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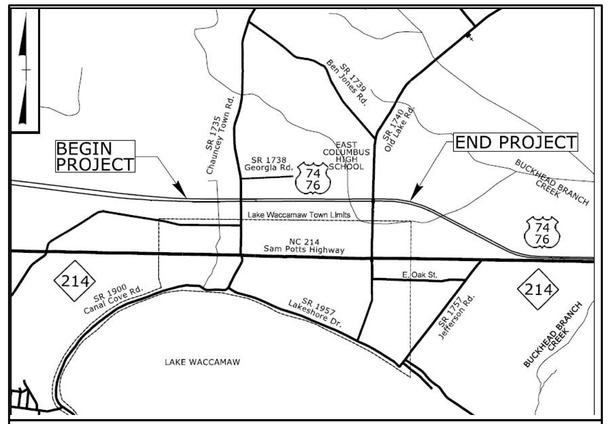
09/08/09

TIP PROJECT: R-5819/R-5820

CONTRACT:



VICINITY MAP

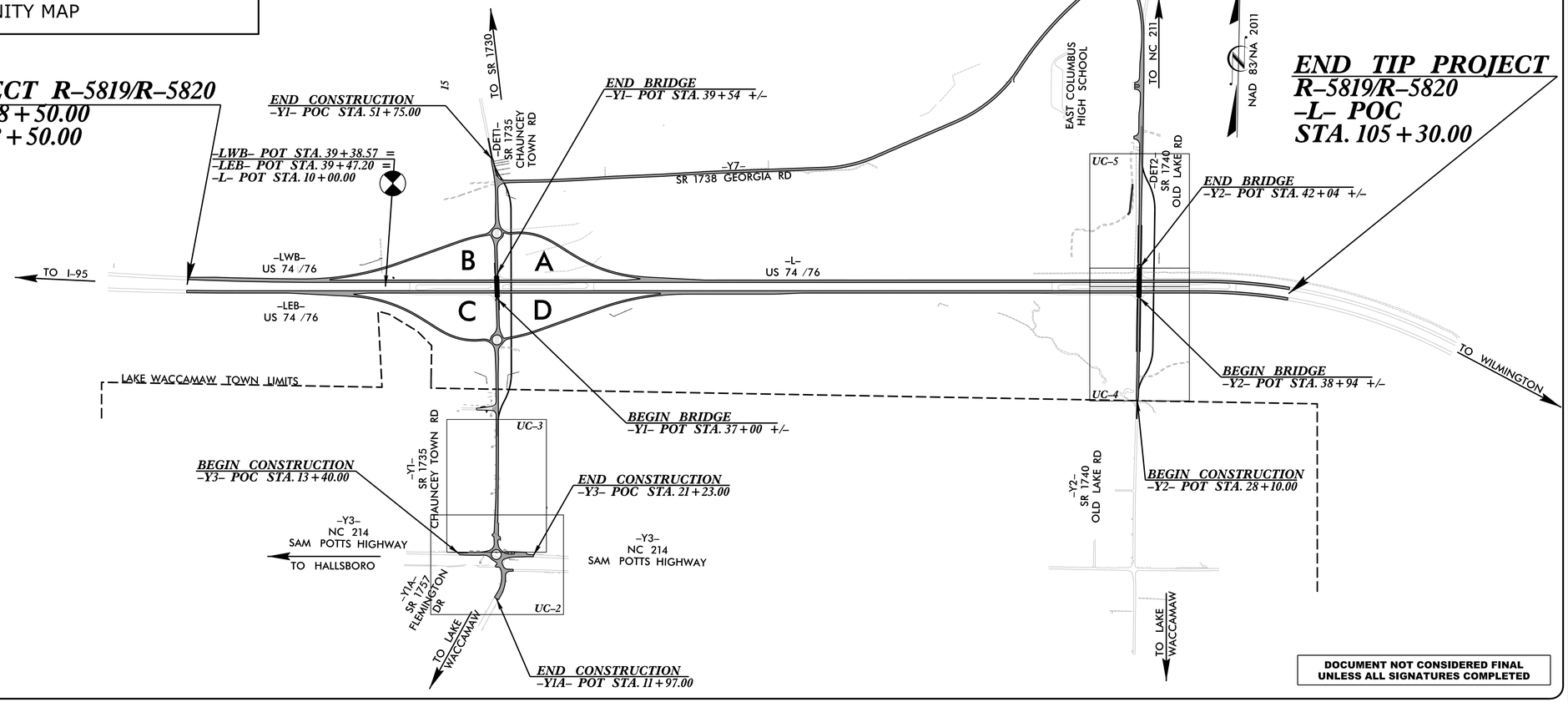
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

COLUMBUS COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5819/R-5820	UC-1	
STATE WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
47091.1.1/47092.1.1		PE	

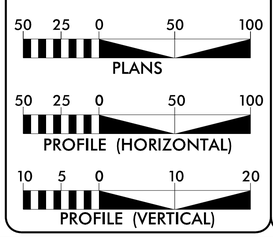
LOCATION: *SR 1740 (OLD LAKE ROAD) CONVERT AT-GRADE INTERSECTION TO GRADE SEPARATION (R-5819)*
SR 1735 (CHAUNCEY TOWN ROAD) CONVERT AT-GRADE INTERSECTION TO INTERCHANGE (R-5820)

TYPE OF WORK: *WET UTILITY PLANS*



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



INDEX OF SHEETS

PROJECT LENGTH

LENGTH OF 2" WATERLINE	=	26 FT.
LENGTH OF 6" WATERLINE	=	1790 FT.
LENGTH OF 8" WATERLINE	=	712 FT.
TOTAL LENGTH OF WATERLINE	=	2528 FT.
LENGTH OF 6" FORCEMAIN	=	28 FT.
LENGTH OF 8" FORCEMAIN	=	1760 FT.
LENGTH OF 10" FORCEMAIN	=	600 FT.
TOTAL LENGTH OF FORCEMAIN	=	2388 FT.

Prepared in the Office of:
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 31, 2021

LETTING DATE:
JUNE 21, 2022

NCDOT CONTACT:

BRANDON BARHAM, PE
PROJECT MANAGER

JOHN M. KAMPRATH, PE
PROJECT DESIGN ENGINEER

ALEX HENDERSON
NCDOT PROJECT MANAGER

UTILITIES ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 14101 ENGINEER JOHN M. KAMPRATH

DocuSigned by:
John M. Kamprath
SIGNATURE:
P.E. 4/12/2022

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

10:53:24 AM
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mkamprath

PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC-2

REVISION NO.	UTILITIES ENGINEER
90% DESIGN – 11/30/21	
100% DESIGN – 3/02/22	
100% DESIGN – 4/11/22	

DocuSigned by: John M. Kamprath
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 14101 JOHN M. KAMPRATH
4/12/2022

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Prepared by

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

LEGEND

	EX. WATERLINE TO REMAIN
	EX. WATERLINE TO BE REMOVED/ABANDONED
6"WL	PROPOSED WATERLINE
FM	EX. SANITARY FORCEMAIN TO REMAIN
	EX. SANITARY FORCEMAIN TO BE REMOVED/ABANDONED
8"PVCFM	PROPOSED 8" C900 FORCEMAIN

NOTES KEYED TO PLAN

1. RELOCATE EX. FIRE HYDRANT ASSEMBLY.
2. INSTALL RELOCATED FIRE HYDRANT ASSEMBLY AND CONNECT TO MAIN WITH 6" X 6" TEE.

Notes

1. ALL WORK ASSOCIATED WITH THE RELOCATION OF WATERMAINS OR SANITARY SEWER FORCEMAINS SHALL BE COMPLETED AS PER THE NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, LATEST EDITION, SUPPLEMENTED (AS REQUIRED) WITH THE FACILITIES OWNER STANDARD SPECIFICATIONS AS DESCRIBED IN THE PROJECT SPECIFIC SPECIAL PROVISIONS.
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Vert. 0 5 10 20 Feet
Horiz. 0 25 50 100Feet

