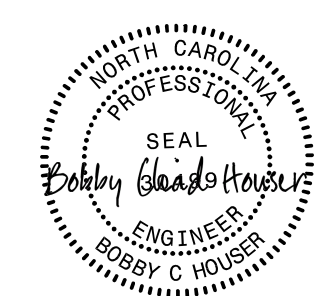
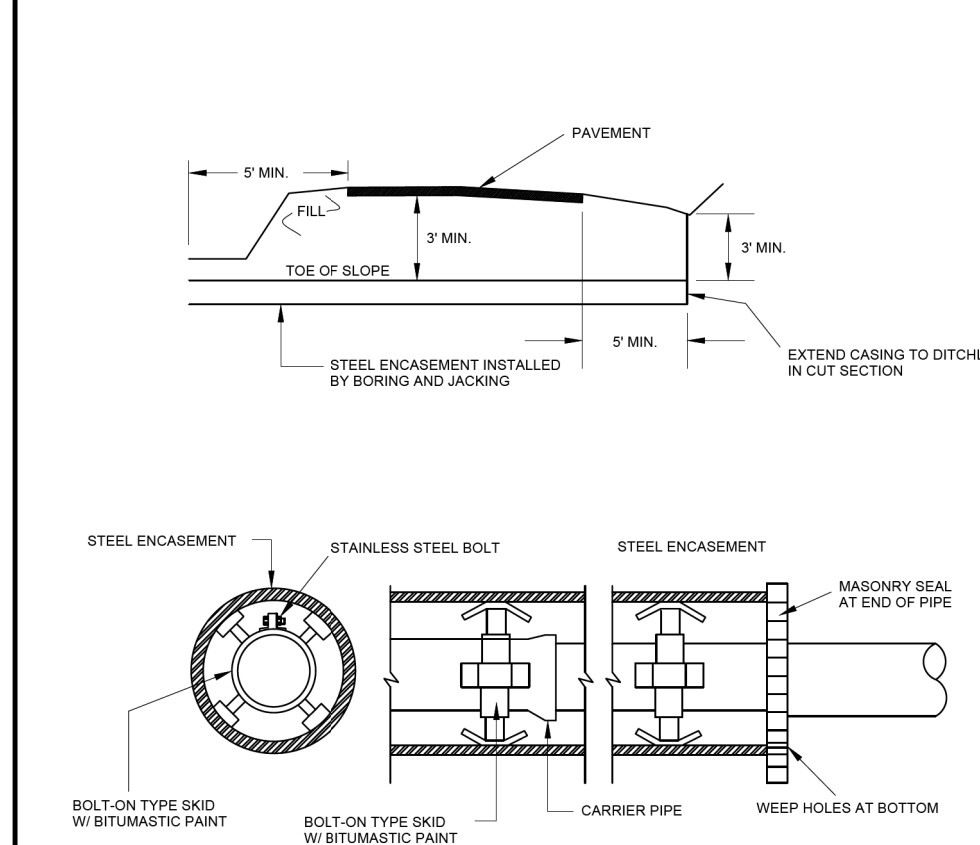


