

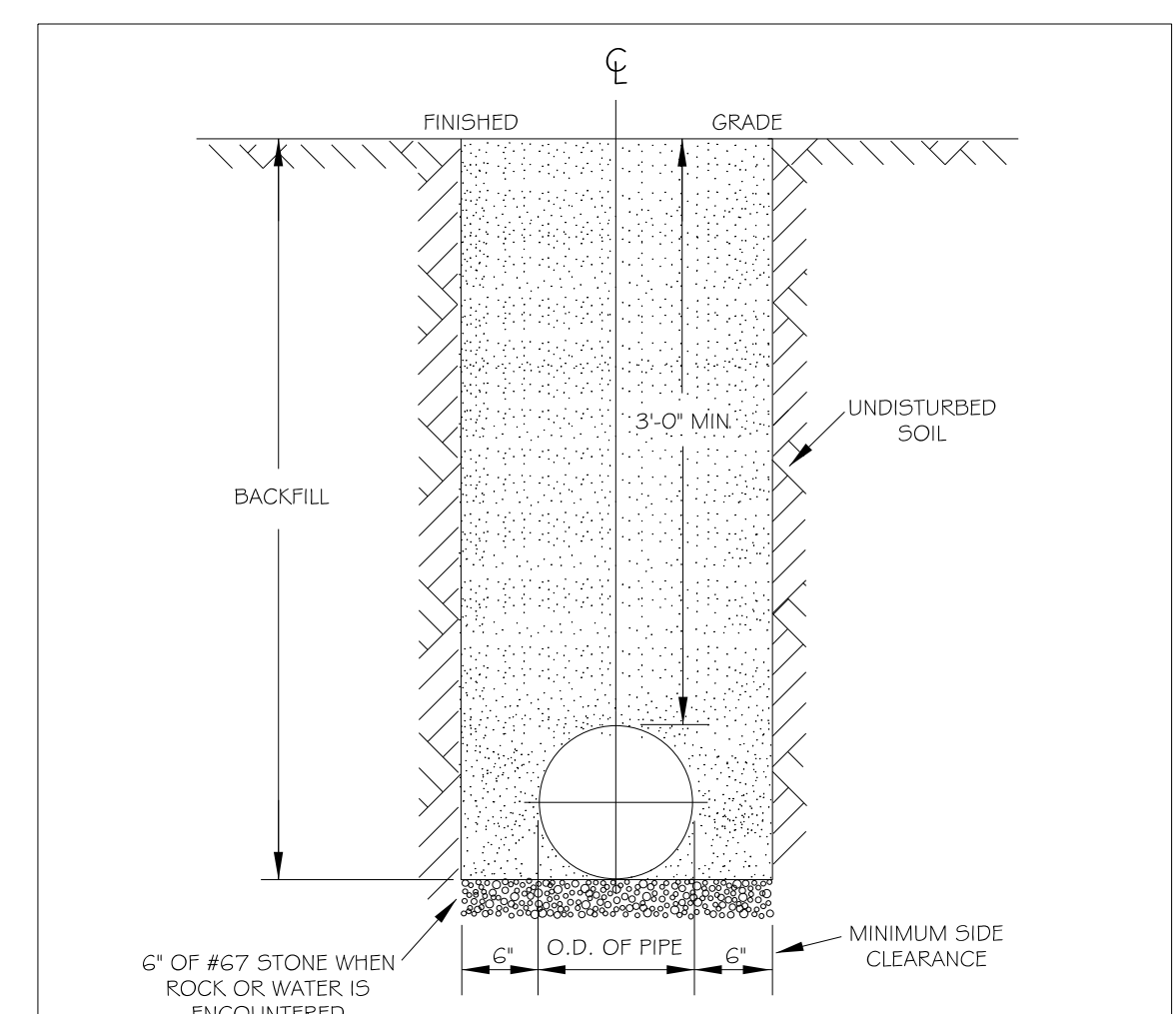


AECOM TECHNICAL SERVICES OF NORTH CAROLINA, INC.
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919-461-1100
F-0342

