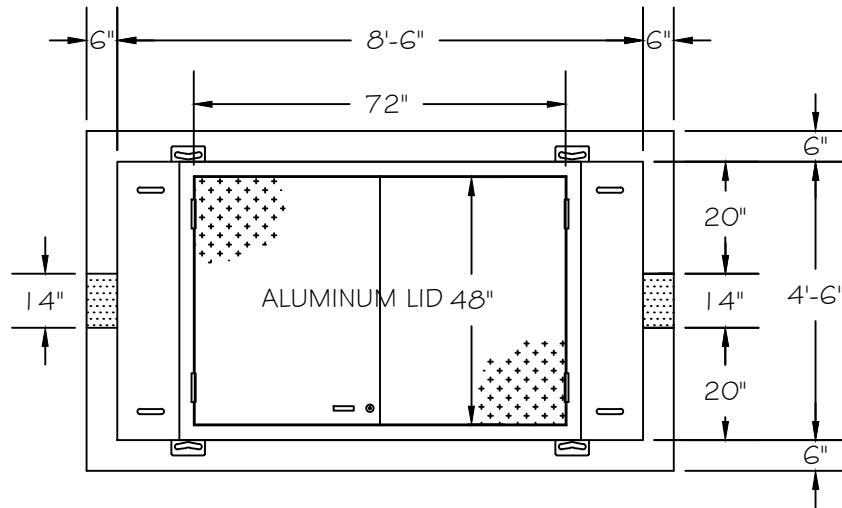
TRAFFIC RATED ACCESS DOOR W/ SLAM LOCK CAST IN TOP



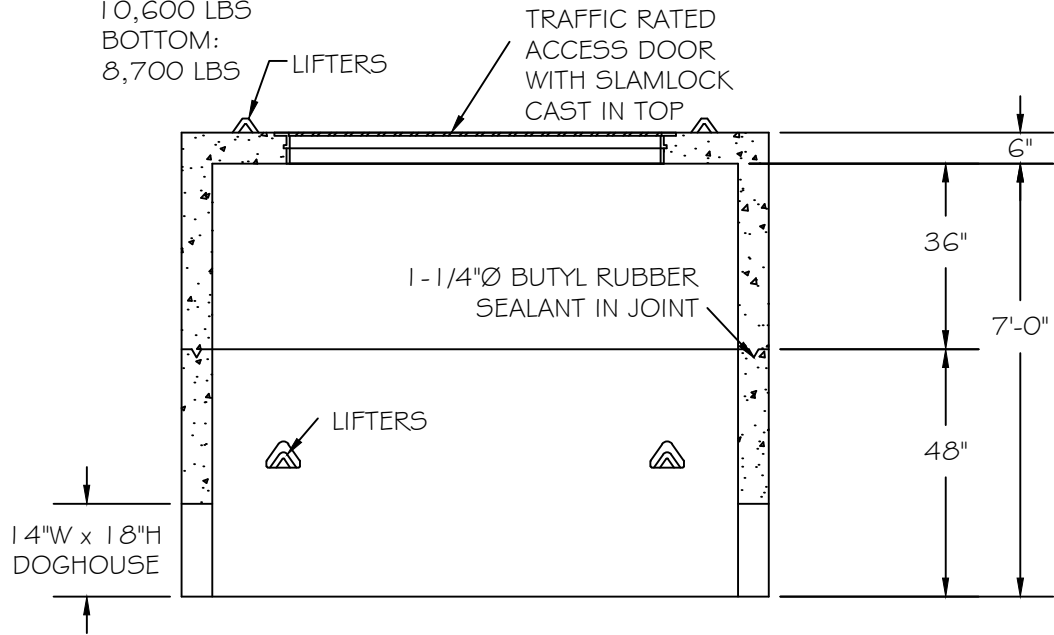
NOTES:

- 1) REINFORCEMENT: #4 @ 6" OCEW
- 2) CONCRETE: 4,000 PSI @ 28 DAYS
- 3) 6" OF #67 STONE SHALL BE PLACED IN BOTTOM OF VAULT
- 4) METER FLANGE SHALL BE PLACED 42" BELOW FINISHED GRADE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL 4" WATER METER VAULT				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-32	A.B.B.	8-26-04		
	D.H.L.	6-18-08		



