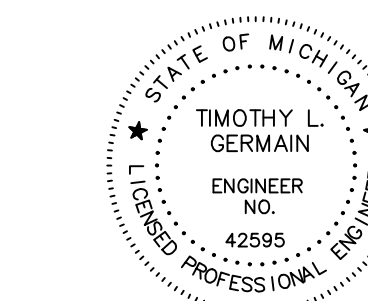




**CIVIL ENGINEERS
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LAND PLANNERS**

NOWAK & FRAUS ENGINEERS
46777 WOODWARD AVE.
PONTIAC, MI 48342-5032
TEL. (248) 332-7931
FAX. (248) 332-8257
WWW.NOWAKFRAUS.COM

SEAL



PROJECT
City of Madison Heights

CLIENT
City of Madison Heights
300 W. 13 Mile Road
Madison Heights,
MI 48071

PROJECT LOCATION
City of Madison Heights,
Oakland County, MI

SHEET
Water Main Standard
Details - HDPE Blocking



Know what's below
Call before you dig.

DATE ISSUED/REVISED

DRAWN BY:
J. Lawrey

DESIGNED BY:
B. Brickel

APPROVED BY:
T. Germain

DATE:
December 9, 2019

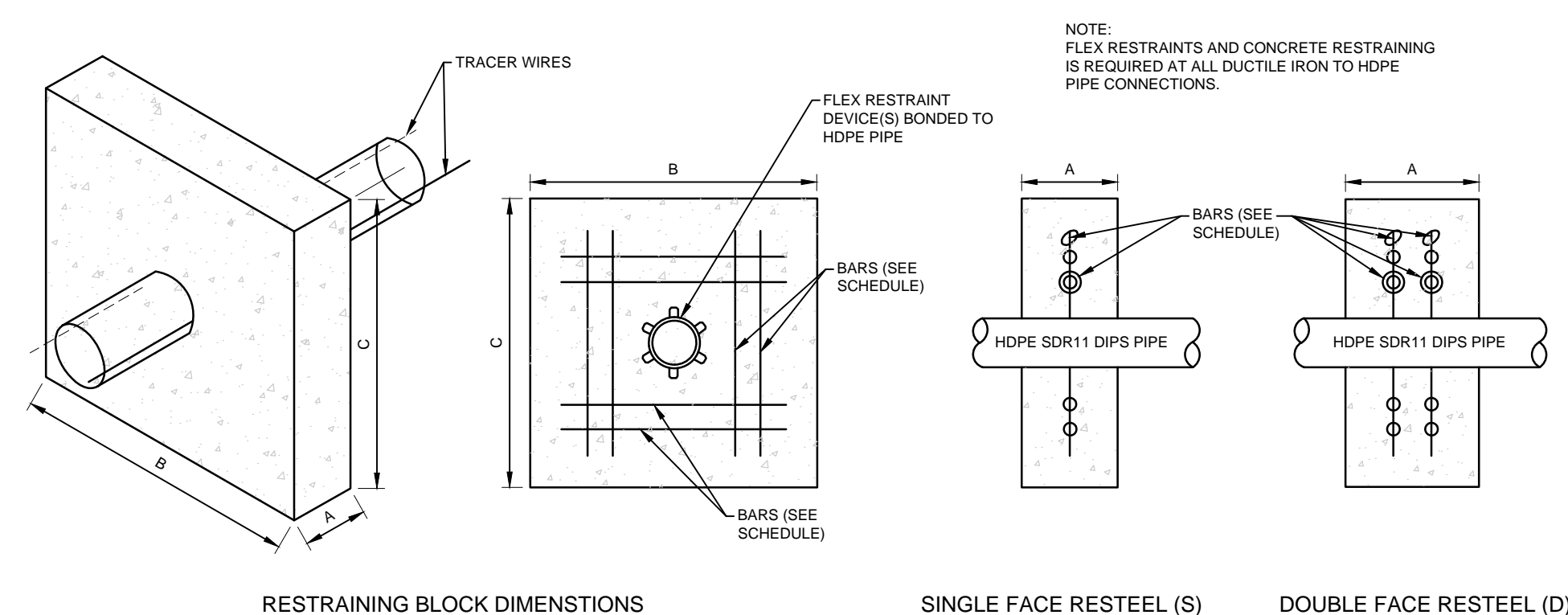
SCALE: N.T.S.