PROJECT TYPICAL DETAILS

PROJECT REFERENCE NO.	SHEET NO.
B-5869	UC-3A
DESIGNED BY: BCH	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

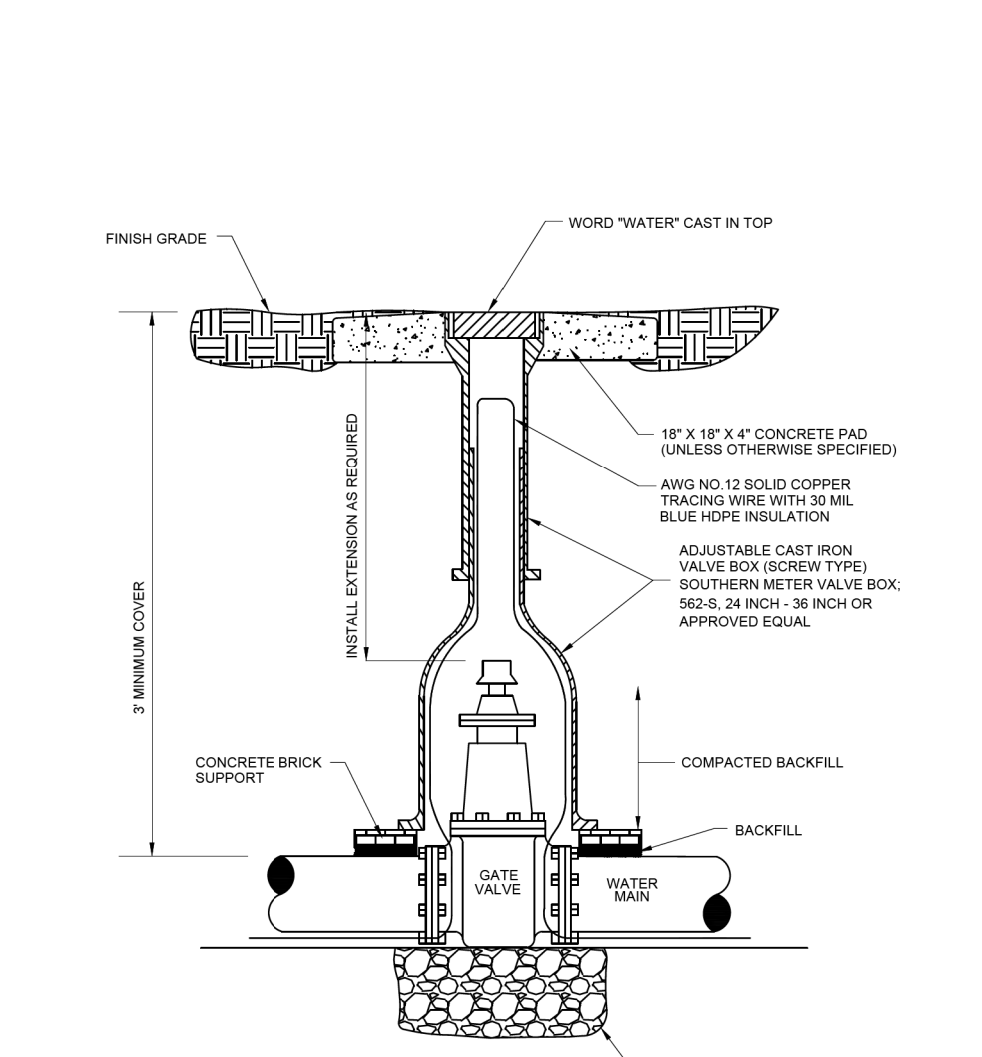


BORE ENCASEMENT DETAIL

NOT TO SCALE

REVISED	3-4-13
STD. NO.	DATE