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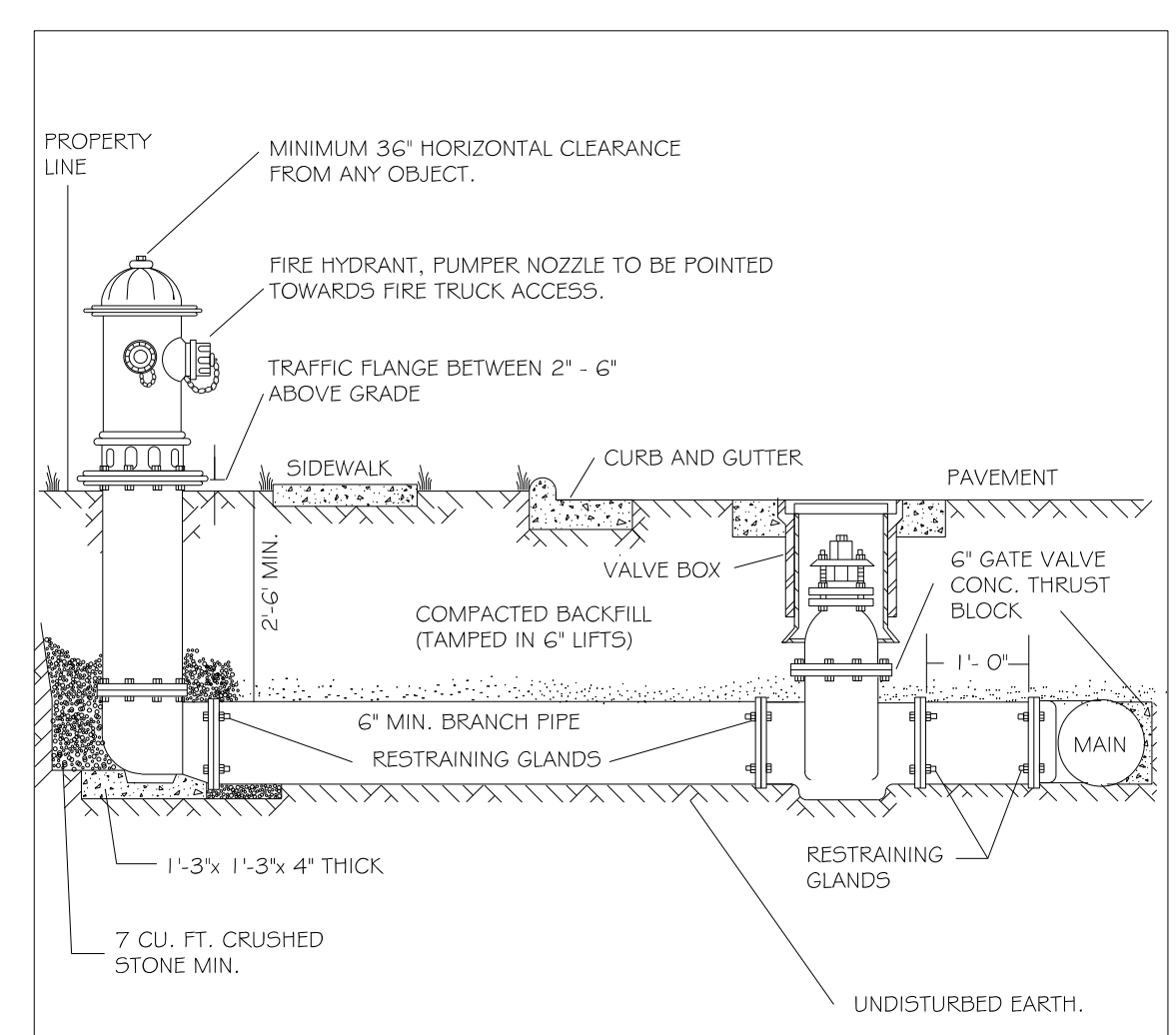
PROJECT REFERENCE NO.	SHEET NO.
B-4654	UC-3A
DESIGNED BY:	1/11/2024
DRAWN BY:	NORTH CAROLINA PROFESSIONAL SEAL 10666
CHECKED BY:	STEPHEN SCRUGGS
APPROVED BY:	D. Stephen Scruggs
REVISED:	PLANS ONLY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SECTION PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION



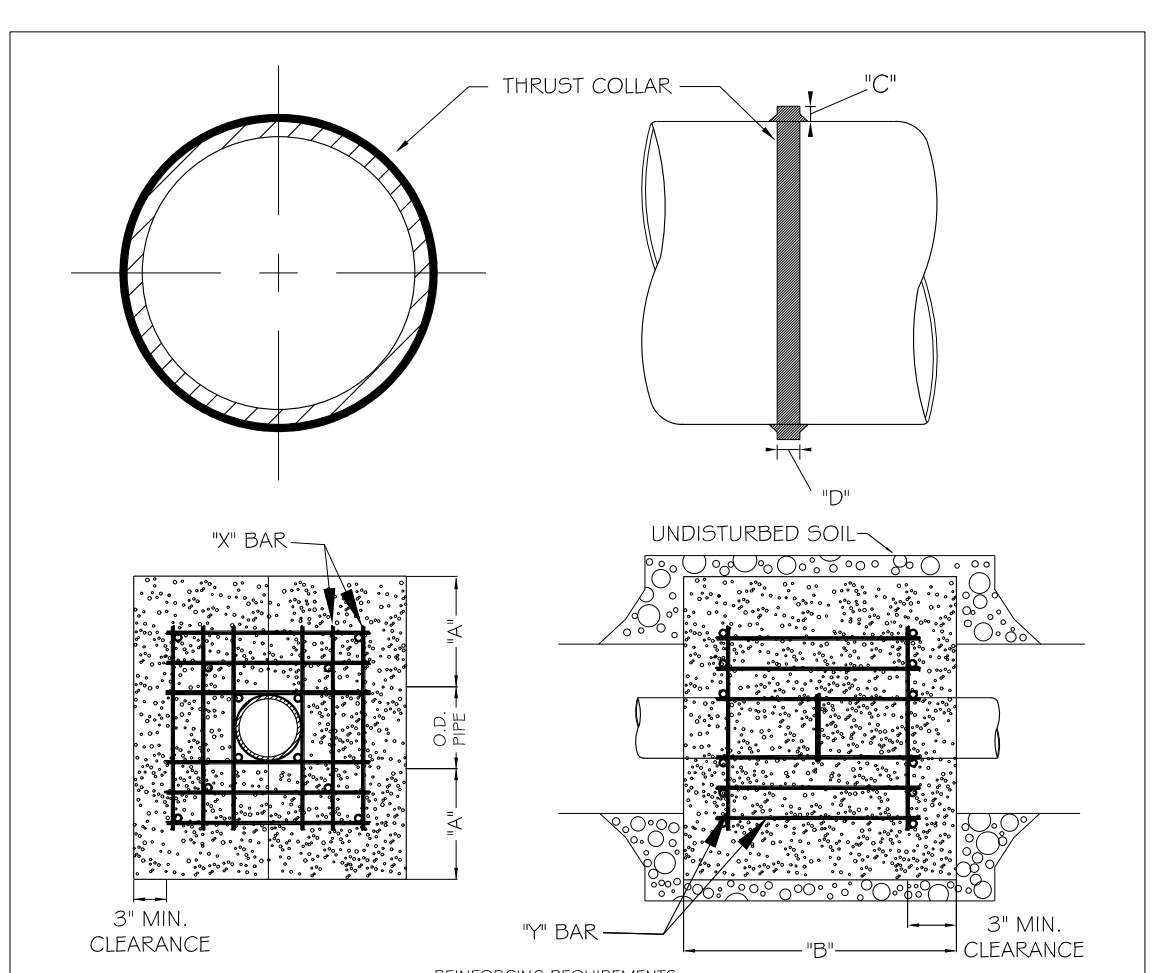
- NOTES:
- TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
 - NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN BACKFILL.
 - ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
 - BACKFILL SHALL BE TAMPED IN 6" LIFTS.
 - ACHIEVE 95%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