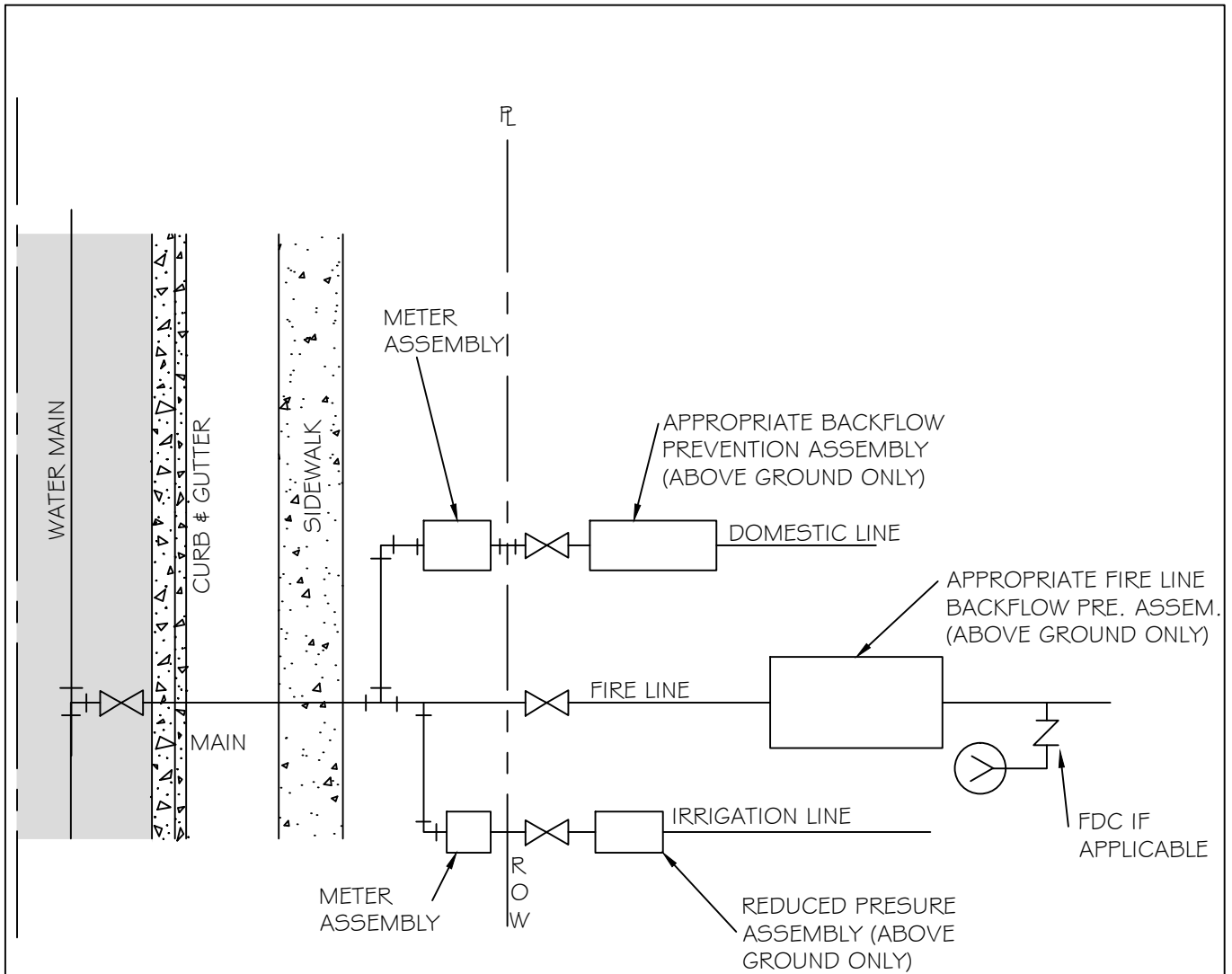
WEIGHT: TOP:  
10,600 LBS  
BOTTOM:  
8,700 LBS



NOTES:

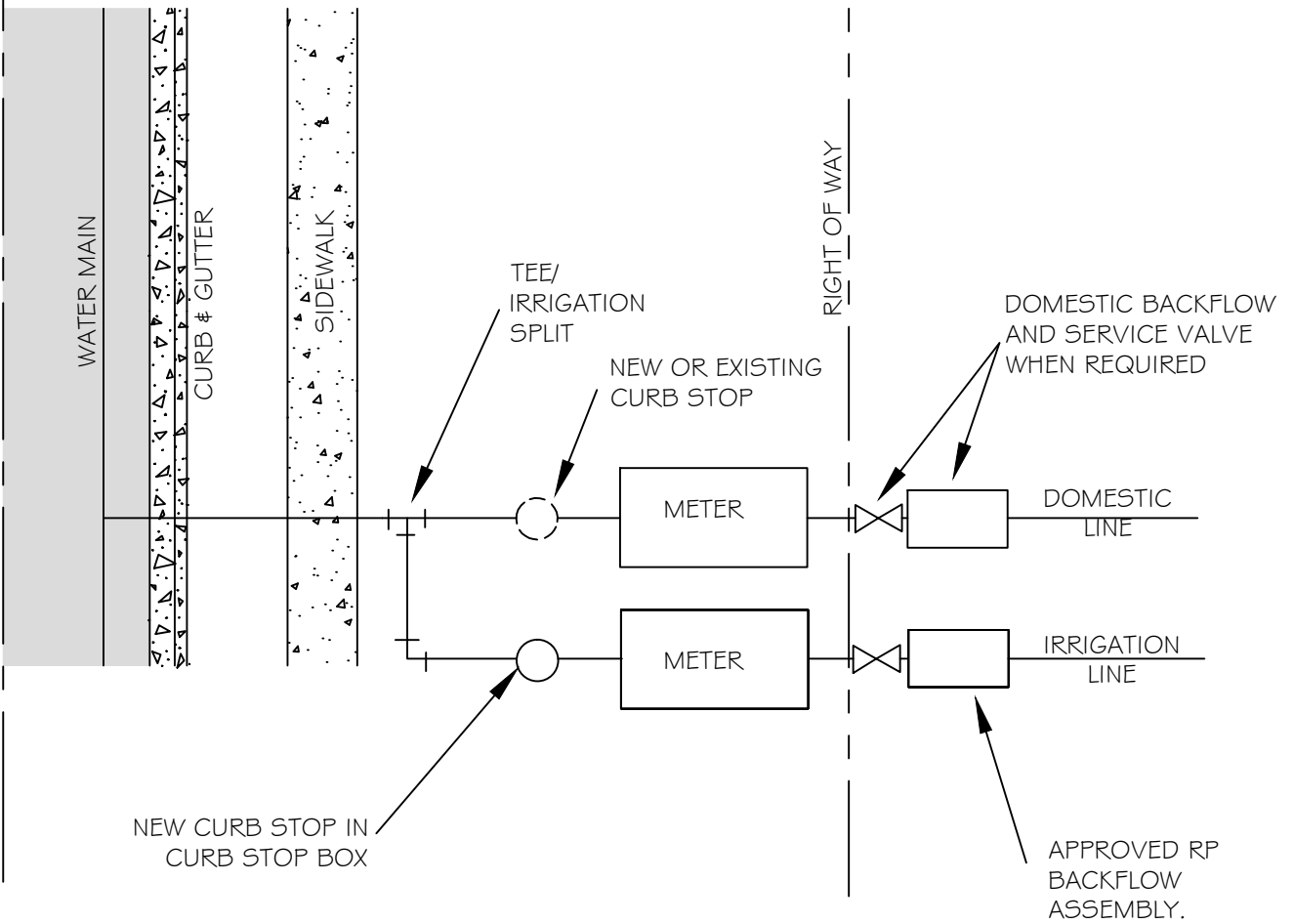
- 1) REINFORCEMENT: #4 @ 6" OCEW
- 2) CONCRETE: 4,000 PSI @ 28 DAYS
- 3) 6" OF #67 STONE SHALL BE PLACED IN BOTTOM OF VAULT
- 4) METER FLANGE SHALL BE PLACED 49" BELOW FINISHED GRADE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL 6" THRU 10" WATER METER VAULT				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-33	A.B.B.	8-26-04		
	D.H.L.	6-18-08		



1. SERVICE TAPS FOR 2" AND SMALLER DOMESTIC SERVICES MAY BE BY CORPORATION COCKS. LARGER SERVICES WILL REQUIRE A TEE AND GATE VALVE OR TAPPING SLEEVE AND VALVE ASSEMBLY AND 90° BEND.
2. DOMESTIC SERVICE TAPS SHALL BE ALLOWED ONLY ON 6" OR LARGER FIRE LINES BEFORE THE BACKFLOW ASSEMBLY.
3. ONE DOMESTIC TAP PER FIRE LINE ON STREET SIDE OF BACKFLOW.
4. FIRE LINE SHALL HAVE A FIRE HYDRANT OR BLOW OFF ASSEMBLY AT ITS END TO FACILITATE FLUSHING WHEN NEEDED.
5. IRRIGATION METER SHALL BE LOCATED ON THE SIDE OF DOMESTIC METER WITH INCREASING ADDRESSES.
6. THE BACKFLOW SHALL BE INSTALLED NO MORE THAN 10' FROM THE METER IN A VISIBLE LOCATION.
7. DOMESTIC/IRRIGATION BACKFLOW RISER/STANDPIPE SHALL BE OF COPPER OR BRASS.
8. THE RP RELIEF VALVE SHALL BE A MINIMUM OF 12" ABOVE ANY MATERIAL (MULCH INCLUDED) OR GRADE.
9. A SERVICE VALVE IS REQUIRED AFTER THE METER BUT BEFORE THE BACKFLOW ASSEMBLY FOR MAINTENANCE AND REPLACEMENT PURPOSES.
10. THE INSTALLATION MUST ALSO MEET ALL CODE REQUIREMENTS PER THE NC PLUMBING CODE.