GENERAL NOTES:
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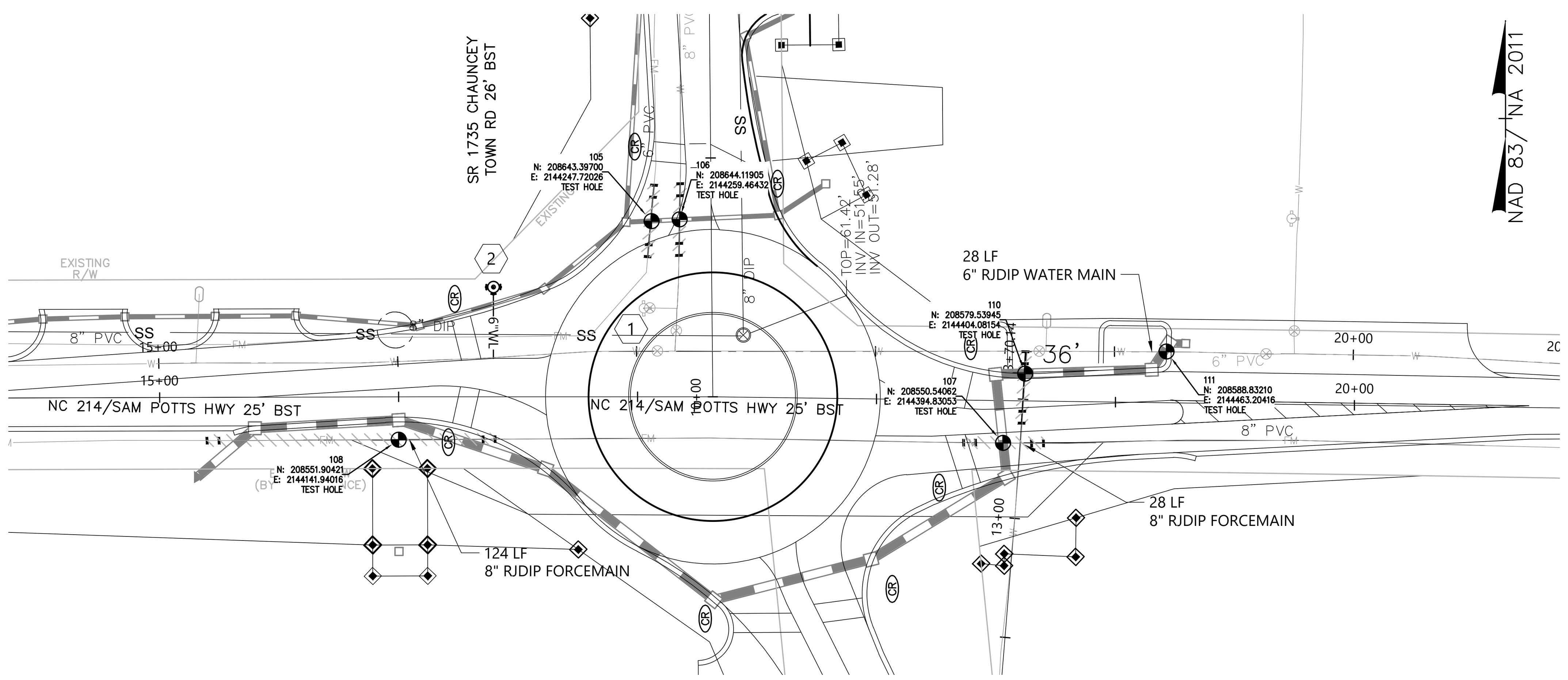
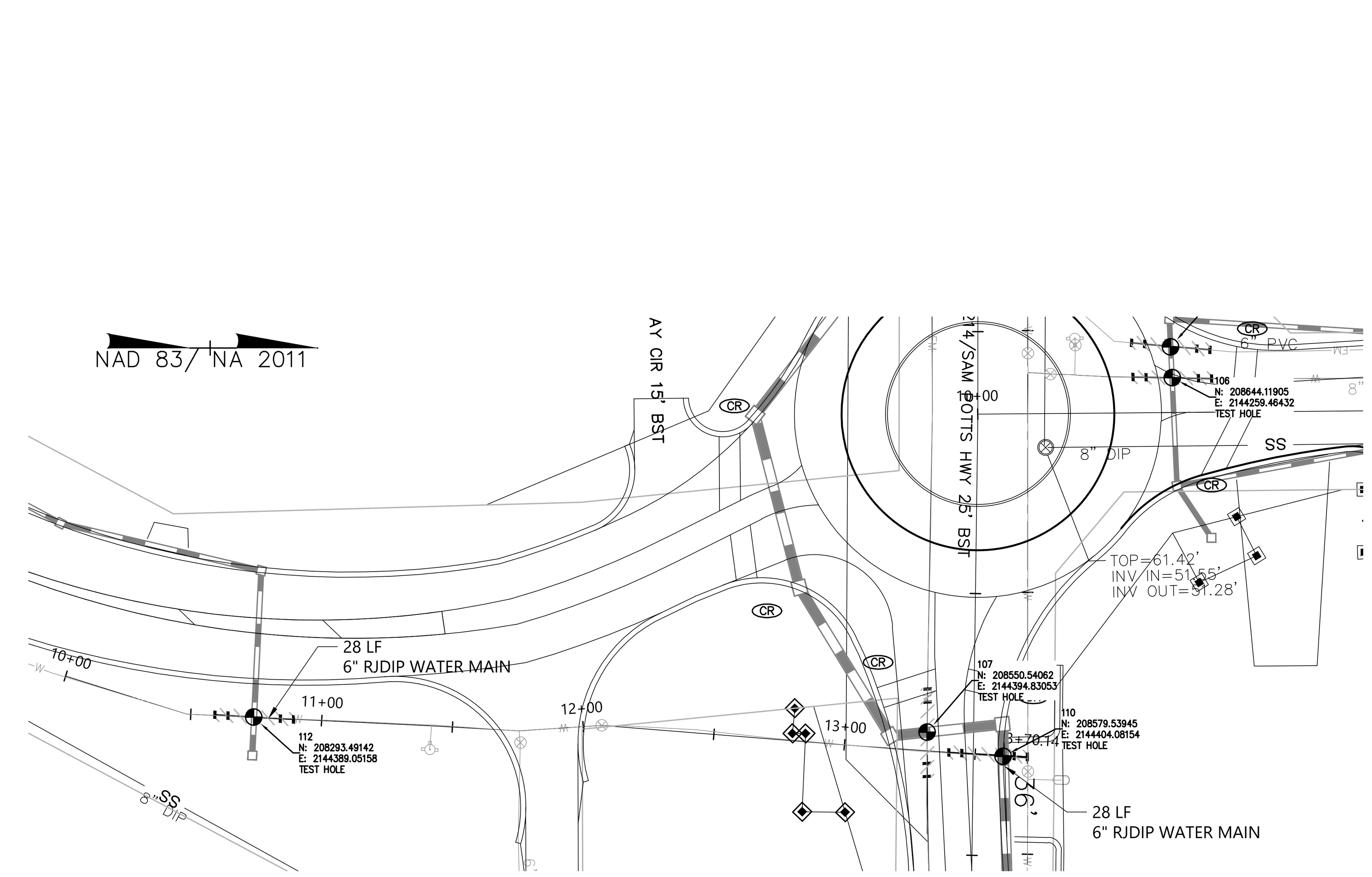
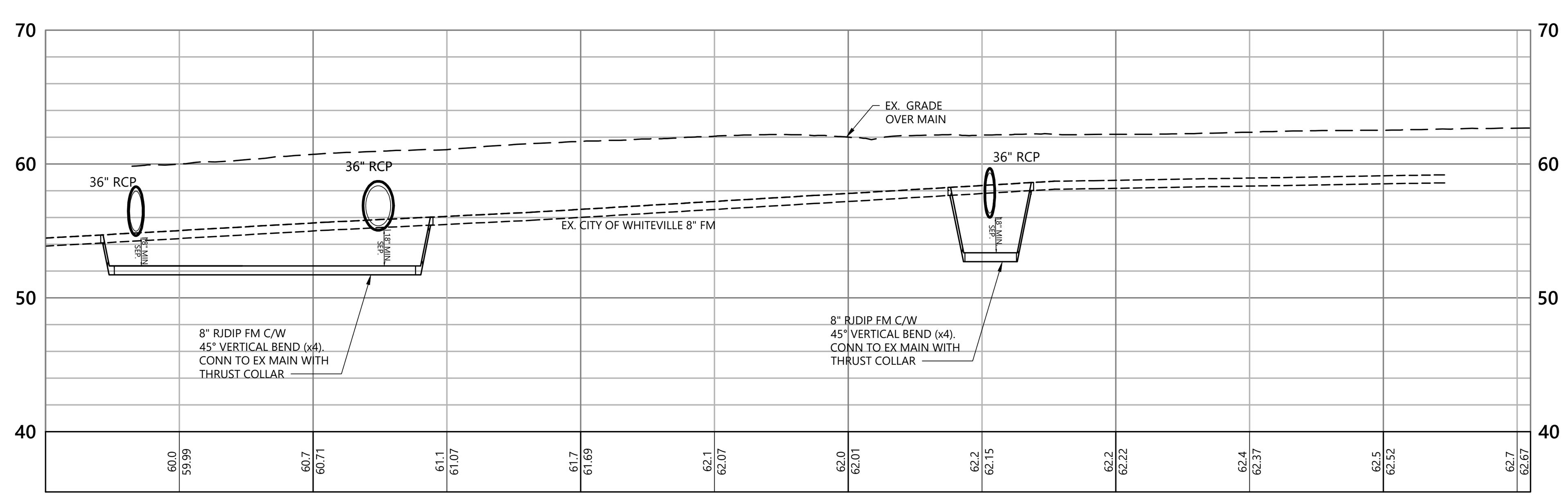
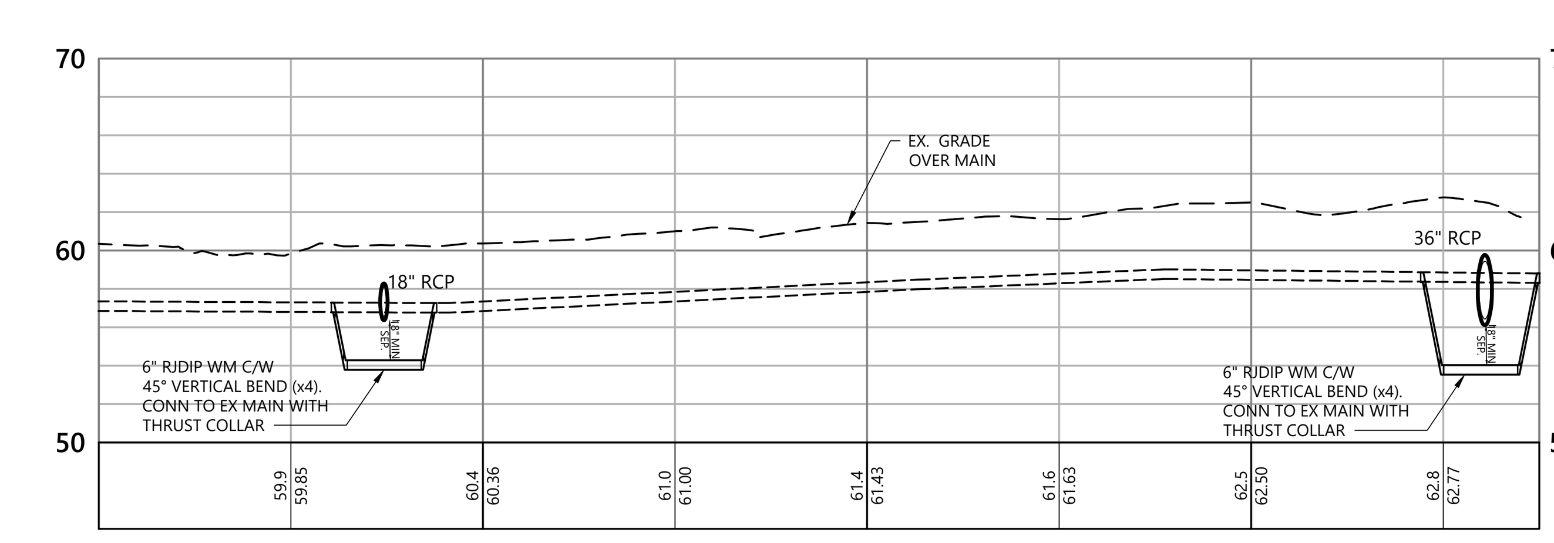






