

PROJECT TYPICAL DETAILS

THRUST COLLAR

CONCRETE THRUST BLOCK AT 45° BEND. SEE THRUST BLOCK DETAIL FOR DIMENSIONS OF BLOCK.

10" MAX.

3/4" S.S. THREADED RODS

NOTE: ALL PIPE SEGMENTS LESS THAN 10' SHALL REQUIRE RODDING.

CONCRETE THRUST BLOCK AT 90° BEND. SEE THRUST BLOCK DETAIL FOR DIMENSIONS OF BLOCK.

ROD REQUIREMENTS

SIZE OF 45° BEND	STATIC THRUST IN POUNDS	NUMBER OF RODS REQUIRED
6"	4,328	2
8"	7,694	2
12"	17,312	4
16"	30,779	6
20"	48,091	8
24"	69,252	10

GENERAL NOTES

1. RODS AND NUTS SHALL BE OF TYPE 304 OR TYPE 316 STAINLESS STEEL.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT BENDS.

VERTICAL BEND RODDING AND BLOCKING DETAIL

NOT TO SCALE

Name	Date		
Drawn By:			
Checked By:			
Approved By:			
Scale:			
Rev.	Description	Date	Init.

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Department of Public Utilities
P.O. Box 2293
Smithfield, NC 27577

WATER
STANDARD DETAIL
Critical Bend Rodding and Blocking Details

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NOTES:

1. CONCRETE SHALL BE 3,000 PSI MIN.
2. CONCRETE FOR THRUST BLOCKING SHALL BE KEPT FAIRLY DRY, THUS MAKING THE CONCRETE WEDGE SHAPE MORE EASILY FORMED WITH THE WIDEST PART (BLOCKING AREA) AGAINST UNDISTURBED SOIL.
3. NO CONCRETE SHALL COVER ANY BOLTS OR GLANDS.
4. ALL FITTING AND ACCESSORIES TO BE WRAPPED WITH 10 MIL POLYETHYLENE PRIOR TO POURING BLOCKING.
5. VOLUME OF THRUST BLOCKING SHALL BE AS SHOWN ON THE THRUST BLOCKING SCHEDULE.

PLAN BENDS

PLAN TEES

SECTION X-X BENDS & TEES

PLAN & ELEV. PLUGS

PIPE SIZE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	TEE	PLUG					
	A	B	A	B	A	B	C	D			
4"	8"	12"	8"	8"	8"	8"	8"	10"	16"		
6"	10"	12"	8"	10"	8"	8"	10"	10"	16"		
8"	10"	12"	10"	10"	8"	8"	10"	12"	24"		
10"	16"	14"	10"	12"	8"	10"	11"	14"	24"		
12"	20"	16"	12"	14"	8"	12"	14"	16"	36"		
14"	22"	18"	14"	16"	10"	14"	16"	18"	36"		
16"	28"	20"	16"	18"	12"	16"	18"	20"	36"		
20"	36"	26"	24"	18"	13"	12"	9"	18"	24"	48"	
24"	48"	33"	30"	21"	18"	18"	10"	21"	21"	20"	56"

THRUST BLOCK DETAIL

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WATER
STANDARD DETAIL
Thrust Block

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REINFORCING

SECTION

PLAN

THRUST COLLAR INSTALLATION

NOT TO SCALE

SCHEDULE

PIPE DIAMETER	CONCRETE THRUST COLLAR	ANCHOR COLLAR	RINGS REQUIRED	
	A	B	C	
6", 8", 12"	1-4"	1-4"	2"	ONE
16"	1-4"	1-4"	2"	ONE
20"	1-4"	1-4"	3"	ONE
24"	1-4"	1-4"	3"	TWO
30"	1-4"	1-4"	4"	TWO
36"	1-4"	1-4"	4"	TWO

NOTE: 6" TO 16" MAINS = 12-NO. 7 BARS
20" TO 36" MAINS = 12-NO. 8 BARS
BARS PLACED AS SHOWN

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WATER
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Thrust Collar Installation