109	3-7-11

CITY OF MORGANTON

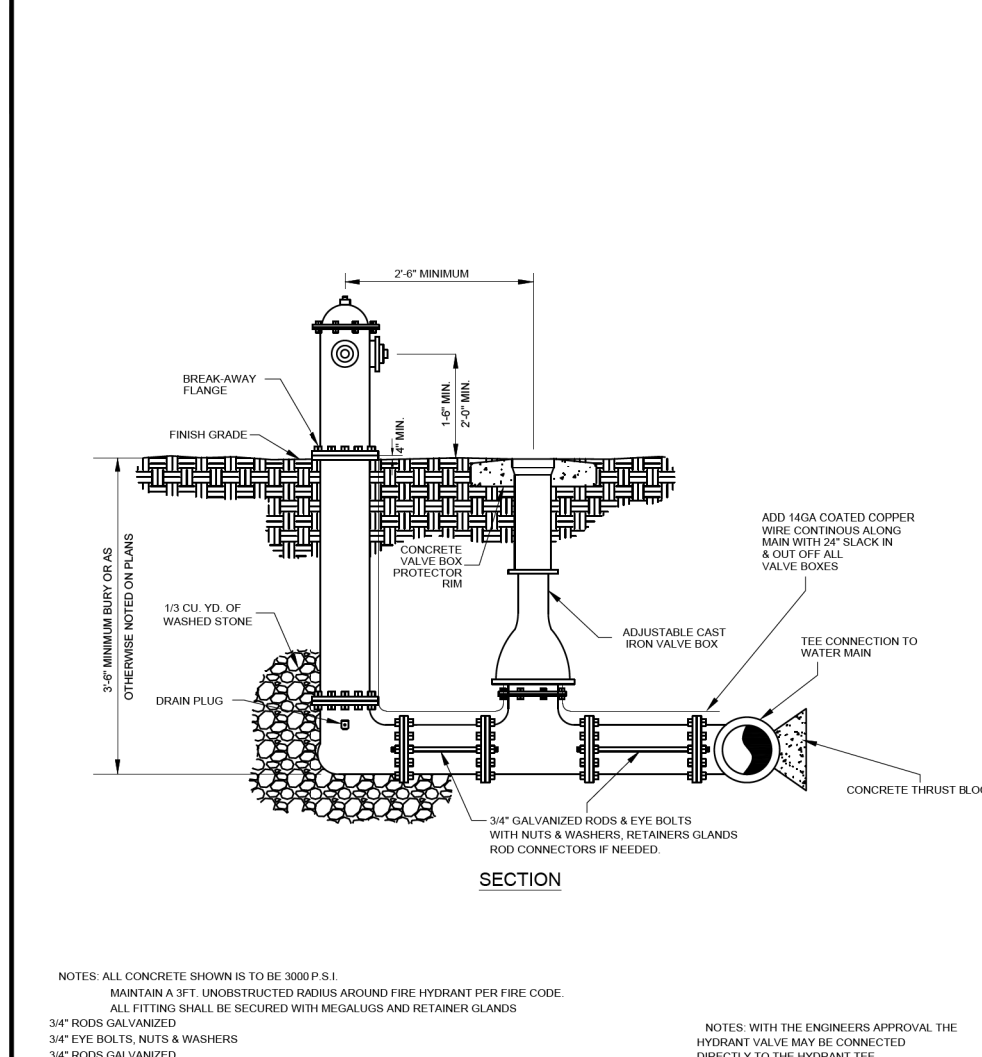


VERTICAL GATE VALVE ASSEMBLY

NOT TO SCALE

REVISED	3-4-13
STD. NO.	DATE
105	3-7-11

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FIRE HYDRANT ROD TYPE INSTALLATION