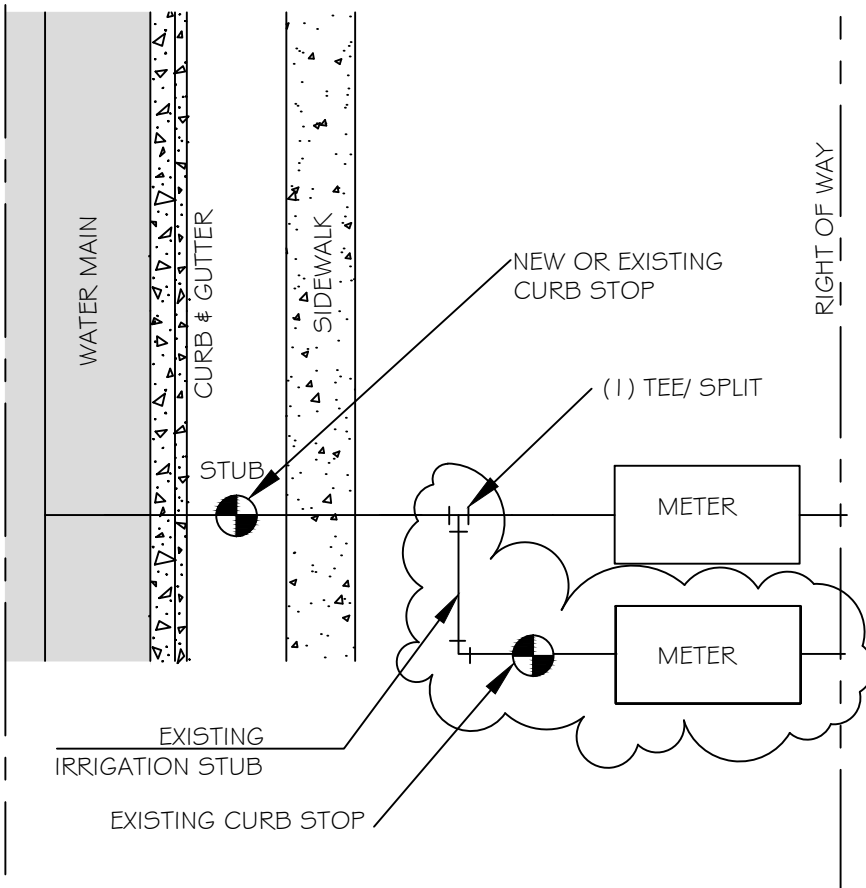
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
<b>FIRE, DOMESTIC &amp; IRRIGATION OPTIONS SCHEMATIC</b>				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-34	D.W.C.	11-18-99	A.B.B.	7-10-04
	RRH	3-31-00	D.H.L.	6/18/08



NOTES:

1. IRRIGATION METER SHALL BE LOCATED ON THE SIDE OF DOMESTIC METER WITH INCREASING ADDRESSES.
2. THE BACKFLOW SHALL BE INSTALLED NO MORE THAN 10' FROM THE METER IN A VISIBLE LOCATION.
3. BACKFLOW RISER/STANDPIPE SHALL BE OF COPPER OR BRASS.
3. THE RP RELIEF VALVE SHALL BE A MINIMUM OF 12" ABOVE ANY MATERIAL (MULCH INCLUDED) OR GRADE.
4. A SERVICE VALVE IS REQUIRED AFTER THE METER BUT BEFORE THE BACKFLOW ASSEMBLY FOR MAINTENANCE AND REPLACEMENT PURPOSES.
5. THE INSTALLATION MUST ALSO MEET ALL CODE REQUIREMENTS PER THE NC PLUMBING CODE.