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS & BACKFILL 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:
- FIRE HYDRANT SHALL BE AS MANUFACTURED: MUELLER, AMERICAN DARING, KENNEDY, MH, WATEROUS, CLOW, EAST JORDAN IRON WORKS, OR US PIPE.
 - BRANCH PIPE SHALL BE DUCTILE IRON AWWA C150-96
 - 6" GATE VALVE SHALL BE AWWA C500-96 OPEN LEFT
 - STEEL RODS AND BOLTS SHALL BE #1 HOT DIPPED GALVANIZED
 - 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

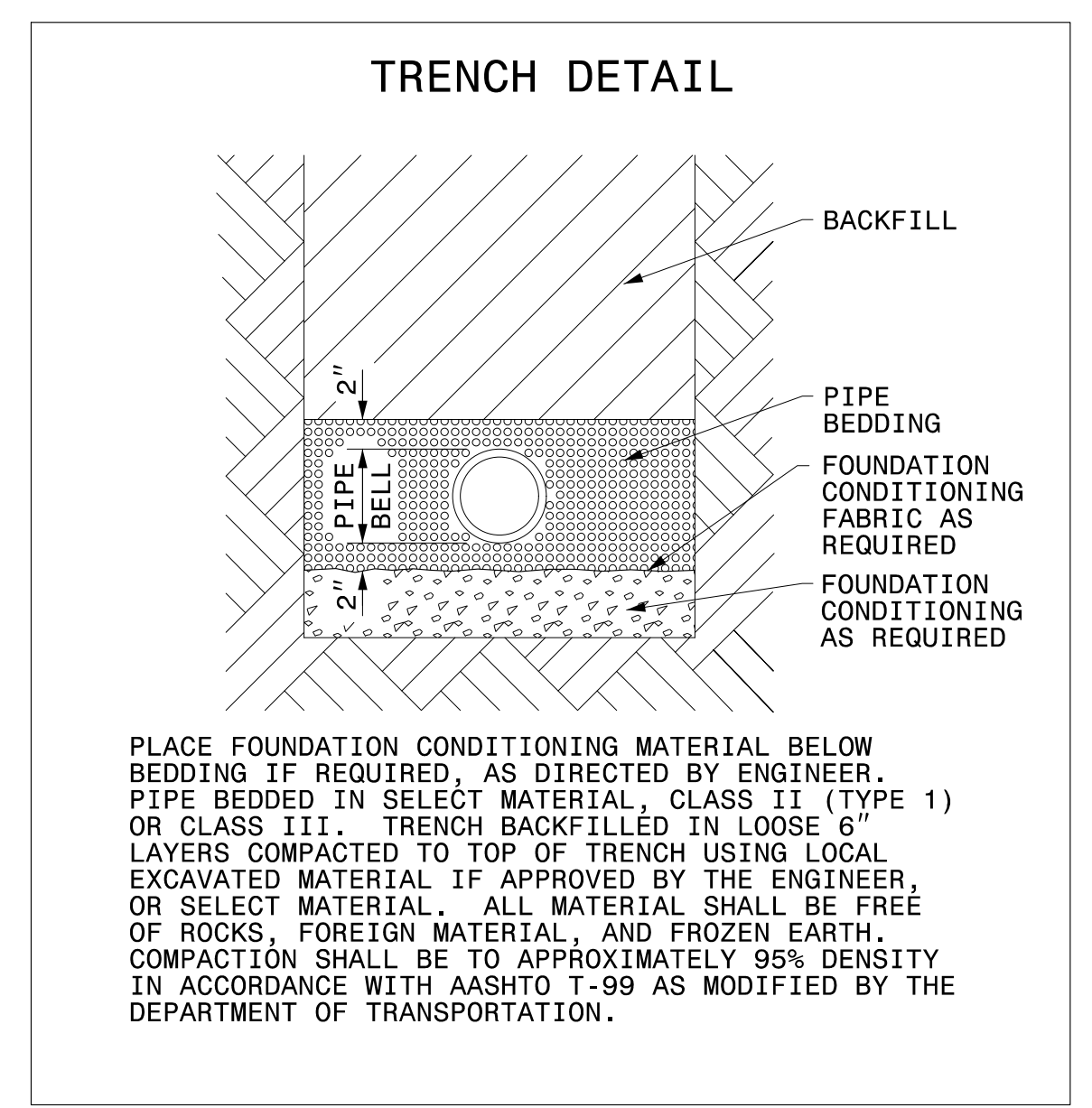
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD FIRE HYDRANT INSTALLATION DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-4	ABB	4-6-04	FAP	2/17/09
	D.H.L.	2/14/08		