8" PVC FORCE MAIN



6'' PVC WATER MAIN

PROFILES NOTES:
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3. THRUST COLLARS TO BE INSTALLED AT EVERY DEFLECTION POINT.
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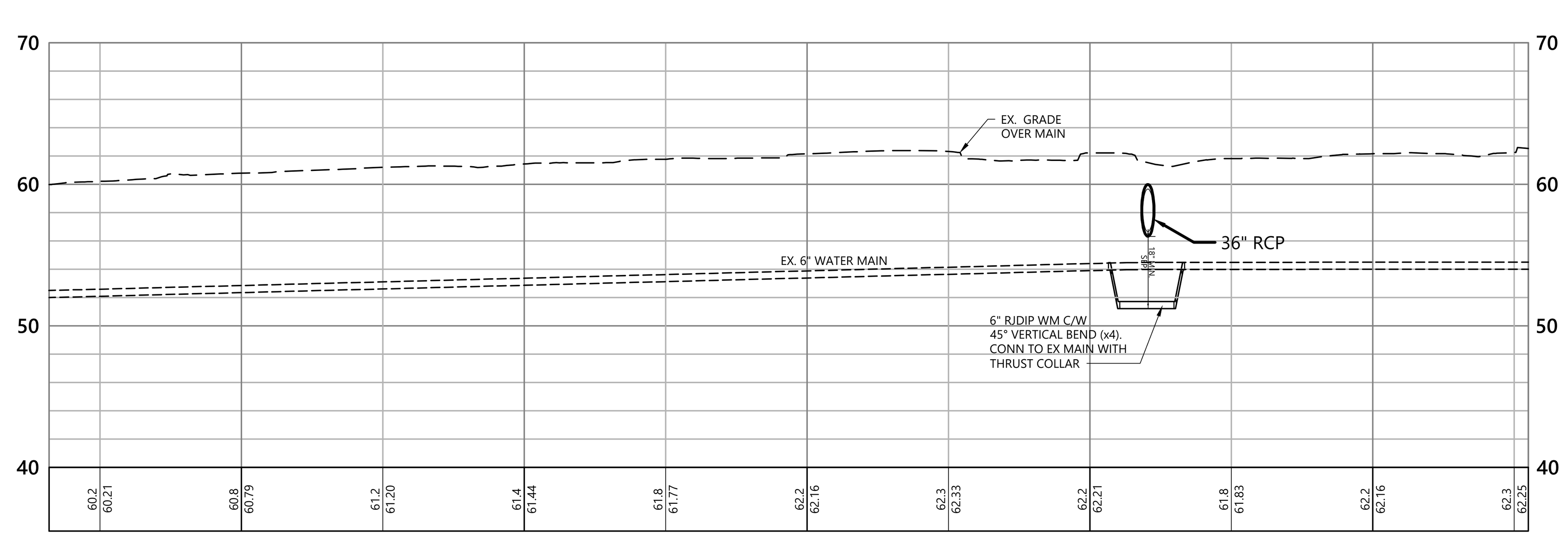
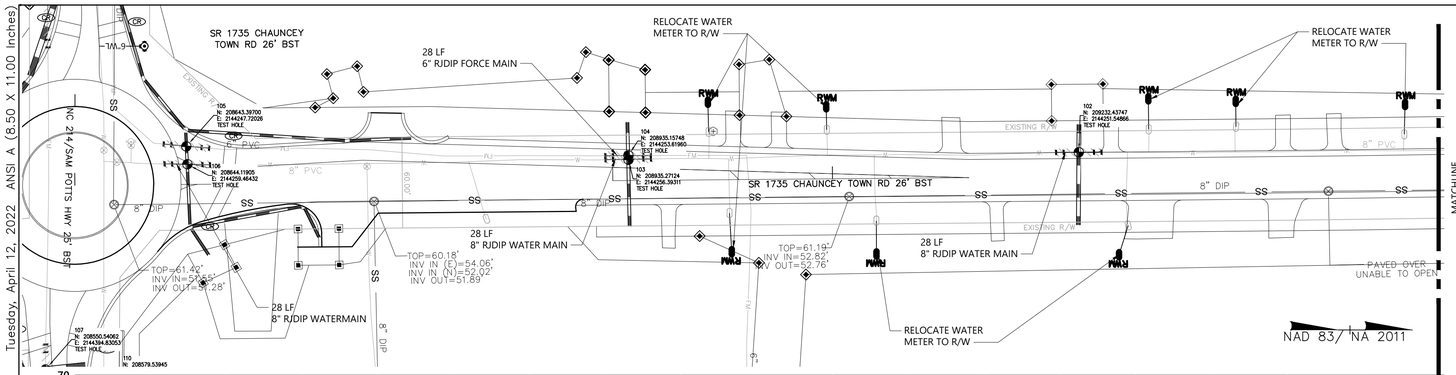
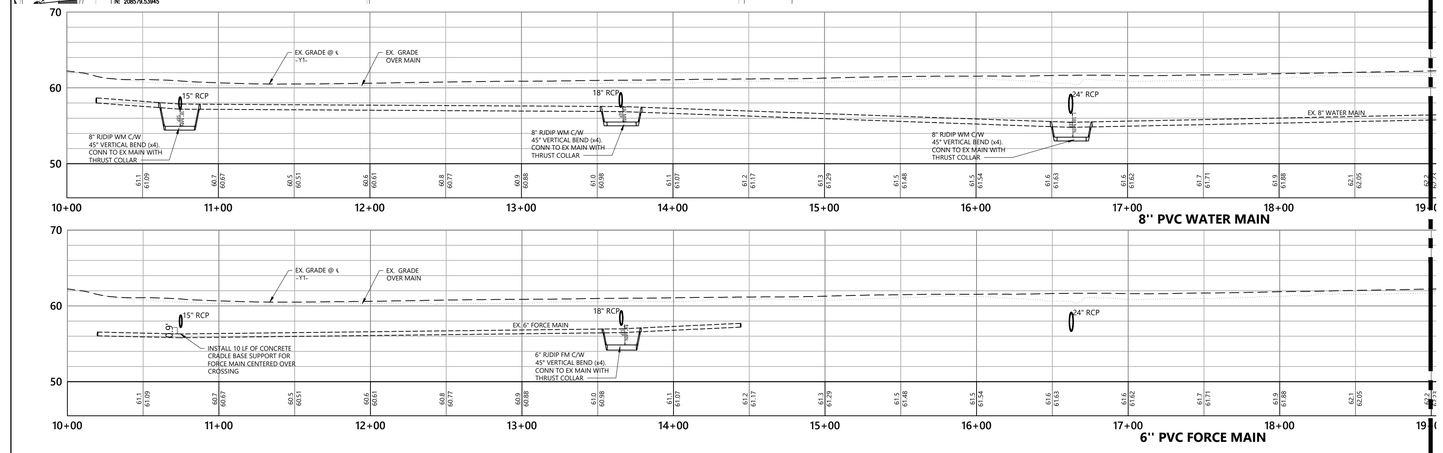
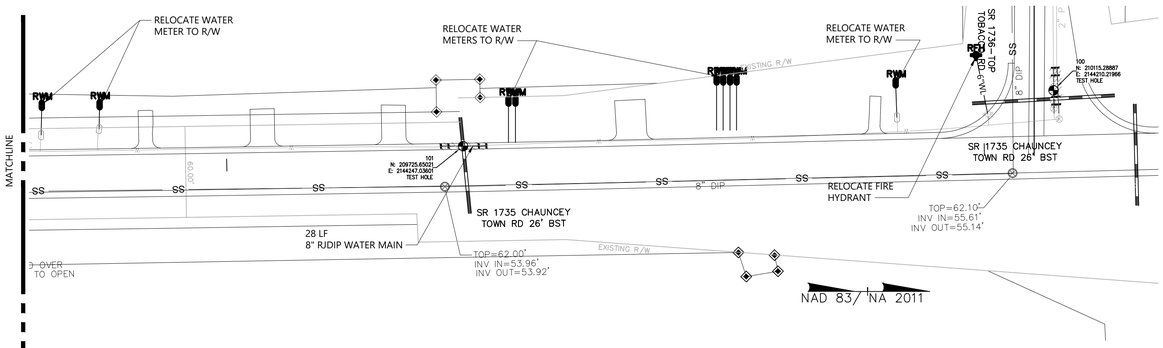


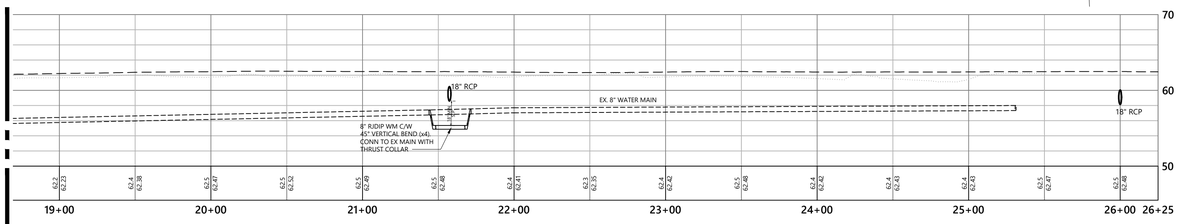
6'' PVC WATER MAIN

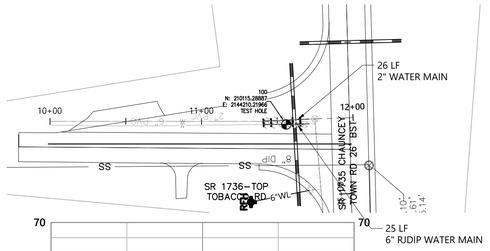
Tuesday, April 12, 2022 ANSI A (8.50 X 11.00 Inches)
4/12/2022
\\vhb.com\gbl\proj\Raleigh\38564.19 NCDOT R5819 R5820 US74\NCDOT\Utilities\Rdy_Ut\Proj\Plan Sheets\R5819_UC_PLAN.dwg
Mark Edwards

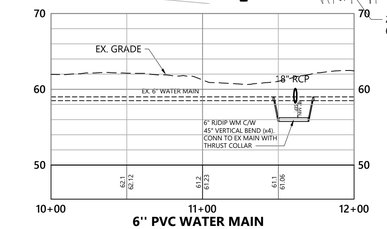












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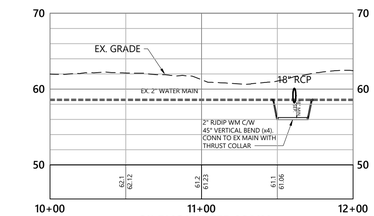

2" PVC WATER MAIN

Vert. 0 5 10 20 Feet
Horiz. 0 25 50 100Feet

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LEGEND

- EX. WATERLINE TO REMAIN
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- 6"WL — PROPOSED WATERLINE
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- EX. SANITARY FORCEMAIN TO BE REMOVED/ABANDONED
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PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC-3
REVISION NO.	UTILITIES ENGINEER
90% DESIGN – 11/30/21	
100% DESIGN – 3/02/22	

DocuSigned by: William W. Edwards, PE — PROFESSIONAL ENGINEER SEAL 14101 CIVIL ENGINEER — 4/12/2022

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared by

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

4/12/2022
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Mark Edwards

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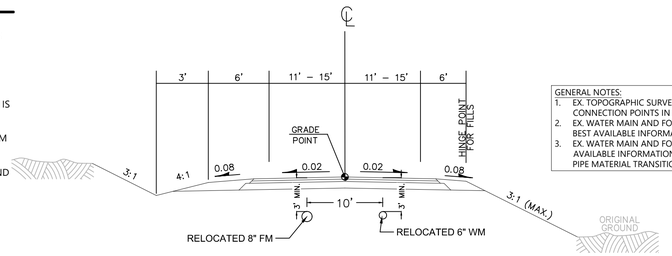

TYPICAL SECTION NO.15
–DET2– (ONSITE DETOUR FOR SR 1740 OLD LAKE RD)

NAD 83/NA 2011
Vert. 0 5 10 20 Feet
Horiz. 0 25 50 100Feet

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PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC–4
REVISION NO.	UTILITIES ENGINEER
90% DESIGN – 11/30/21	DocuSigned by: John W. Kowalski, PROFESSIONAL ENGINEER SEAL 14101 ENGINEER JOHN W. KOWALSKI 4/12/2022
100% DESIGN – 3/02/22	