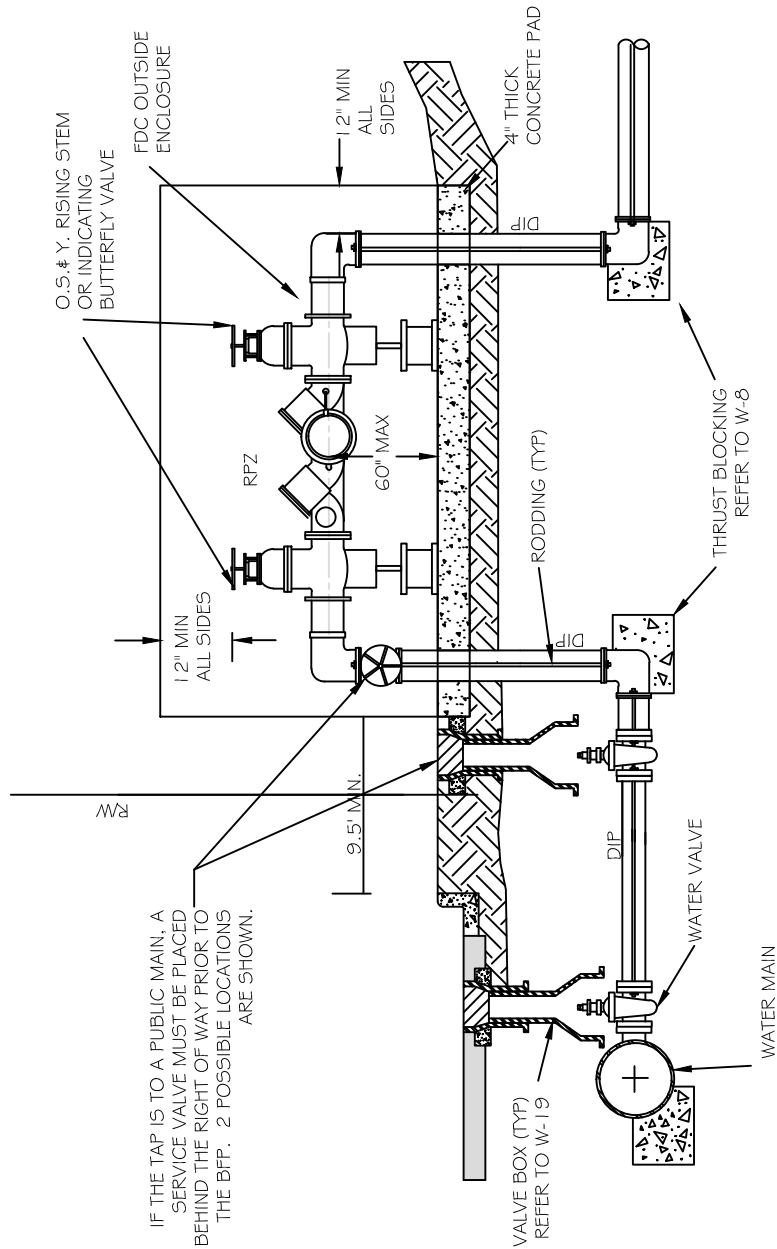
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
IRRIGATION TAP ON NEW AND EXISTING SERVICES				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-35	RRH	3-31-00	D.H.L.	6-18-08
	ABB	7-10-04	J.P.S.	10/25/10



NOTES:

1. Remove tee fitting, repair stub with curb stop & valve box if not existing.
2. Work to be performed by licensed utility contractor, Stub permit inspection required.
3. For repair of existing service, one brass compression coupling and type K copper as needed to be used for repair.
4. Remove meter box and piping. ( Prior to termination the meter division / utility billing must be contacted for meter removal & account closure).

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
Irrigation Meter Termination				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-35T			R.K.V.	6/24/13