NFE JOB NO. SHEET NO.
L418 D6

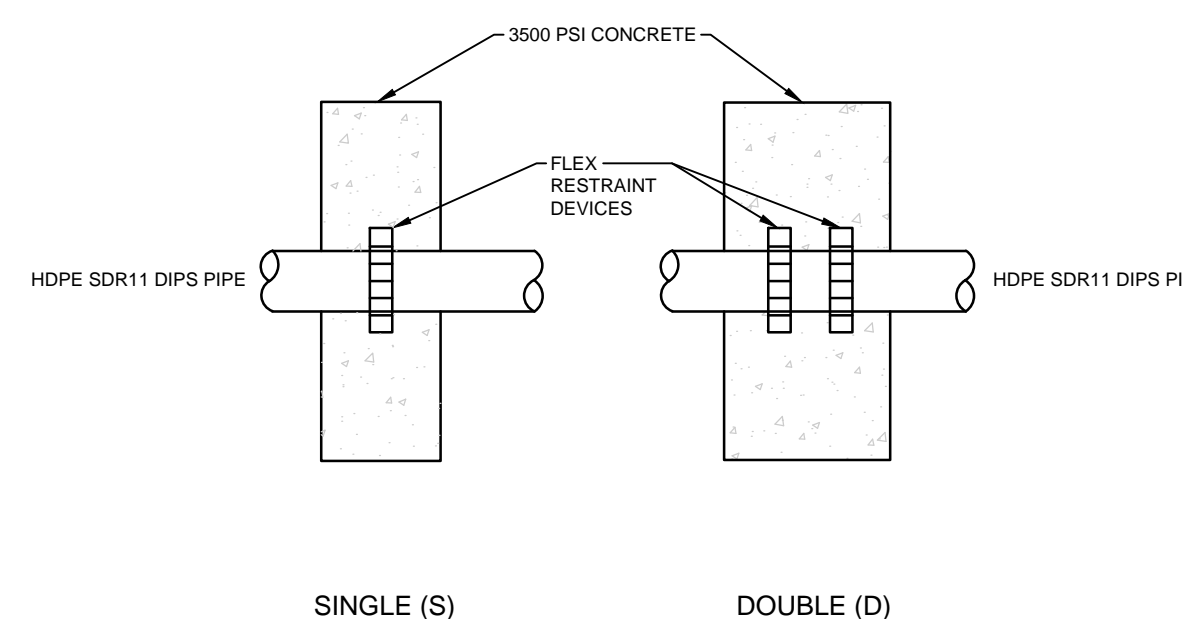
HDPE SDR11 DIPS RESTRAINING BLOCK SCHEDULE

HDPE SDR 11 DIPS SIZE	A	B	C	EFFECTIVE AREA	# RESTRAINTS	REINFORCING
4"	1 FT	2 FT	2 FT	4.0 S.F.	1	4 #6(S)
6"	1 FT	3 FT	3 FT	9.0 S.F.	2	4 #6(S)
8"	1 FT	3.75 FT	3.75 FT	14.0 S.F.	2	4 #6(S)
10"	1 FT	4.75 FT	4.75 FT	22.6 S.F.	3	8 #4(S)
12"	1.5 FT	5.5 FT	5.5 FT	30.3 S.F.	4	8 #6(S)
14"	1.5 FT	6.33 FT	6.33 FT	40.0 S.F.	5	8 #6(S)
16"	2 FT	7.25 FT	7.25 FT	52.6 S.F.	6	16 #6(D)
18"	2 FT	8.1 FT	8.1 FT	65.6 S.F.	7	16 #6(D)
20"	2 FT	9 FT	9 FT	81.0 S.F.	9	16 #6(D)
24"	2 FT	10.75 FT	10.75 FT	115.6 S.F.	14(D)	16 #6(D)
30"	2.5 FT	13.25 FT	13.25 FT	175.6 S.F.	19(D)	16 #6(D)
36"	2.5 FT	15.9 FT	15.9 FT	252.8 S.F.	28(D)	16 #6(D)