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
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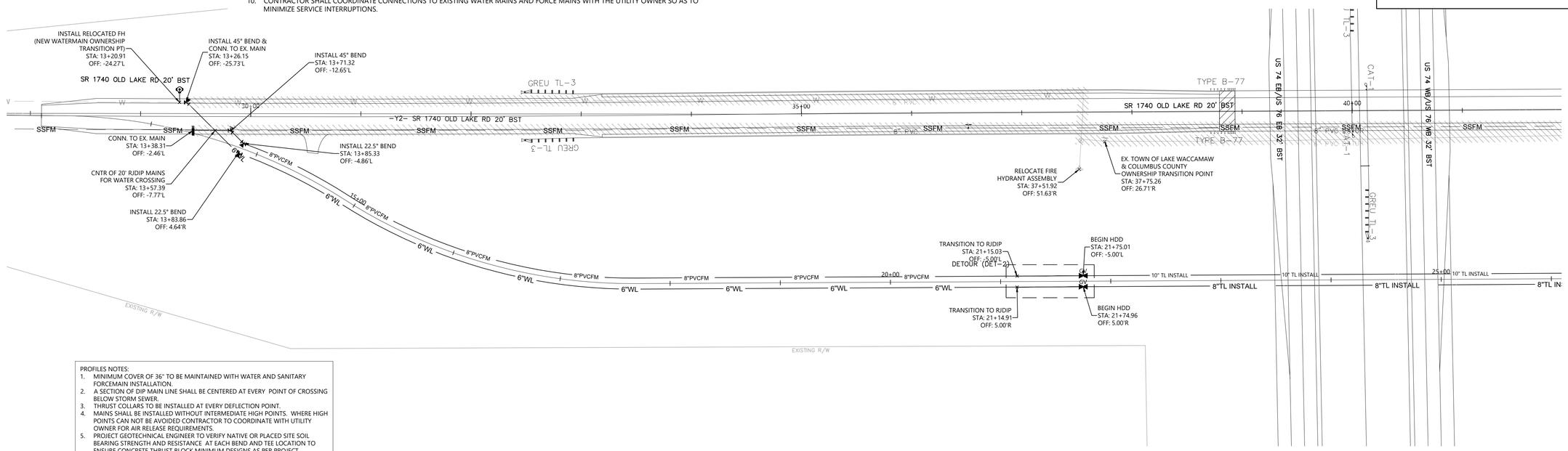

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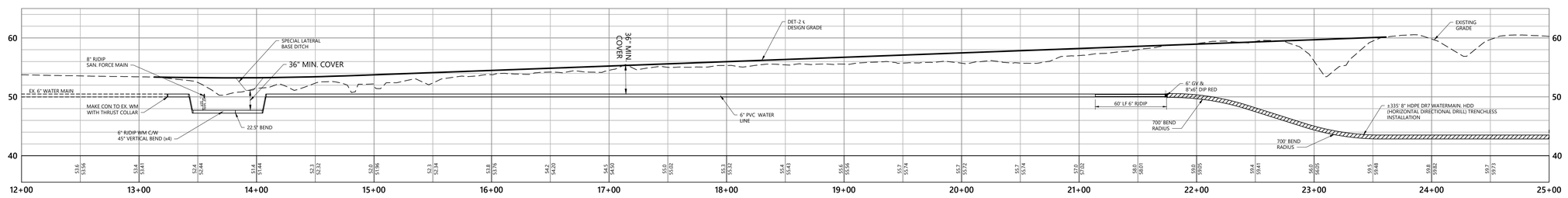
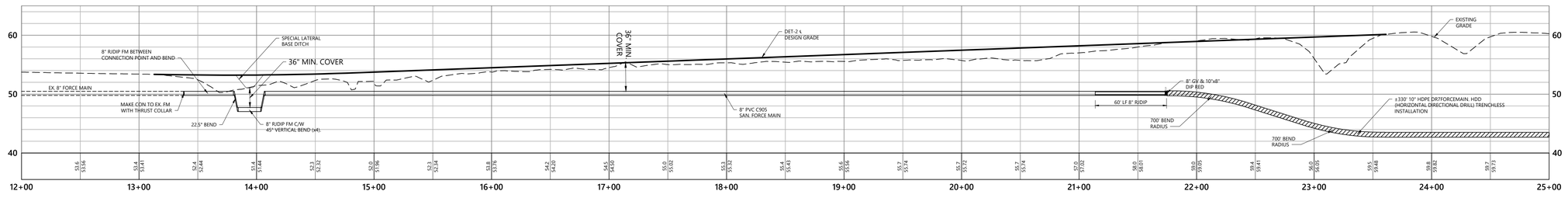


6" WATER MAIN



8" FORCE MAIN

Tuesday, April 12, 2022 ANSI A (8.50 X 11.00 Inches)

LEGEND

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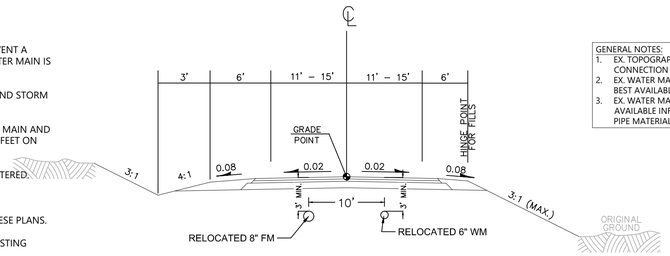
7. CONTRACTOR SHALL COORDINATE UTILITY RELOCATION OR ABANDONMENT WITH LOCAL UTILITY COMPANIES AS REQUIRED.
8. ALL CONNECTIONS TO EXISTING WATER MAINS OR FORCE MAINS TO BE MADE WITH THRUST COLLAR AS PER THE DETAIL OF THESE PLANS.
9. CONTRACTOR SHALL PROVIDE A VACUUM TRUCK ON-SITE TO CLEAN UP WASTEWATER SPILLAGE DURING CONNECTIONS TO EXISTING FORCE MAIN.
10. CONTRACTOR SHALL COORDINATE CONNECTIONS TO EXISTING WATER MAINS AND FORCE MAINS WITH THE UTILITY OWNER SO AS TO MINIMIZE SERVICE INTERRUPTIONS.



TYPICAL SECTION NO.15
–DET2– (ONSITE DETOUR FOR SR 1740 OLD LAKE RD)

NAD 83/NA 2011
Vert. 0 5 10 20 Feet
Horiz. 0 25 50 100Feet

GENERAL NOTES:
1. EX. TOPOGRAPHIC SURVEY AND SUE BY OTHERS. CONTRACTOR TO CONFIRM FINAL CONNECTION POINTS IN FIELD.
2. EX. WATER MAIN AND FORCE MAIN DEPTHS SHOWN ARE APPROXIMATE BASED ON BEST AVAILABLE INFORMATION. ACTUAL DEPTH IS TO BE CONFIRMED IN FIELD.
3. EX. WATER MAIN AND FORCE MAIN MATERIALS SHOWN ARE BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR IS RESPONSIBLE TO PROVIDE ADEQUATE PIPE MATERIAL TRANSITION AT ALL CONNECTIONS.

PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC–5
REVISION NO.	UTILITIES ENGINEER
90% DESIGN – 11/30/21	
100% DESIGN – 3/02/22	

DocuSigned by: MARK A. EDWARDS, NORTH CAROLINA LICENSE NO. 050741A, SEAL 14101, ENGINEER, 4/12/2022

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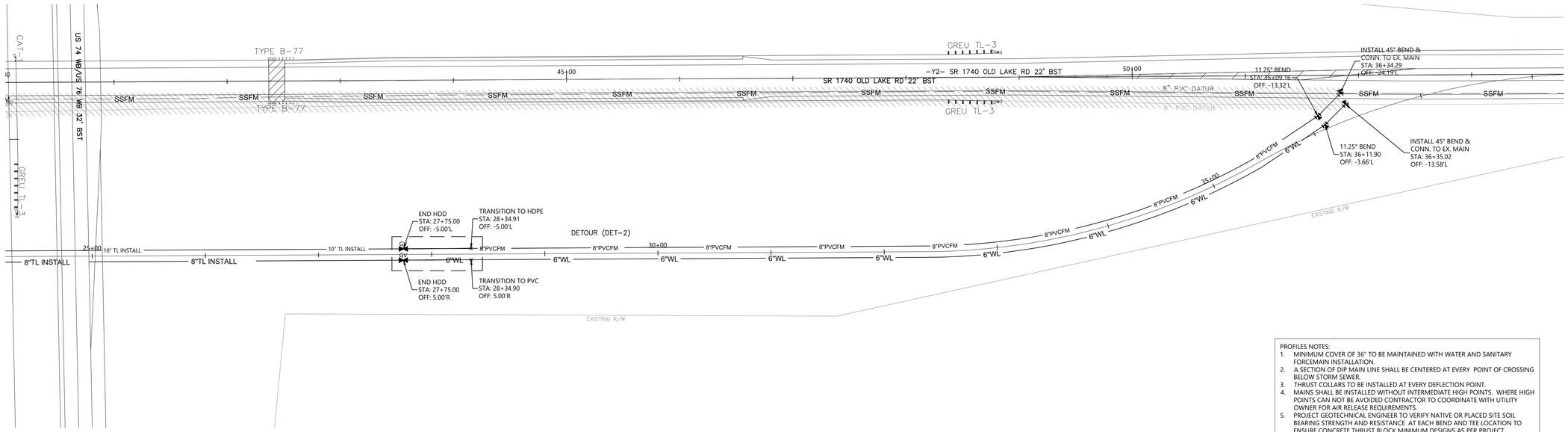
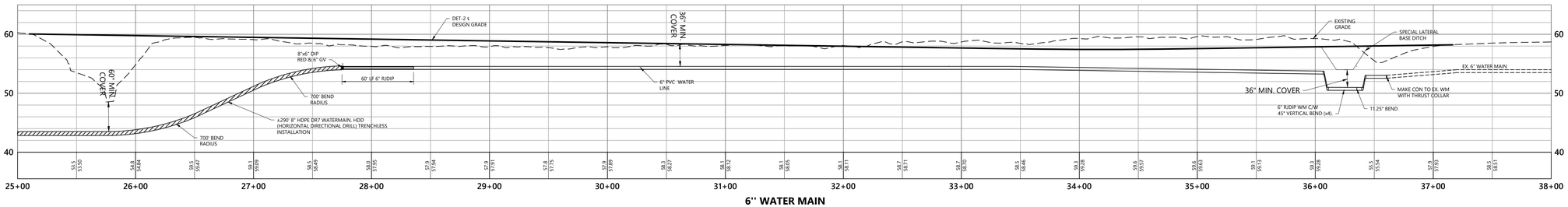
Prepared by