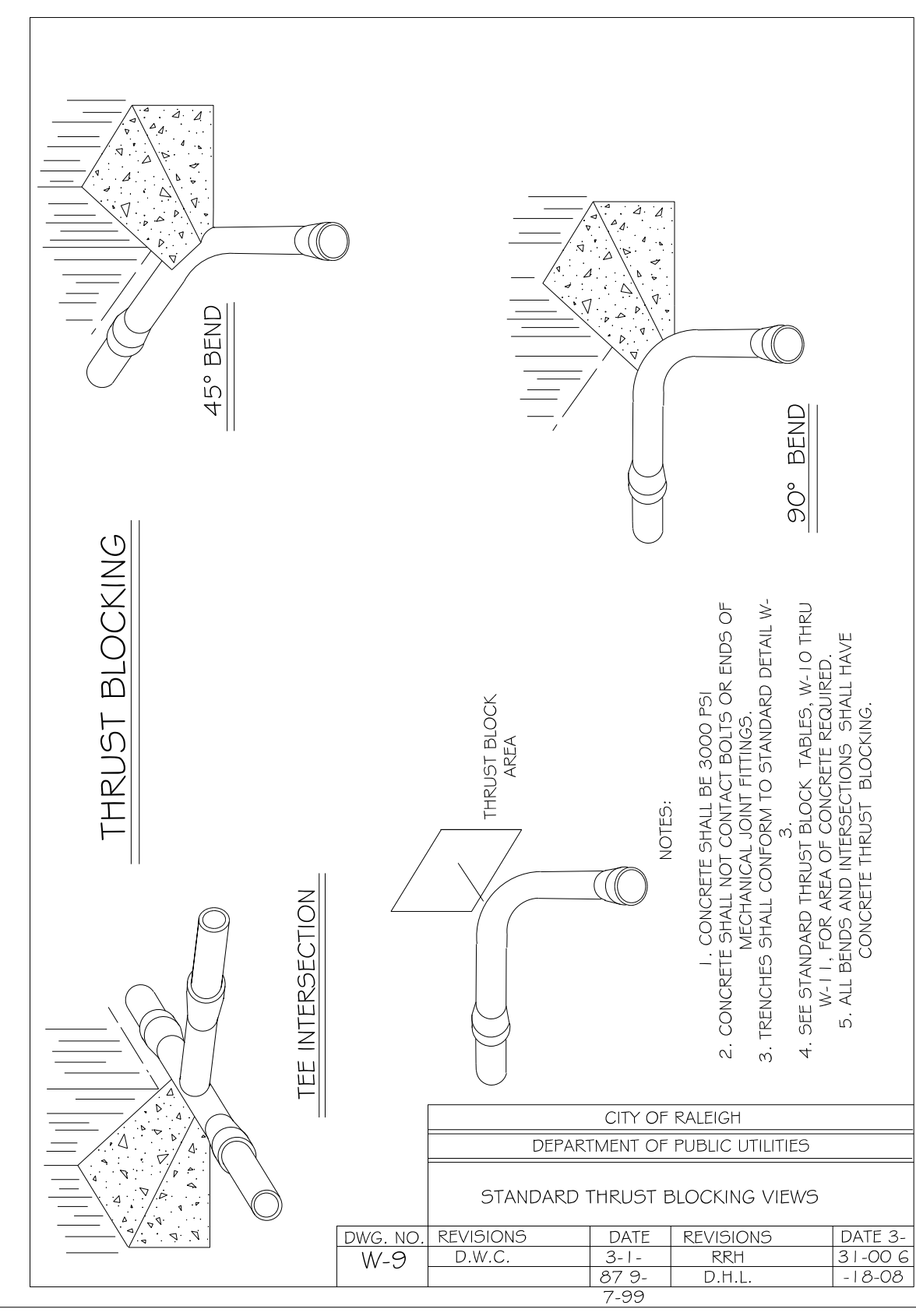
REINFORCING REQUIREMENTS					
I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT
6" - 36"	#4	2'-2" O.D. PIPE	1.502 LBS/FT	1'-3"	1.1 LBS EACH
40" & greater	#6	3'-0" O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS EACH