NOT TO SCALE

STD. NO.	DATE
102	3-7-11

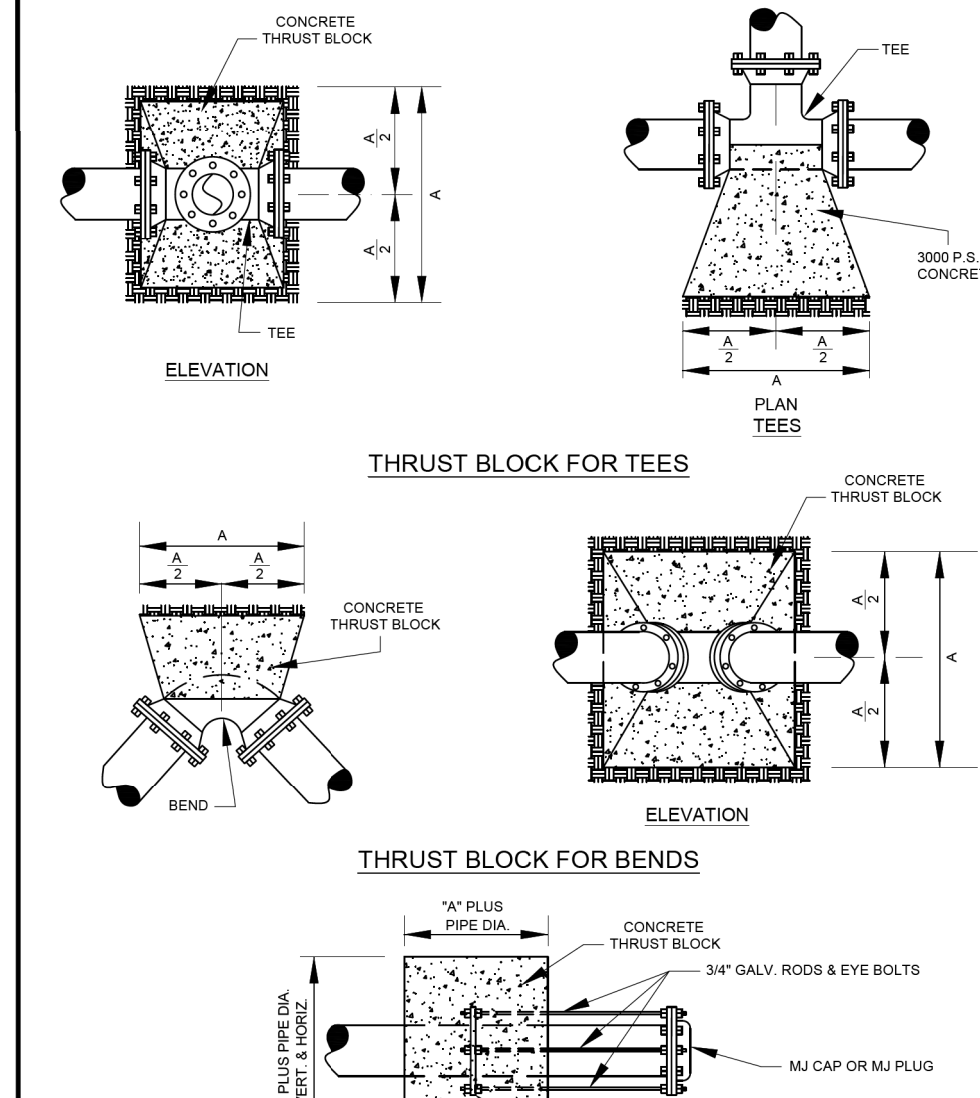
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RESTRAINED JOINT DESIGN TABLE FOR DUCTILE IRON PIPE