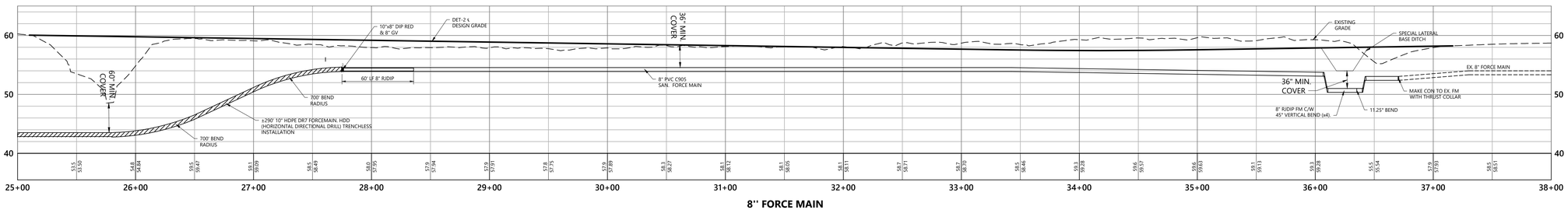
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606



PROFILES NOTES:
1. MINIMUM COVER OF 36" TO BE MAINTAINED WITH WATER AND SANITARY FORCEMAIN INSTALLATION.
2. A SECTION OF DIP MAIN LINE SHALL BE CENTERED AT EVERY POINT OF CROSSING BELOW STORM SEWER.
3. THRUST COLLARS TO BE INSTALLED AT EVERY DEFLECTION POINT.
4. MAINS SHALL BE INSTALLED WITHOUT INTERMEDIATE HIGH POINTS. WHERE HIGH POINTS CAN NOT BE AVOIDED CONTRACTOR TO COORDINATE WITH UTILITY OWNER FOR AIR RELEASE REQUIREMENTS.
5. PROJECT GEOTECHNICAL ENGINEER TO VERIFY NATIVE OR PLACED SITE SOIL BEARING STRENGTH AND RESISTANCE AT EACH BEND AND TEE LOCATION TO ENSURE CONCRETE THRUST BLOCK MINIMUM DESIGNS AS PER PROJECT SPECIFICATIONS ARE SUFFICIENT. WHERE MAINS ARE PLACED IN FILL ADDITIONAL CONCRETE AND REINFORCEMENT MAY BE WARRANTED.



6'' WATER MAIN



8'' FORCE MAIN

4/12/2022
\\vhb.com\gbl\pro\Raleigh\38564.19 NCDOT R5819 R5820 US74\NCDOT\Utilities\Rdy_Ut\Proj\Plan Sheets\R5819_UC_PLAN.dwg
Mark Edwards

PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC- DT1

REVISION NO.	UTILITIES ENGINEER
90% DESIGN - 11/30/21	
100% DESIGN - 3/02/22	

DocuSigned by: John M. Kamprath DDA3CA149C5741A... NORTH CAROLINA PROFESSIONAL SEAL 14101 ENGINEER JOHN M. KAMPRATH 4/12/2022

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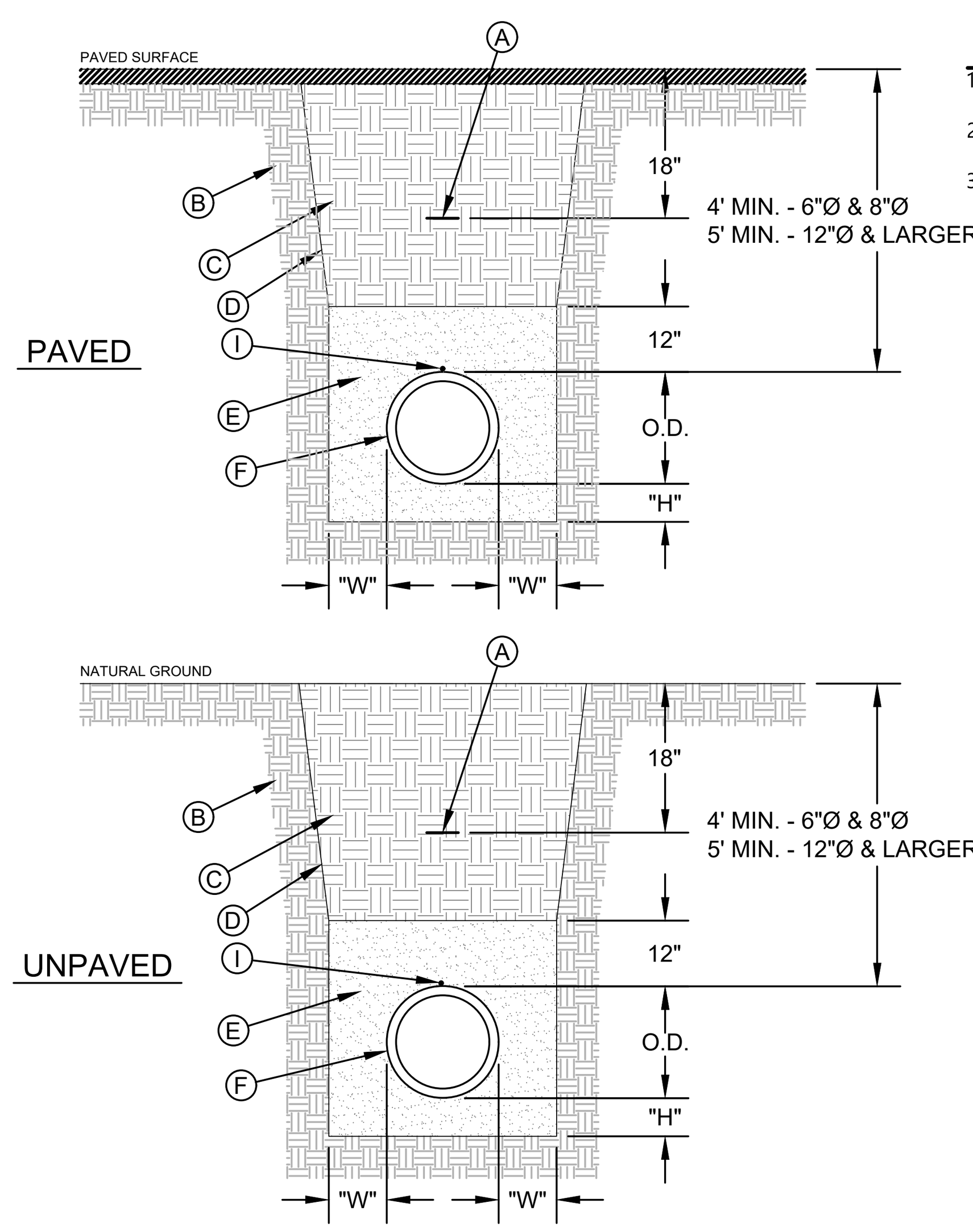
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

EMBEDMENT CLASS "A" FOR PRESSURE PIPE AND GRAVITY PIPE DRY CONDITIONS



GENERAL NOTES (DRY):
1. BEDDING FOR PRESSURE AND GRAVITY PIPE IN DRY CONDITIONS.
2. PROVIDE TRENCH SAFETY SYSTEM FOR TRENCH DEPTHS GREATER THAN 5 FEET.
3. IF THE NATIVE MATERIAL EXCAVATED FROM THE TRENCH IS UNSUITABLE AS BACKFILL MATERIAL, OR THE REQUIRED COMPACTION IS UNATTAINABLE, THE CONTRACTOR SHALL, AT HIS EXPENSE, IMPORT SELECT MATERIAL TO BE MIXED WITH OR USED IN PLACE OF THE NATIVE MATERIAL. SELECT MATERIAL MUST BE APPROVED BY ENGINEER. SUBSTITUTE SOIL CEMENT SLURRY (1-SACK) IF REQUIRED IN SPECS.

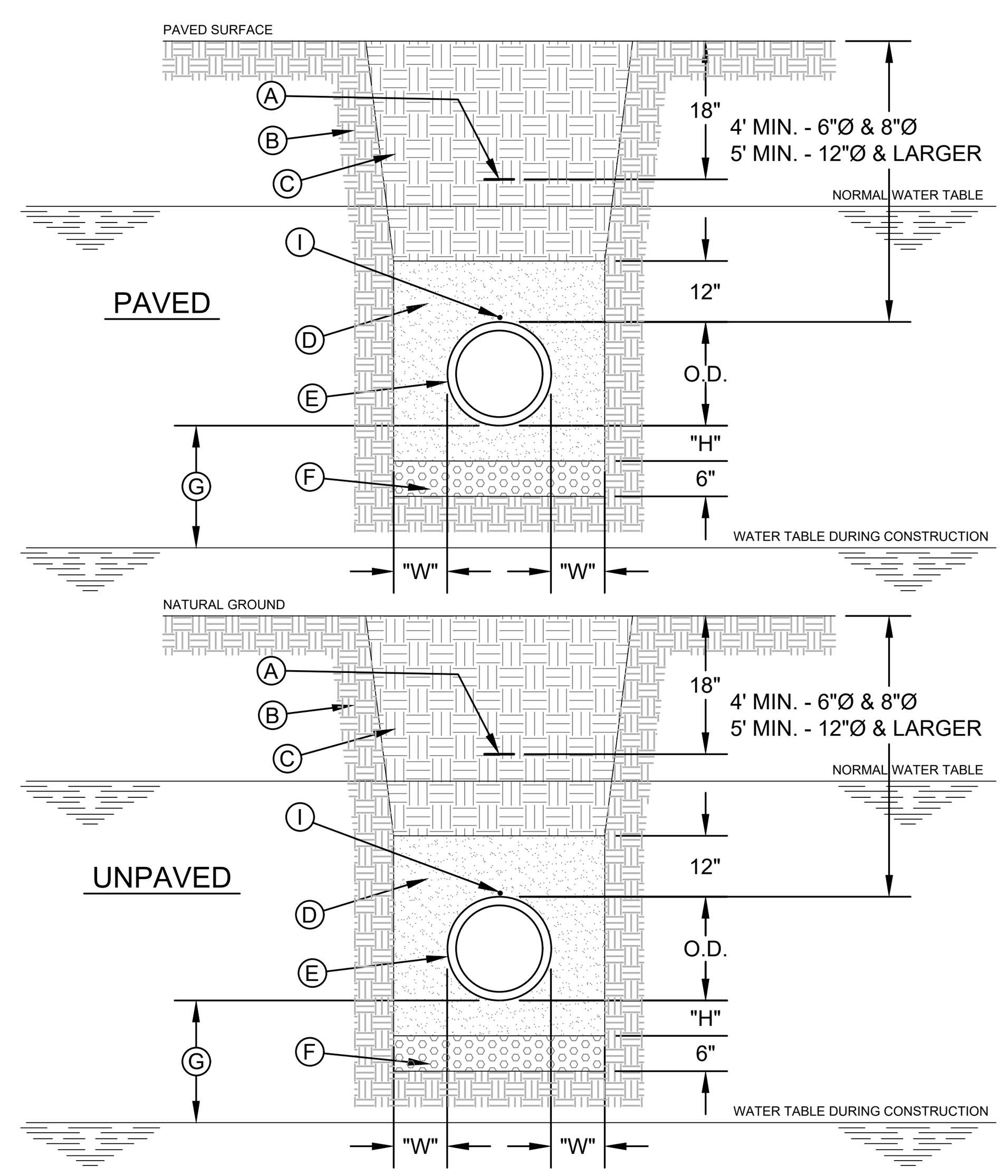
CONSTRUCTION KEY NOTES (DRY):
A. APPROVED MARKING TAPE.
B. UNDISTURBED STABLE MATERIAL.
C. NATIVE MATERIAL BACKFILL.
PAVED CONDITION: COMPACT TO 90% DENSITY PER ASTM D-1557 MODIFIED PROCTOR.
UNPAVED CONDITION: COMPACT TO 85% DENSITY PER ASTM D-1557 MODIFIED PROCTOR.
(*SEE NOTE #3 IF THESE PREVIOUS CONDITIONS CANNOT BE MET.)
D. SLOPE TRENCH IN SANDY SOIL CONDITIONS.
E. USE CLASS II OR CLASS III SAND PER ASTM D-2487. NATIVE MATERIAL OR IMPORTED SELECT MATERIAL MEETING OR EXCEEDING THIS REQUIREMENT MAY BE USED. COMPACT TO 85% DENSITY PER ASTM D-1557 MODIFIED PROCTOR (OR 90% D-698 STANDARD PROCTOR).
F. APPROVED PIPE.
G. TRENCH DIMENSIONS AS FOLLOWS:

PIPE DIAMETER	"H"
6" - 30"	4"
GREATER THAN 30"	6"

PIPE DIAMETER	"W"
6" - 30"	8"
GREATER THAN 30"	12"

I. TRACER WIRE TO BE INSTALLED OVER NON-FERROUS (PVC, HDPE, ETC.) PIPES.

EMBEDMENT CLASS "B" FOR PRESSURE PIPE WET CONDITIONS



GENERAL NOTES (WET):
1. BEDDING FOR PRESSURE PIPE IN WET CONDITIONS.
2. PROVIDE TRENCH SAFETY SYSTEM FOR TRENCH DEPTHS GREATER THAN 5 FEET.
3. A DRY TRENCH MUST BE MAINTAINED WHILE PLACING BEDDING.
4. IF THE NATIVE MATERIAL EXCAVATED FROM THE TRENCH IS UNSUITABLE AS BACKFILL MATERIAL, OR THE REQUIRED COMPACTION IS UNATTAINABLE, THE CONTRACTOR SHALL, AT HIS EXPENSE, IMPORT SELECT MATERIAL TO BE MIXED WITH OR USED IN PLACE OF THE NATIVE MATERIAL. SELECT MATERIAL MUST BE APPROVED BY ENGINEER. SUBSTITUTE SOIL CEMENT SLURRY (1-SACK) IF REQUIRED IN SPECS.

CONSTRUCTION KEY NOTES (WET):
A. APPROVED MARKING TAPE.
B. UNDISTURBED STABLE MATERIAL.
C. NATIVE MATERIAL BACKFILL.
PAVED CONDITION: COMPACT TO 90% DENSITY PER ASTM D-1557 MODIFIED PROCTOR.
UNPAVED CONDITION: COMPACT TO 85% DENSITY PER ASTM D-1557 MODIFIED PROCTOR.
(*SEE NOTE #4 IF THESE PREVIOUS CONDITIONS CANNOT BE MET.)
D. USE CLASS II OR CLASS III SAND PER ASTM D-2487. NATIVE MATERIAL OR IMPORTED SELECT MATERIAL MEETING OR EXCEEDING THIS REQUIREMENT MAY BE USED. COMPACT TO 85% DENSITY PER ASTM D-1557 MODIFIED PROCTOR (OR 90% D-698 STANDARD PROCTOR).
E. APPROVED PIPE (WRAP DUCTILE IRON OR STEEL PIPE IN APPROVED POLYETHYLENE SHEETING, MINIMUM 6 MIL THICKNESS).
F. USE CLASS I GRAVEL PER ASTM D-2321 AND D-2487. NO COMPACTION REQUIRED. USE MINIMAL TAMPING, RODDING OR HAUNCH SLICING CAREFULLY IN THE EMEBEDMENT ZONE. IF REQUIRED BY THE ENGINEER, TEST PER ASTM D-4254 PERCENT OF RELATIVE DENSITY.
G. 18" MINIMUM UNLESS OTHERWISE SPECIFIED.
H. TRENCH DIMENSIONS AS FOLLOWS:

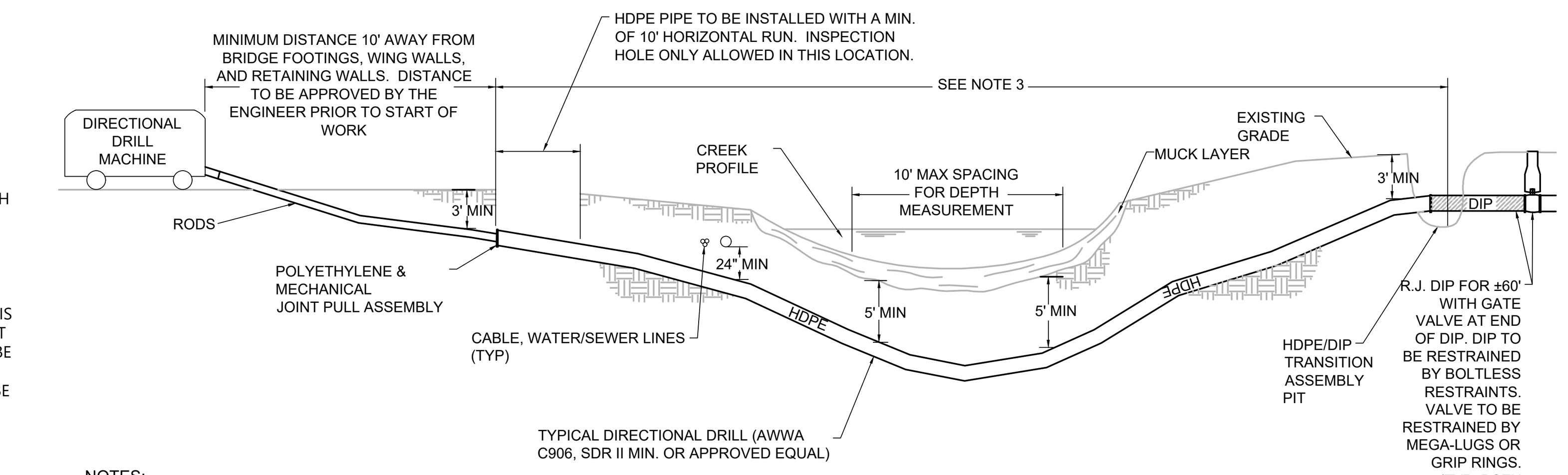
PIPE DIAMETER	"H"
6" - 30"	4"
GREATER THAN 30"	6"

PIPE DIAMETER	"W"
6" - 30"	8"
GREATER THAN 30"	12"

I. TRACER WIRE TO BE INSTALLED OVER NON-FERROUS (PVC, HDPE, ETC.) PIPES.

Utility Trench

N.T.S. Source: VHB

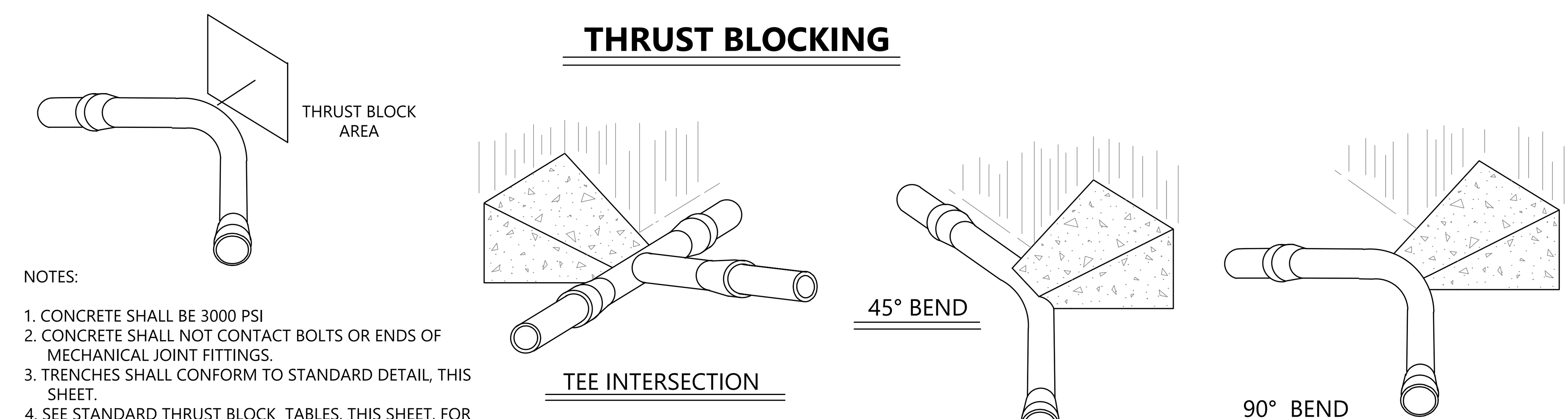


NOTES:
1. A PROFILE AND PLAN SHALL BE PROVIDED FROM ENTRY TO EXIT FOR EACH DIRECTIONAL DRILL SECTION BY THE DIRECTIONAL BORE CONTRACTOR.
2. ALL BORE SECTIONS SHALL BE HYDROSTATICALLY TESTED PER SPECIFICATION STANDARDS UPON COMPLETION OF INSTALLATION AND PRIOR TO PLACING THE WATER MAIN ON-LINE.
3. LENGTH OF CROSSING, LOCATION OF INSPECTION/OBSERVATION EXCAVATION, NUMBER OF PIPE, LOCATION OF BORE MACHINE, AUGER ENTRANCE LOCATION AND TIE-IN POINTS ARE TO BE APPROVED BY THE ENGINEER PRIOR TO ANY START OF WORK.
4. THIS DETAIL IS ALSO APPLICABLE TO STREAMS, WETLANDS, LARGE STORM DRAINS, AND SIMILAR APPLICATIONS FOR DIRECTIONAL DRILL WITH POLYETHYLENE PIPE.