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JOHNSTON COUNTY

PROJECT REFERENCE NO.
HN-0040

SHEET NO.
UC-3B

DESIGNED BY: ELM

DRAWN BY: ELM

CHECKED BY: MUP

APPROVED BY: MUP

REVISED:

NORTH CAROLINA
DEPARTMENT OF
TRANSPORTATION

UTILITIES ENGINEERING SEC.
PHONE: (919) 707-6690
FAX: (919) 250-4151

SEAL
2022
Professional Engineer
5/11/2025

UTILITY CONSTRUCTION
PLANS ONLY

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

RESTRAINED FLANGE ADAPTER "UNIFLANGE" OR EQUAL

MJ ACCESSORY KIT

"FIELD LOK" GASKET OR EQUAL

DIP (BELL)

DIP (PE)

3/4" THREADED TYPE 304 OR TYPE 316 S.S. RODS MIN. 4 EA.

HARNESS RESTRAINT DETAIL

NOT TO SCALE

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Restraint Harness

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PIPE RESTRAINT CHARTS

Horizontal & Vertical Up Bends		
Pipe Size (inch)	Bend Angle	Pipeline Restraint Req. (feet)
4"	11.25	2
	22.5	5
	30	6
	45	10
	60	14
	90	24
6"	11.25	3
	22.5	7
	30	9
	45	14
	60	19
	90	33
8"	11.25	4
	22.5	9
	30	11
	45	18
	60	25
	90	43
10"	11.25	5
	22.5	10
	30	14
	45	21
	60	30
	90	52
12"	11.25	6
	22.5	12
	30	16
	45	25
	60	35
	90	60
16"	11.25	7
	22.5	13
	45	27
	90	65
	11.25	9
	22.5	18
24"	45	37
	90	90

Vertical Down Bends		
Pipe Size (inch)	Bend Angle	Pipeline Restraint Req. (feet)
4"	11.25	4
	22.5	8
	30	11
	45	17
	60	24
	90	41
6"	11.25	8
	22.5	12
	30	16
	45	24
	60	34
	90	59
8"	11.25	7
	22.5	15
	30	20
	45	31
	60	44
	90	76
10"	11.25	9
	22.5	18
	30	25
	45	38
	60	53
	90	92
12"	11.25	11
	22.5	21
	30	28
	45	44
	60	62
	90	107
16"	11.25	14
	22.5	28
	45	58
	90	139
	11.25	20
	22.5	39
24"	45	81
	90	194

Tees, Reducers, Caps		
Fitting Type	Size (inch)	Pipeline Restraint Req. (feet)
Tee	4	35
	6	52
	8	70
	10	85
	12	101
	16	131
	24	186
	6x4	30
	8x6	32
	10x4	74
Reducer	10x6	58
	10x8	31
	12x4	93
	12x6	78
	12x10	31
	16x4	128
	16x6	117
	16x8	101
	16x10	82
	16x12	59
Cap	24x4	187
	24x6	180
	24x8	170
	24x10	160
	24x12	143
	24x16	106
	4	41
	6	59
	8	76
	10	92

NOTE: AT PIPE INTERSECTIONS, MULTIPLE VALVES, RUN WIRE UP AT ONLY ONE VALVE.

PLACE TRACER WIRE BOX AT INTERVALS WHERE VALVES DO NOT OCCUR & PLACE TRACER WIRE IN BOX.

FINISHED GRADE

TRACER WIRE BOX

VALVE BOX

TRACER WIRE BOX

SINGLE 12 AWG SOLID CORE WIRE

PVC PIPELINE

GATE VALVE

MASONRY BLOCK

TRACER WIRE TO BE LAID UNDERNEATH WATER LINE

NOTES:

1. PLACE TRACER WIRE IN TRACER WIRE BOX AS SHOWN.
2. NO UNDERGROUND SPLICING WILL BE ALLOWED. DO NOT SPLICE WIRE WHEN BEGINNING A NEW SPOOL. INSTEAD INSTALL A TRACER WIRE BOX AND ATTACH EACH WIRE TO THE BOX.
3. TRACER WIRE BOXES SHALL BE PLACED NO FARTHER THAN 400' APART

TYPICAL TRACER WIRE INSTALLATION DETAIL

NOT TO SCALE