FITTING	REQUIRED RESTRAINED LENGTH (FT) OF BARE D.I. PIPE BY DEPTH OF COVER									
	3 FT	4 FT	5 FT	6 FT	7 FT	8 FT	9 FT	10 FT	11 FT	12 FT
HORIZONTAL BENDS										
6 INCH DIA - 11.25 DEG	3	2	2	2	2	1	1	1	1	1
6 INCH DIA - 22.5 DEG	5	4	4	3	3	3	3	2	2	2
6 INCH DIA - 45 DEG	11	9	8	7	7	6	5	5	5	5
6 INCH DIA - 90 DEG	26	22	19	17	16	14	13	12	11	10
8 INCH DIA - 11.25 DEG	3	2	2	2	2	2	2	2	2	2
8 INCH DIA - 22.5 DEG	7	6	5	5	4	4	3	3	3	3
8 INCH DIA - 45 DEG	14	12	10	9	8	8	7	7	7	7
8 INCH DIA - 90 DEG	33	29	25	23	20	19	17	16	15	14
10 INCH DIA - 11.25 DEG	5	4	4	3	3	3	2	2	2	2
10 INCH DIA - 22.5 DEG	9	8	7	6	6	5	5	5	5	5
10 INCH DIA - 45 DEG	20	17	15	13	12	11	10	10	10	10
10 INCH DIA - 90 DEG	47	41	36	33	29	27	25	23	22	21
12 INCH DIA - 11.25 DEG	6	5	5	4	4	3	3	3	3	3
12 INCH DIA - 22.5 DEG	12	11	9	8	8	7	6	6	6	6
12 INCH DIA - 45 DEG	25	22	19	17	16	14	13	12	11	11
12 INCH DIA - 90 DEG	7	6	6	5	5	4	4	4	4	4
16 INCH DIA - 11.25 DEG	15	13	11	10	9	9	8	7	7	7
16 INCH DIA - 22.5 DEG	31	27	24	21	19	18	16	15	15	15
16 INCH DIA - 45 DEG	74	65	57	52	47	43	40	37	36	35
20 INCH DIA - 11.25 DEG	7	6	6	5	4	4	4	4	4	4
20 INCH DIA - 22.5 DEG	15	13	11	10	9	8	8	7	7	7
20 INCH DIA - 45 DEG	31	27	23	21	19	17	16	15	15	15
20 INCH DIA - 90 DEG	10	8	7	6	6	5	5	5	5	5
24 INCH DIA - 11.25 DEG	19	17	15	13	12	11	10	9	9	9
24 INCH DIA - 22.5 DEG	40	35	30	27	25	22	21	19	19	19
24 INCH DIA - 45 DEG	14	12	10	9	8	8	7	7	7	7
24 INCH DIA - 90 DEG	28	24	21	19	17	16	14	13	13	13
30 INCH DIA - 11.25 DEG	57	50	44	39	35	32	30	28	28	28
30 INCH DIA - 22.5 DEG	18	15	14	12	11	10	9	9	9	9
30 INCH DIA - 45 DEG	36	31	27	25	22	20	19	17	17	17
30 INCH DIA - 90 DEG	74	65	57	51	46	42	39	36	36	36
36 INCH DIA - 11.25 DEG	22	19	17	15	14	12	11	11	11	11
36 INCH DIA - 22.5 DEG	44	38	34	30	27	25	23	21	21	21
36 INCH DIA - 45 DEG	91	79	70	63	57	52	48	44	44	44
VERTICAL BENDS - DOWN										
6 INCH DIA - 11.25 DEG	7	6	6	5	4	4	4	4	4	4
6 INCH DIA - 22.5 DEG	15	13	11	10	9	8	8	7	7	7
6 INCH DIA - 45 DEG	31	27	23	21	19	17	16	15	15	15