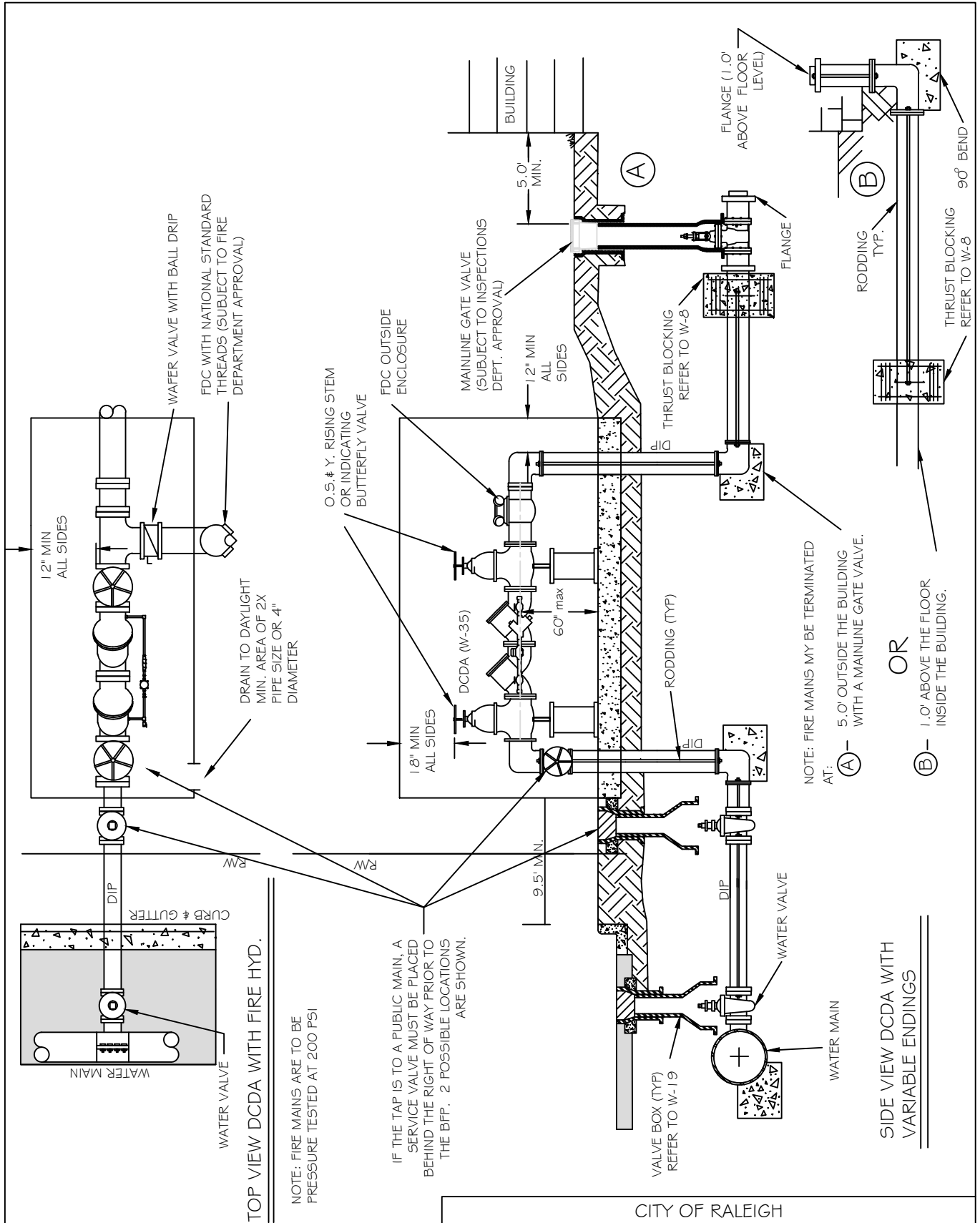


IF THE TAP IS TO A PUBLIC MAIN, A SERVICE VALVE MUST BE PLACED BEHIND THE RIGHT OF WAY PRIOR TO THE BFP. 2 POSSIBLE LOCATIONS ARE SHOWN.

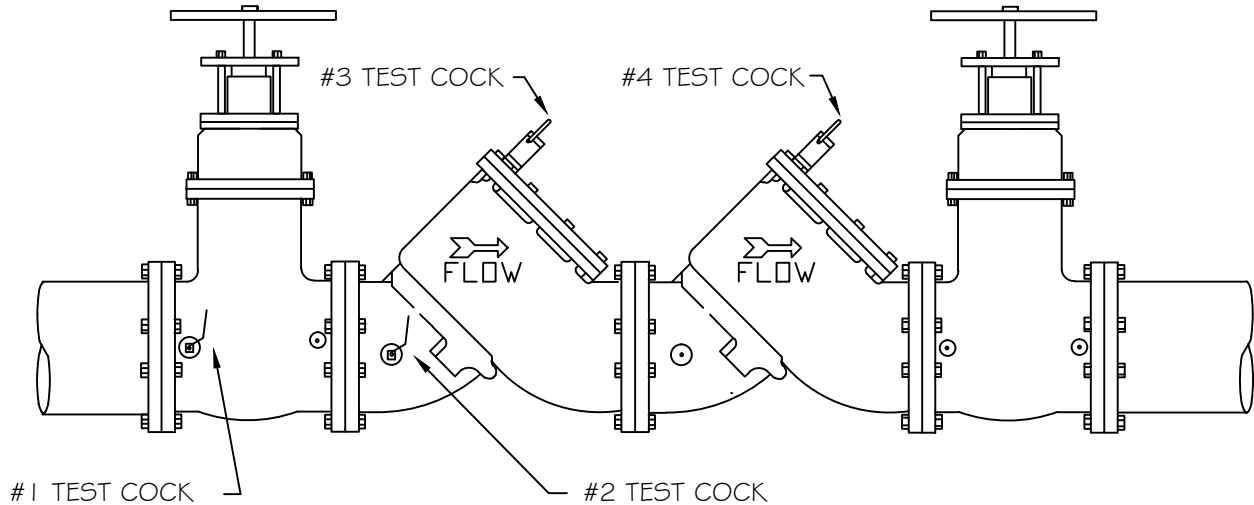
1. ALL ABOVE GROUND ENCLOSURES MUST HAVE ADEQUATE DRAINAGE (TWICE THE DIAMETER OF THE SUPPLY PIPE) TO DAYLIGHT ABOVE GRADE.
2. REDUCED PRESSURE BACKFLOW PREVENTERS MAY BE LOCATED IN A BUILDING PROVIDED THERE ARE NO OTHER UNPROTECTED TAPS BETWEEN THE MAIN AND THE BUILDING. DRAINAGE IN A BUILDING MUST BE TWICE THE DIAMETER OF THE SUPPLY PIPE.
3. ABOVE GROUND INSULATED VAULTS MUST BE ASSE 1060 APPROVED ABOVE GROUND ENCLOSURES. SEE CROSS CONNECTION MANUAL FOR ENCLOSURE FREEZE PROTECTION AND CERTIFICATION REQUIREMENTS.
4. RESIDENTIAL LAWN IRRIGATION R.P. ASSEMBLIES THAT ARE REMOVED TO PREVENT FREEZING IN THE WINTER MONTHS MUST BE CAPPED OFF. ALL ABOVE GROUND ASSEMBLIES, EXCEPT RESIDENTIAL LAWN IRRIGATION ASSEMBLIES, MUST BE PROTECTED FROM FROST.
6. FOR ENCLOSURE DIMENSIONS SEE DETAIL W-34.
7. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
8. ALL ASSEMBLIES MUST BE ON THE CURRENT APPROVAL LIST.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL REDUCED PRESSURE ZONE BACKFLOW PREVENTER ASSEMBLY				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-36	Y.C.A.	12-31-91	A.B.B.	7-10-04
	D.W.C.	11-8-99	D.H.L.	6/18/08