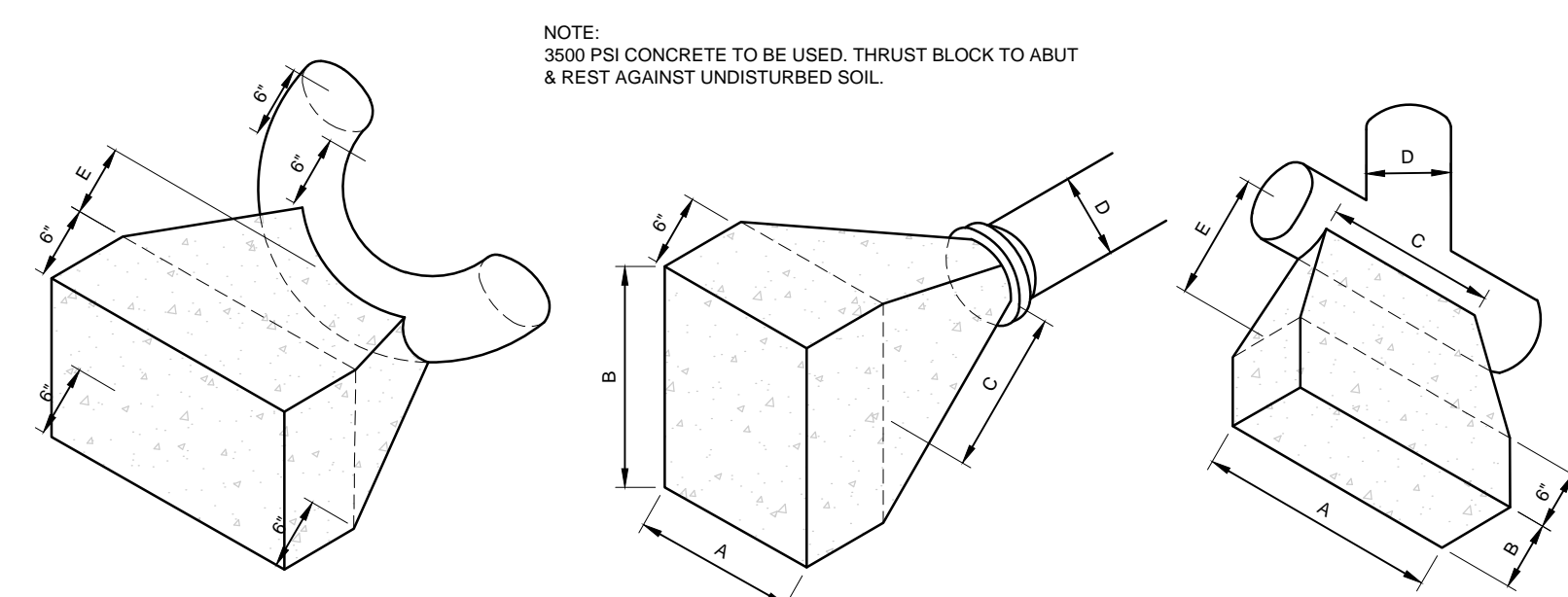
- RESTRAINING BLOCKS SHALL HAVE A MINIMUM OF 3/4" COVER.
- RESTRAINING BLOCK DIMENSIONS "B" AND "C" MAY BE CHANGED DUE TO DEPTH OF COVER LIMITATIONS PROVIDED THE EFFECTIVE AREA IS MAINTAINED.



HDPE RESTRAINING RESTEEL
NOT TO SCALE



HDPE RESTRAINING BLOCK RESTRAINTS
NOT TO SCALE



FOR 90° BENDS OR SMALLER

D	A	B	C	E MIN
20"	8'	6.5'	3.5'	2.5'
16"	6'	4'	2.5'	2'
12"	4'	3'	2'	1.75'
10"	3'	3'	2'	1.75'
8"	3'	2'	2'	1.5'
6"	2'	1.5'	2'	1.25'

FOR PLUGS

D	A	B	C MIN
20"	7'	5'	2.5'
16"	4.8'	4.8'	2'
12"	4.3'	3'	1.75'
10"	3'	2'	1.5'
8"	2.8'	2.5'	1.5'
6"	1.5'	1.5'	0.25'

FOR TEES

D	A	B	C	E MIN
20"	6.5'	4.5'	3.5'	3'
16"	4.7'	4.7'	2.5'	2.75'
12"	4'	3'	2.5'	2.5'
10"	3'	2'	2'	2.25'
8"	2.7'	2'	2'	2.25'
6"	2'	2'	2'	2.25'