- NOTES:
- SEE STANDARD DETAIL W-9 FOR THRUST BLOCK LOCATIONS.
 - CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
 - REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
 - TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL W-3.
 - BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL W-3.
 - 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		



PLACE FOUNDATION CONDITIONING MATERIAL BELOW BEDDING IF REQUIRED, AS DIRECTED BY ENGINEER. PIPE BEDDED IN SELECT MATERIAL, CLASS II (TYPE 1) OR CLASS III. TRENCH BACKFILLED IN LOOSE 6" LAYERS COMPACTED TO TOP OF TRENCH USING LOCAL EXCAVATED MATERIAL IF APPROVED BY THE ENGINEER, OR SELECT MATERIAL. ALL MATERIAL SHALL BE FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH. COMPACTION SHALL BE TO APPROXIMATELY 95% DENSITY IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY THE DEPARTMENT OF TRANSPORTATION.



THRUST BLOCKING

TEE INTERSECTION

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

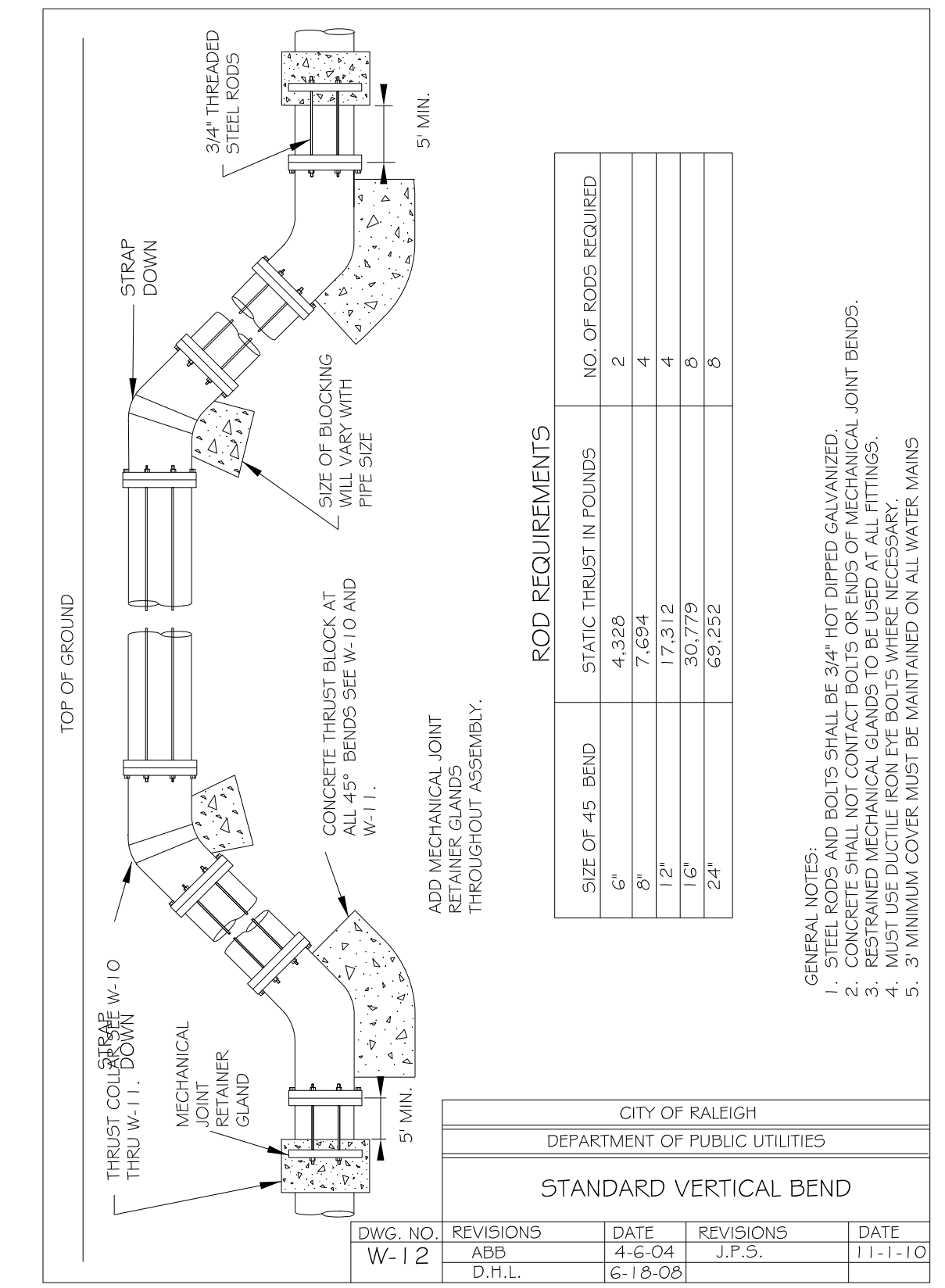
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD THRUST BLOCKING VIEWS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-9	D.W.C.	3-1-	RRH	31-00 G
		87-9-	D.H.L.	-18-08
		7-99		