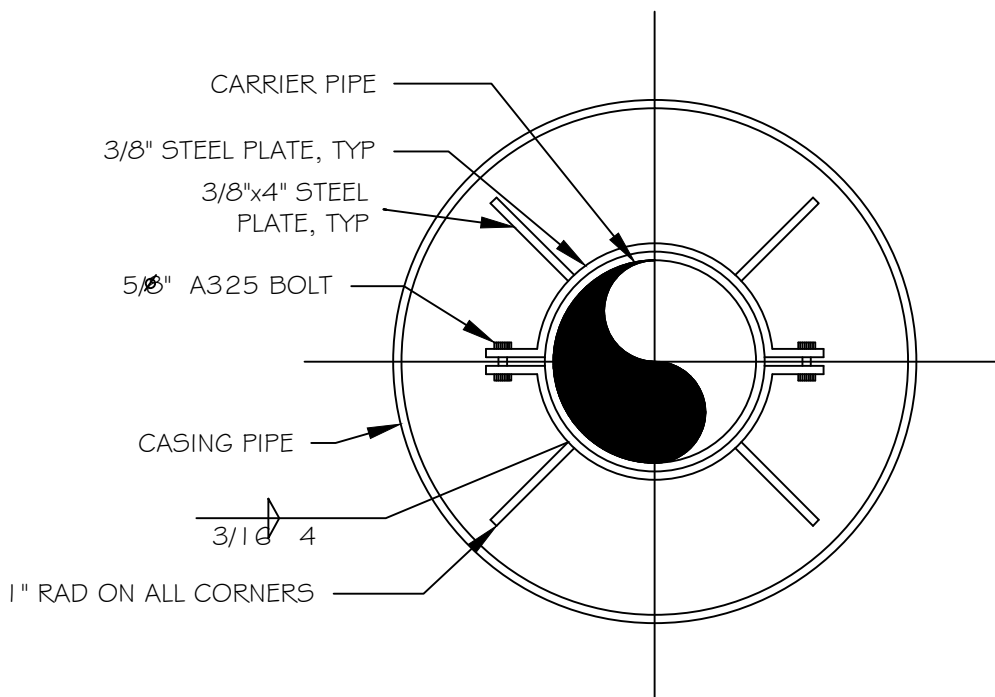


CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL FIRE MAIN DOUBLE DETECTOR CHECK VALVE ASSEMBLY				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-37	Y.C.A.	6-92	ABB	10-4-04
	D.W.C.	11-3-99	D.H.L.	6/18/08



1. SHUT-OFF VALVES, CHECK VALVES, AND TEST COCKS SHALL BE STANDARD TO THE APPROVED BACKFLOW ASSEMBLY.
2. ALL LARGE(2-1/2" - 10") ASSEMBLIES TO BE SUPPORTED BY A CRADLE.
3. ENCLOSURE FOUNDATIONS SHALL BE CONSTRUCTED OF 4" OF CONCRETE OR 6" OF STONE.
4. ASSEMBLIES MUST BE ON CURRENT APPROVAL LIST.
5. 2 1/2" AND LARGER ASSEMBLIES SHALL BE FUSION BONDED EPOXY COATED INCLUDING SHUTOFF VALVES.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD DOUBLE CHECK VALVE ASSEMBLY				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-38	D.W.C.	12-29-99	A.B.B.	4-13-04
	RRH	3-31-00	D.H.L.	6/18/08