6 INCH DIA - 90 DEG	10	8	7	6	6	5	5	5	5	5
8 INCH DIA - 11.25 DEG	19	17	15	13	12	11	10	9	9	9
8 INCH DIA - 22.5 DEG	40	35	30	27	25	22	21	19	19	19
8 INCH DIA - 45 DEG	14	12	10	9	8	8	7	7	7	7
8 INCH DIA - 90 DEG	28	24	21	19	17	16	14	13	13	13
10 INCH DIA - 11.25 DEG	57	50	44	39	35	32	30	28	28	28
10 INCH DIA - 22.5 DEG	18	15	14	12	11	10	9	9	9	9
10 INCH DIA - 45 DEG	36	31	27	25	22	20	19	17	17	17
10 INCH DIA - 90 DEG	74	65	57	51	46	42	39	36	36	36
12 INCH DIA - 11.25 DEG	22	19	17	15	14	12	11	11	11	11
12 INCH DIA - 22.5 DEG	44	38	34	30	27	25	23	21	21	21
12 INCH DIA - 45 DEG	91	79	70	63	57	52	48	44	44	44
VERTICAL BENDS - UP										
6 INCH DIA - 11.25 DEG	3	2	2	2	2	1	1	1	1	1
6 INCH DIA - 22.5 DEG	5	4	4	3	3	3	3	2	2	2
6 INCH DIA - 45 DEG	11	9	8	7	7	6	5	5	5	5
6 INCH DIA - 90 DEG	3	2	2	2	2	2	2	2	2	2
8 INCH DIA - 11.25 DEG	7	6	5	5	4	4	3	3	3	3
8 INCH DIA - 22.5 DEG	14	12	10	9	8	8	7	7	7	7
8 INCH DIA - 45 DEG	5	4	4	3	3	3	2	2	2	2
8 INCH DIA - 90 DEG	9	8	7	6	6	5	5	5	5	5
10 INCH DIA - 11.25 DEG	20	17	15	13	12	11	10	10	10	10
10 INCH DIA - 22.5 DEG	6	5	5	4	4	3	3	3	3	3
10 INCH DIA - 45 DEG	12	11	9	8	8	7	6	6	6	6
10 INCH DIA - 90 DEG	25	22	19	17	16	14	13	12	12	12
12 INCH DIA - 11.25 DEG	7	6	6	5	5	4	4	4	4	4
12 INCH DIA - 22.5 DEG	15	13	11	10	9	9	8	7	7	7
12 INCH DIA - 45 DEG	31	27	24	21	19	18	16	15	15	15
DEAD ENDS / VALVES										
6 INCH DIA	50	45	41	38	35	33	31	29	29	29
8 INCH DIA	65	59	54	50	46	43	40	38	38	38
10 INCH DIA	80	72	66	61	56	52	49	46	46	46
12 INCH DIA	94	85	78	72	66	62	58	54	54	54
16 INCH DIA	123	111	102	94	87	81	76	71	71	71
20 INCH DIA	151	137	125	115	107	100	93	88	88	88
REDUCERS										
3 FT	3	4	5	6	7	8	9	10	11	12
12 INCH X 8 INCH	50	45	41	38	35	33	31	29	29	29
TEES										
3 FT	3	4	5	6	7	8	9	10	11	12
8" RUN X 8" BRANCH : RL = 1 FT	64	58	53	48	44	41	38	36	36	36
8" RUN X 8" BRANCH : RL = 5 FT	59	52	47	42	39	35	32	30	30	30
12" RUN X 12" BRANCH : RL = 1 FT	93	84	77	70	65	60	56	53	53	53
12" RUN X 12" BRANCH : RL = 5 FT	88	79	71	65	59	54	50	47	47	47