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	SOIL TYPE										
	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY	SOFT CLAY	GRAVICOSS SAND	COARSE SAND	ADHESIVE DRY CLAY	SAND, COMPACT FIRM	SAND, CLEAN DRY	SOIL, LOOSE	ROCKY SOIL	ROCKY FLOOR
6"	11 1/4"	1,108	1	1	1	1	1	1	2	1	
22 1/2"	2,207	1	2	2	1	1	1	3	1		
45°	4,328	2	3	3	1	1	2	5	1		
90°	7,996	2	4	5	1	1	2	8	1		
PLUG	5,655	2	3	4	1	1	2	6	1		
8"	11 1/4"	1,970	1	1	2	1	1	2	1		
22 1/2"	3,922	1	2	3	1	1	1	4	1		
45°	7,694	2	4	5	1	1	2	8	1		
90°	14,215	4	8	9	2	2	4	15	2		
PLUG	10,053	3	5	6	2	2	3	10	1		
12"	11 1/4"	4,433	2	3	3	1	1	2	5	1	
22 1/2"	8,826	3	5	6	2	2	3	9	1		
45°	17,312	5	9	11	3	3	5	18	2		
90°	31,963	8	16	19	4	4	8	32	4		
PLUG	22,619	6	12	14	3	3	6	23	3		
16"	11 1/4"	7,881	2	4	5	1	1	2	8	1	
22 1/2"	15,691	4	8	10	2	2	4	16	2		
45°	30,779	8	16	19	4	4	8	31	4		
90°	56,861	15	29	35	8	8	15	57	6		
PLUG	40,213	10	21	25	5	5	10	41	5		

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
THRUST BLOCKING DESIGN QUANTITY TABLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-10	D.W.C.	-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	SOIL TYPE									
	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY	SOFT CLAY	GRAVICOSS SAND	COARSE SAND	ADHESIVE DRY CLAY	SAND, COMPACT FIRM	SAND, CLEAN DRY	SOIL, LOOSE	ROCKY SOIL
24"	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	
30"	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	
36"	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	
48"	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	

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
THRUST BLOCKING DESIGN QUANTITY TABLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
W-11	D.W.C.	23-99		



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	8
16"	30,779	16
24"	69,252	32

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		