HDPE THRUST BLOCK DETAILS
NOT TO SCALE

HDPE WATER MAIN NOTES

- ALL HDPE WATER MAIN SHALL BE D.I.P.S. SDR 11 MANUFACTURED FROM A PE 4710 RESIN. HDPE PIPE SHALL BE MARKED WITH A PERMANENTLY CO-EXTRUDED BLUE STRIPE.
- ALL HDPE FITTINGS SHALL BE MANUFACTURED FROM A PE 4710 RESIN.
- ALL HDPE WATER SERVICES SHALL BE SDR 9.
- ELECTROFUSION EQUIPMENT SHALL BE CALIBRATED AND CERTIFIED PER THE PIPE MANUFACTURER'S REQUIREMENTS.
- CONCRETE RESTRAINING BLOCKS AND THRUST BLOCKS SHALL BE CONSTRUCTED OF MINIMUM 3,500 P.S.I. CONCRETE.
- ALL HDPE PIPING SHALL BE INSTALLED WITH TWO TRACER/LOCATOR WIRES INSULATED WITH HIGH MOLECULAR WEIGHT POLYETHYLENE (HMWPE) SPECIFICALLY FOR USE IN DIRECT BURIAL APPLICATIONS.
- TRACER WIRES SHALL BE 6-GAUGE SOLID OR STRANDED ANNEALED OR HARD COPPER PER UL83 (THERMOPLASTIC INSULATED WIRES AND CABLES) AND ASTM REQUIREMENTS INCLUDING ASTM B1 (STANDARD SPECIFICATION FOR HARD-DRAWN COPPER WIRE), B3 (STANDARD SPECIFICATION FOR SOFT OR ANNEALED COPPER WIRE), AND B8 (STANDARD SPECIFICATION FOR CONCENTRIC-LAY-STRANDED COPPER CONDUCTORS, HARD, MEDIUM-HARD, OR SOFT).
- TRACER WIRE SHALL BE INSTALLED. INSULATION SHALL BE FOR 600-VOLT APPLICATIONS AND SHALL BE A MINIMUM OF 45 MILS THICK. THE MINIMUM THICKNESS AT ANY POINT SHALL NOT BE LESS THAN 90% OF THE SPECIFIED AVERAGE THICKNESS IN COMPLIANCE WITH UL 83. THE TRACER WIRE SHALL HAVE THE UL 83 SPECIFICATION SHALL BE CLEARLY MARKED ON THE WIRE INSULATION. THE INSULATION SHALL BE COLORED BLUE FOR WATER MAIN APPLICATIONS.
- TWO TRACER WIRES SHALL BE ATTACHED TO THE WATER MAIN PIPE AT FIVE FOOT INTERVALS OR AS APPROVED BY THE ENGINEER. ATTACHMENT TO PIPE SHALL BE MADE WITH PLASTIC CABLE TIES OR EQUIVALENT. THE USE OF TAPE IS NOT APPROVED. TRACER WIRES SHALL BE CHECKED FOR CONTINUITY PRIOR TO PLACING THE WATER MAIN INTO SERVICE.
- HDPE PIPE TRANSITIONS TO DUCTILE IRON PIPE SHALL BE PERFORMED USING FUSED-ON MECHANICAL JOINT ADAPTERS OR FLANGE ADAPTERS. MEGA-LUGS OR MEGA-LUGS COMBINED WITH INTERNAL PIPE STIFFENERS ARE NOT APPROVED.
- HYDROSTATIC TESTING SHALL BE PER AWWA STANDARDS (ASTM F2164). TESTING SHALL BE PERFORMED AFTER THE INITIAL EXPANSION PHASE AND AFTER THE SYSTEM HAS STABILIZED. TESTING PRESSURE SHALL BE 150 P.S.I. HELD FOR 2 HOURS.

HDPE WATER MAIN ALLOWABLE LOSSES FOR 2 HOUR TEST PERIOD

PIPE DIA.	PIPE LENGTH	ALLOWABLE WATER LOSS PER FT.	TOTAL LOSS ALLOWED
3"	_____	x 0.15	= _____
4"	_____	x 0.25	= _____
6"	_____	x 0.60	= _____
8"	_____	x 1.00	= _____
10"	_____	x 1.30	= _____
12"	_____	x 2.30	= _____
14"	_____	x 2.80	= _____
16"	_____	x 3.30	= _____
18"	_____	x 4.30	= _____
20"	_____	x 5.50	= _____
24"	_____	x 8.90	= _____