ASSUMPTIONS
LAYING CONDITION = TYPE 4
SOIL DESIGNATION = COHESIVE-GRANULAR
DESIGN PRESSURE = 200 PSI (TEST PRESSURE)
SAFETY FACTOR = 1.5

NOTES
1. RESTRAINED LENGTH IS MEASURED AS FOLLOWS:
A. HORIZONTAL/VERTICAL BENDS - ALONG EACH SIDE OF BEND.
B. HORIZONTAL/VERTICAL BENDS - OFFSET - ALONG THE OUTER SIDE OF EACH BEND.
ALL PIPE BETWEEN THE TWO BENDS SHALL BE RESTRAINED JOINT.
2. WHEN IT IS NOT POSSIBLE TO INSTALL THE RESTRAINED LENGTHS AS NOTED BY THIS TABLE, CONTRACTOR SHALL INSTALL THE APPROPRIATE CONCRETE THRUST RESTRAINTS AS PER THE DETAILS HEREIN.



THRUST BLOCK FOR TEES

THRUST BLOCK FOR BENDS

THRUST BLOCK FOR PIPE CAP

NOT TO SCALE

STD. NO.	DATE
104.1	3-7-11

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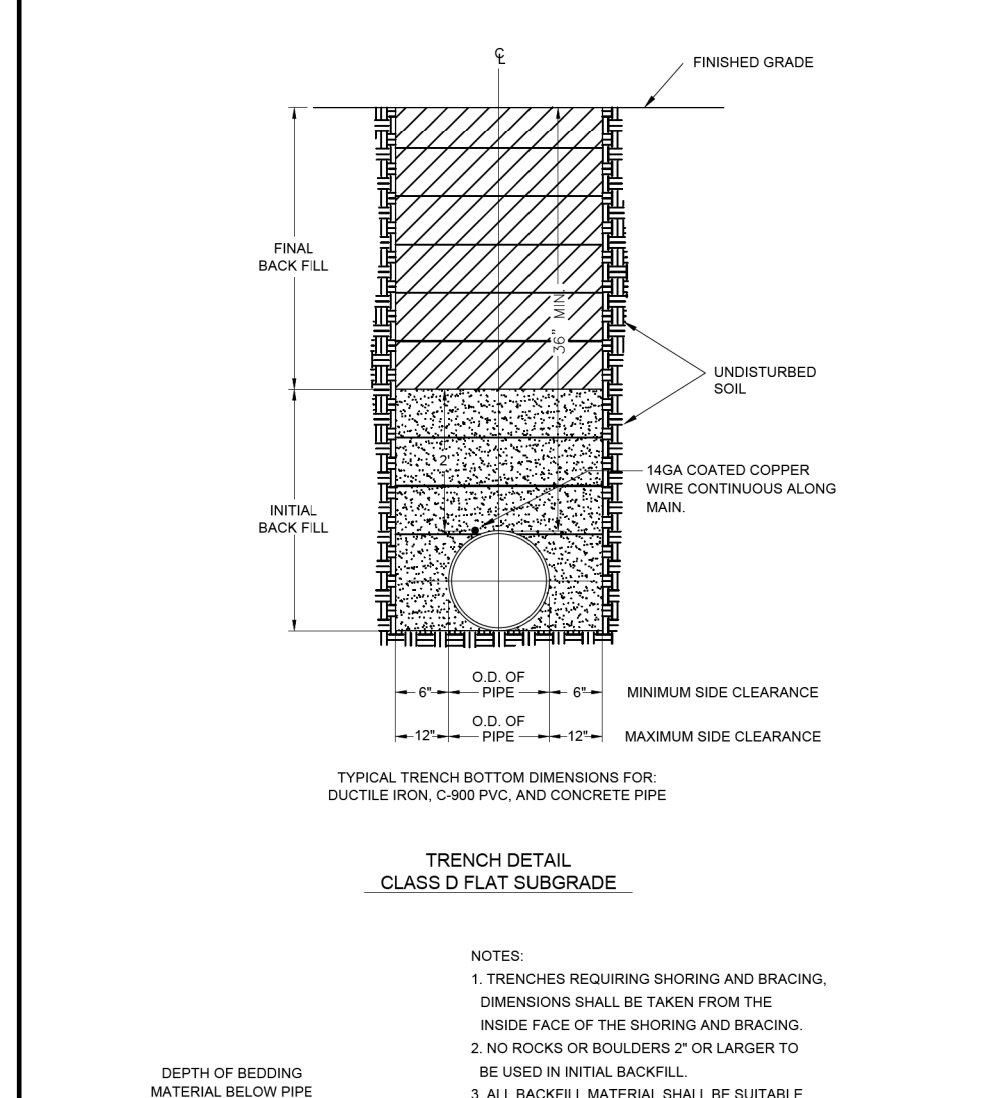
SIZE	11 1/4" BEND	22 1/2" BEND	45" BEND	90" BEND	TEE	CAP
6	12	12	12	16	16	14
8	12	12	16	22	22	18
10	12	14	20	28	28	22
12	12	18	24	32	32	25
14	14	20	28	38	38	32
16	16	22	32	42	42	36
18	18	26	36	48	48	40
20	20	28	40	52	52	44
24	24	34	46	64	64	54
30	30	42	58	78	78	66
36	36	50	70	84	84	80
42	40	58	80	108	108	90
48	48	66	90	124	124	104

THRUST BLOCK DIMENSION "A"
(DIMENSION "A" IN INCHES)
4,000 P.S.I. CONCRETE

NOT TO SCALE

STD. NO.	DATE
104.2	3-7-11

CITY OF MORGANTON



WATER LINE TRENCH BOTTOM AND BACKFILLING REQUIREMENTS

NOT TO SCALE

STD. NO.	DATE
111	3-7-11

CITY OF MORGANTON