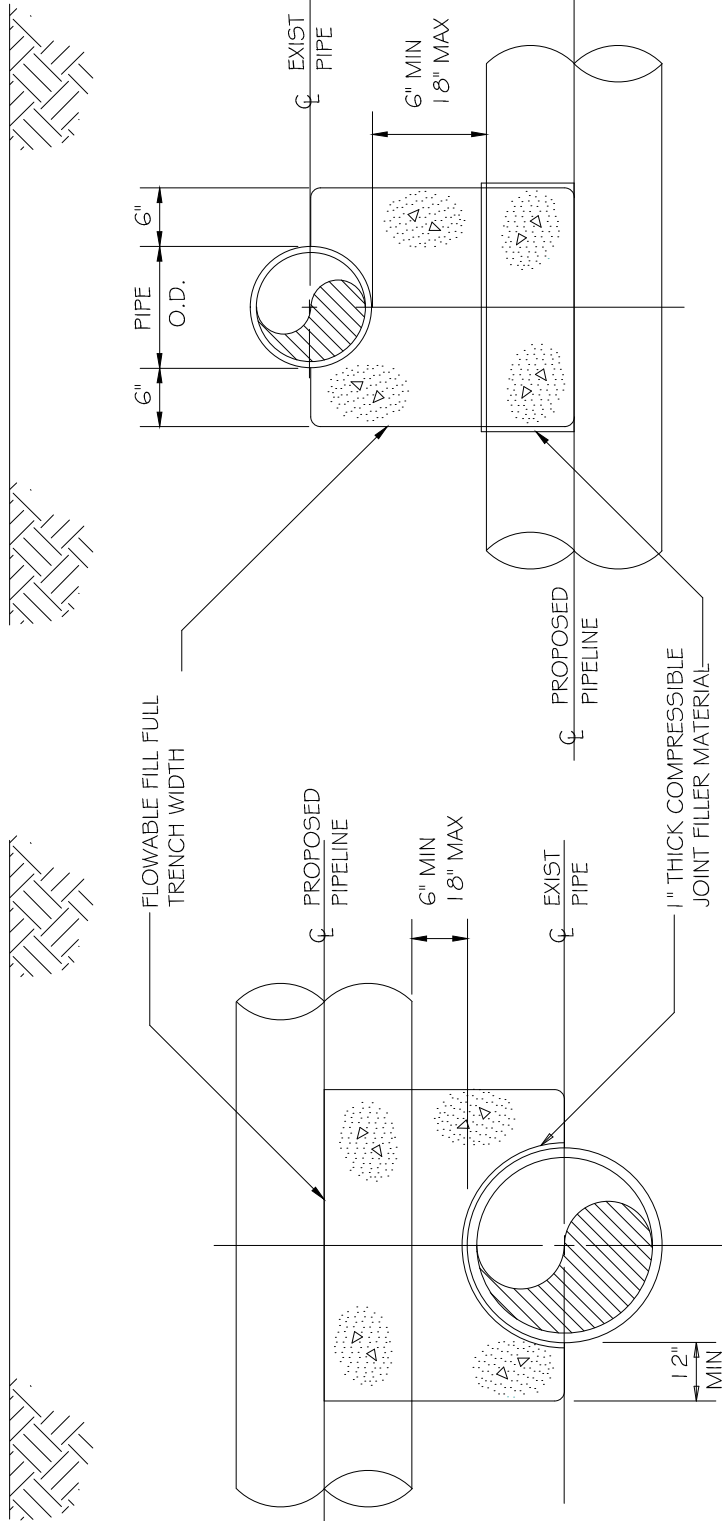


NOTE:

1) USE A MINIMUM OF TWO SPIDERS PER PIPE JOINT ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT ENDS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
PIPE ALIGNMENT GUIDE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-40	RRH	3-31-00		
	A.B.B.	4-16-04		

NOTE: NO ENCASMENT REQUIRED FOR SPACE GREATER THAN 18" FOR WATER LINES



PROPOSED PIPELINE UNDER EXISTING PIPE

PROPOSED PIPELINE OVER EXISTING PIPE

CITY OF RALEIGH  
DEPARTMENT OF PUBLIC UTILITIES

CONCRETE CRADLE PROTECTION FOR WATER LINE CROSSINGS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-41	DHL	2-20-08		