Horizontal Directional Drill (HDD) HDPE

N.T.S. Source: VHB

THRUST BLOCKING



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, THIS SHEET.
4. SEE STANDARD THRUST BLOCK TABLES, THIS SHEET, FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

Standard Thrust Block Views

N.T.S. Source: VHB

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/FT²	SOFT CLAY 2000 LBS/FT²	GRAVEL / COARSE SAND 1600 LBS/FT²	8000 LBS/FT² DRY CLAY - ALWAYS DRY	SAND, COMPACT FIRM 8000 LBS/FT²	SAND - CLEAN DRY 4000 LBS/FT²	SOIL 1000 LBS/FT² QUICKSAND - VERY POOR	ROCK - POOR 10,000 LBS/FT²
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	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°	31,983	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

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.

THRUST BLOCKING DESIGN QUANTITY TABLE

REVISIONS	DATE	REVISIONS	DATE

REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS
BASED ON TEST PRESSURE OF 200 P.S.I.

ALL AREAS GIVEN IN SQUARE FEET.

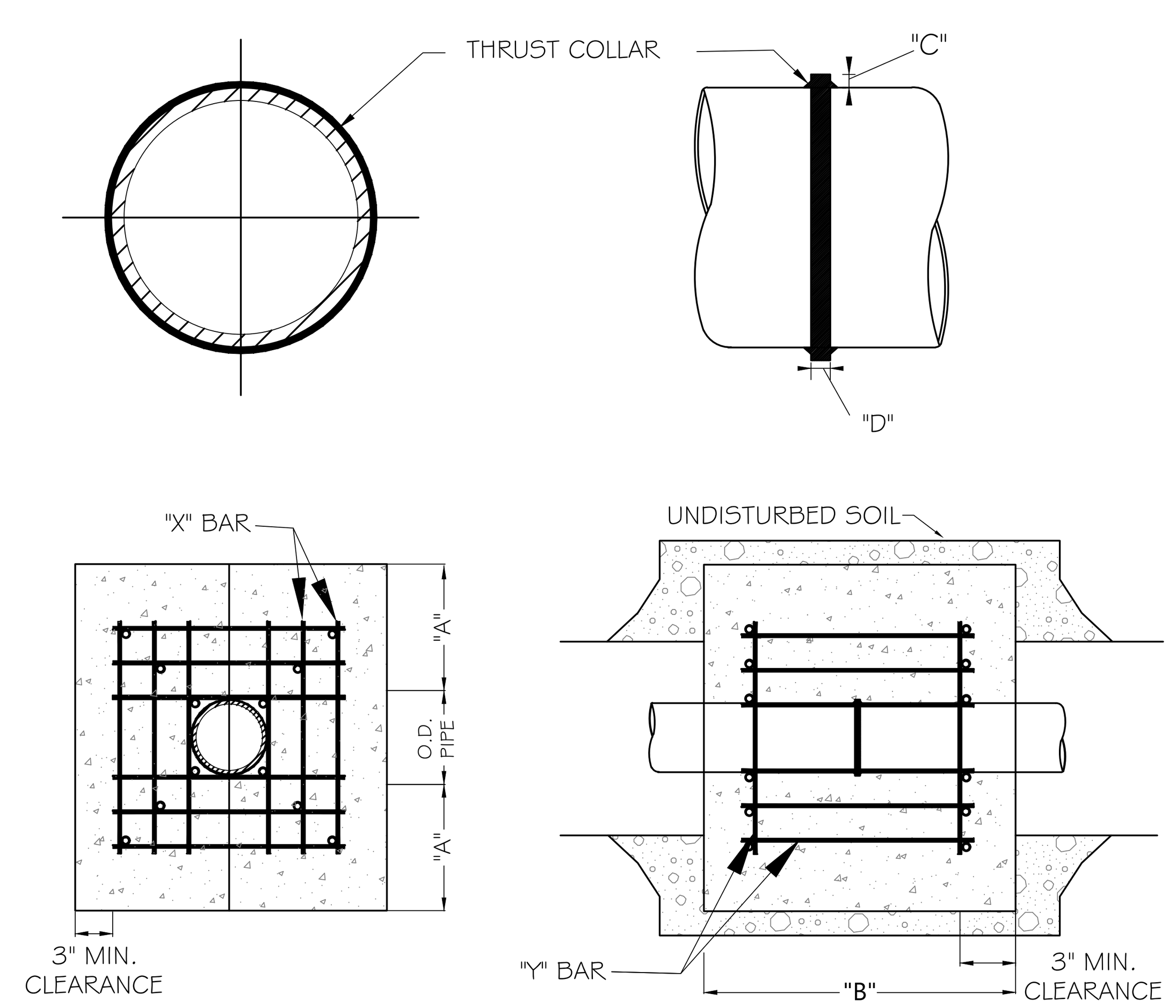
SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY 4000 LBS/FT²	SOFT CLAY 2000 LBS/FT²	GRAVEL / COARSE SAND 1600 LBS/FT²	8000 LBS/FT² DRY CLAY - ALWAYS DRY	SAND, COMPACT FIRM 8000 LBS/FT²	SAND - CLEAN DRY 4000 LBS/FT²	SOIL 1000 LBS/FT² QUICKSAND - VERY POOR	ROCK - POOR 10,000 LBS/FT²
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

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.

THRUST BLOCKING DESIGN QUANTITY TABLE

REVISIONS	DATE	REVISIONS	DATE



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
36" & GREATER	#6	3'-0" + O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS EACH	X-24, Y-12

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

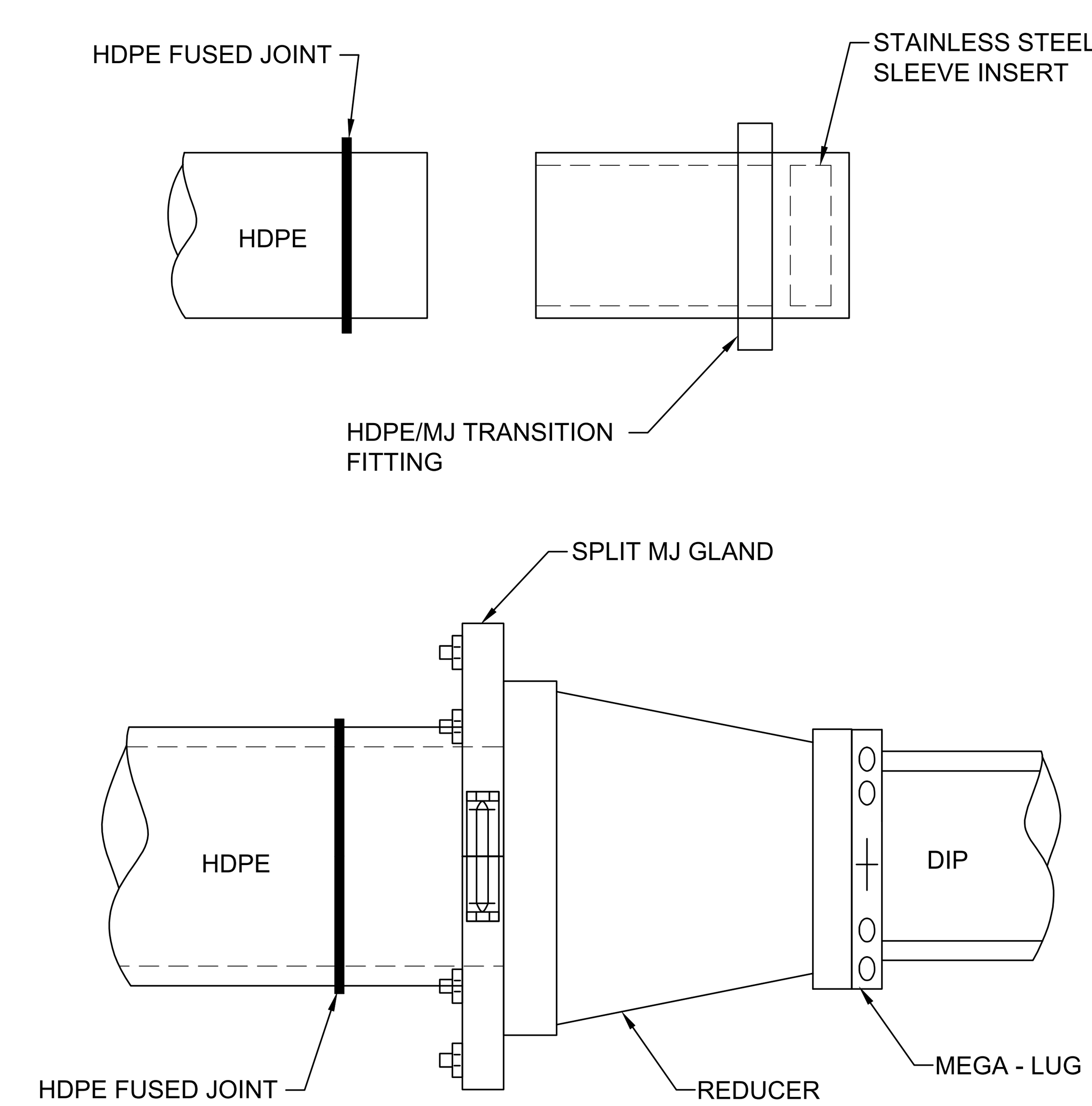
THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" - 16"	1'-4"	1'-7"	0'-2"	3/8"
20" -24"	1'-4"	1'-7"	0'-3"	1/2"
30" -36"	1'-4"	1'-7"	0'-4"	5/8"
48" & GREATER	1'-8"	1'-9"	0'-6"	7/8"

Thrust Collar Detail

5/9

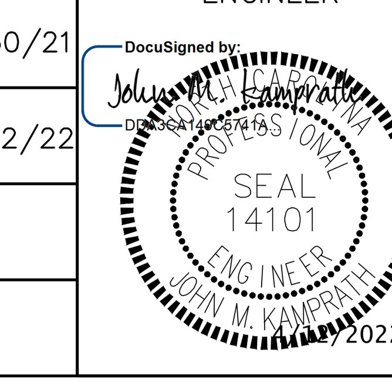
N.T.S. Source: VHB



HDPE/DIP Transition Assembly

N.T.S. Source: VHB

PROJECT REFERENCE NO.	SHEET NO.
R5819/R5820	UC- DT2
REVISION NO.	UTILITIES ENGINEER
90% DESIGN – 11/30/21	
100% DESIGN – 3/02/22	



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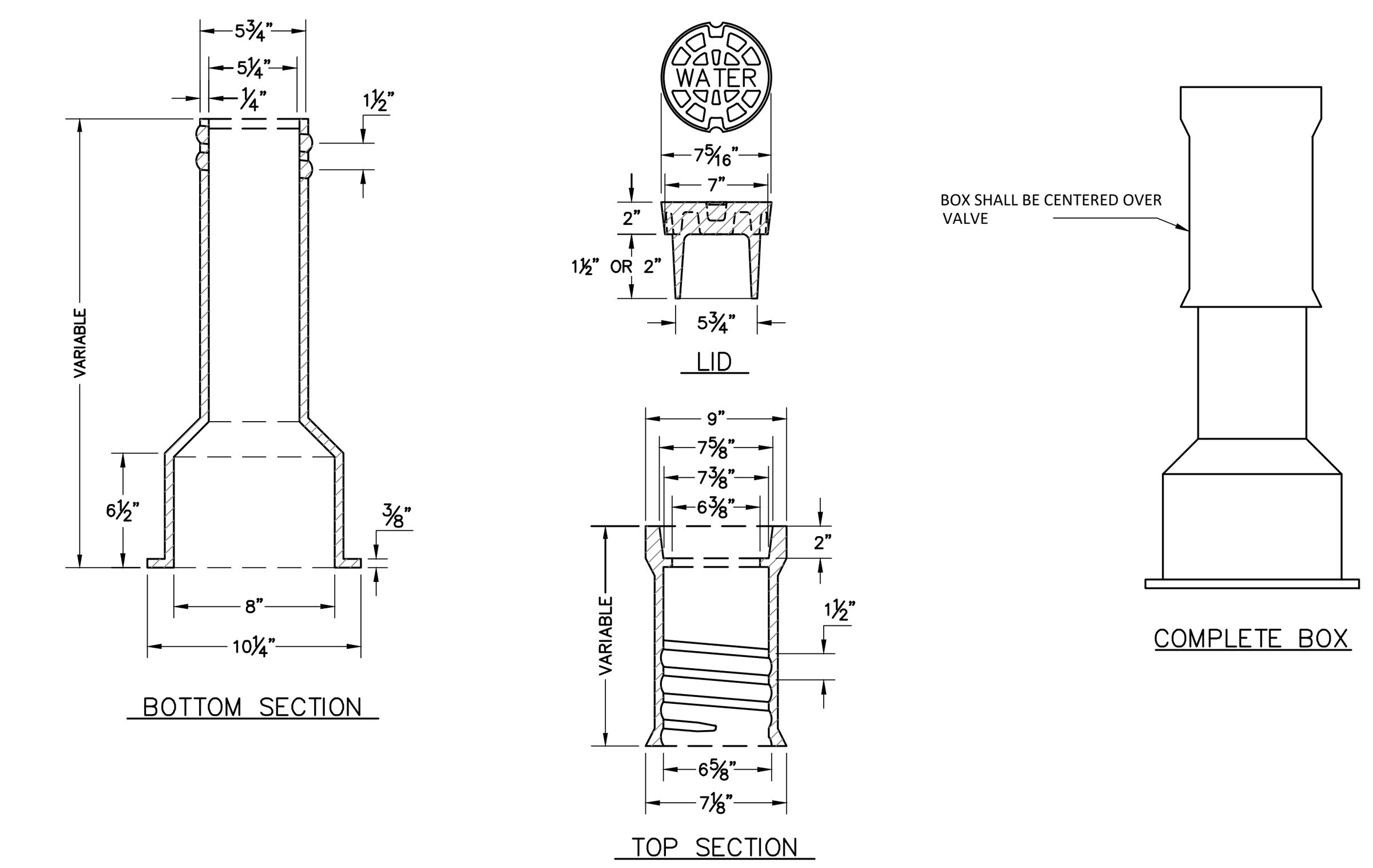
Prepared by

vhb

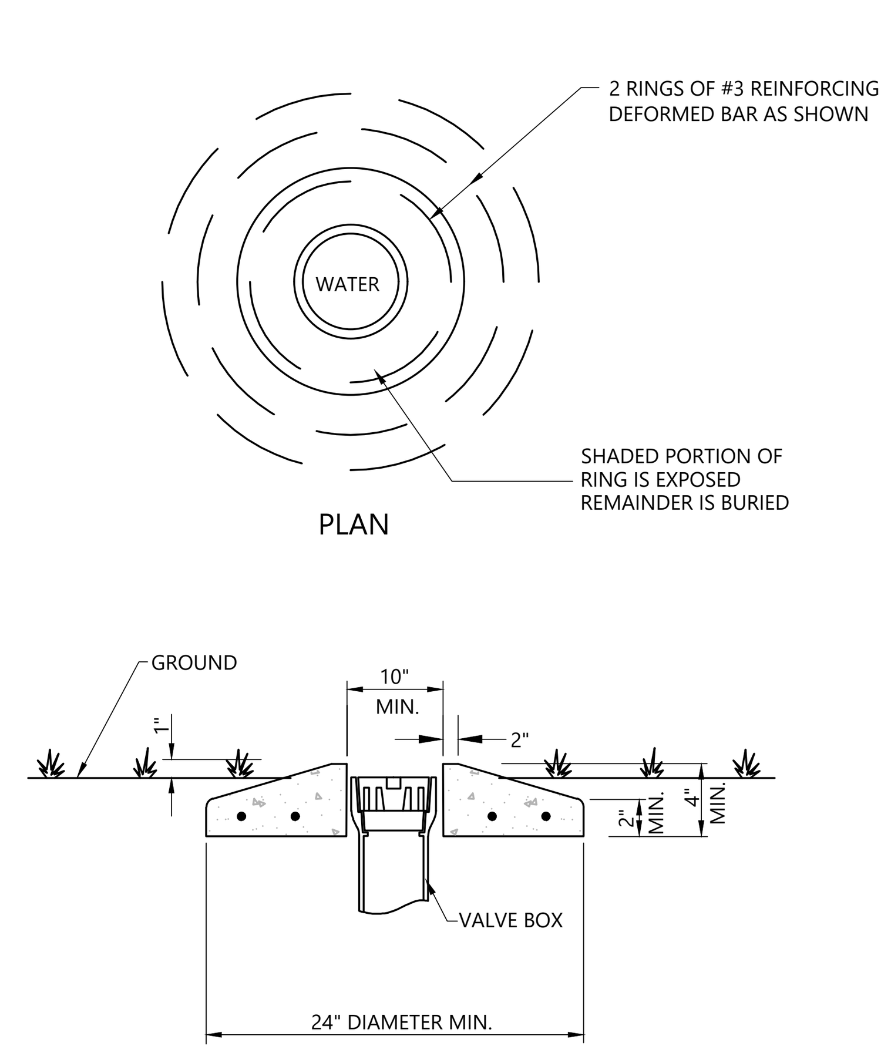
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

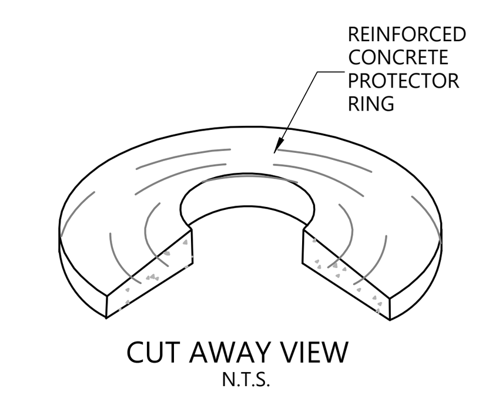


DIMENSIONS IN INCHES	
LENGTH	
TOP	BOTTOM
10	15
10	24
16	24
16	36
26	36
26	48
26	60

Valve Box

N.T.S. Source: VHB

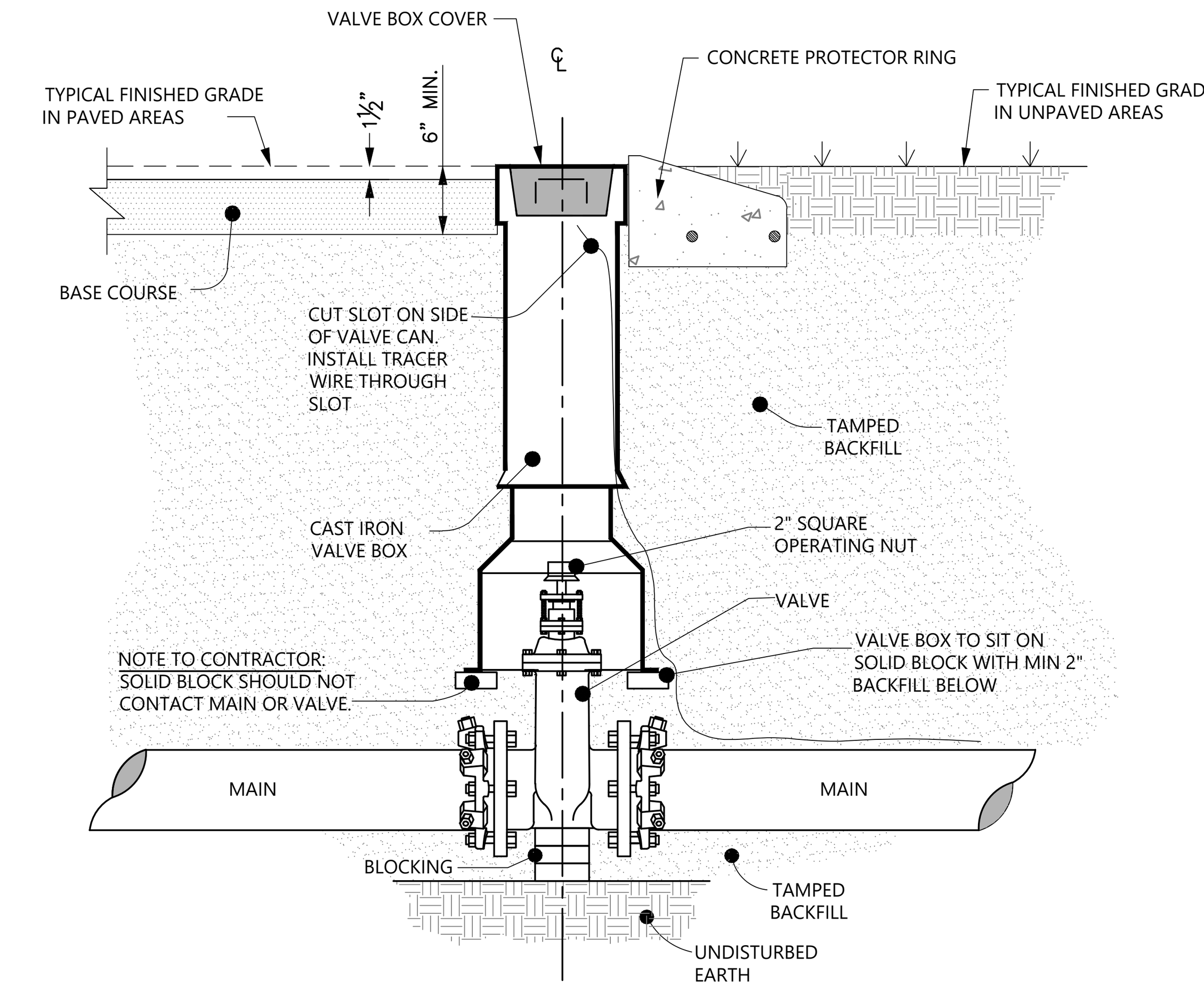




NOTES:
1. CONCRETE PROTECTOR RING SHALL BE 3000 P.S.I. PRECAST REINFORCED CONCRETE.

Concrete Protector Ring

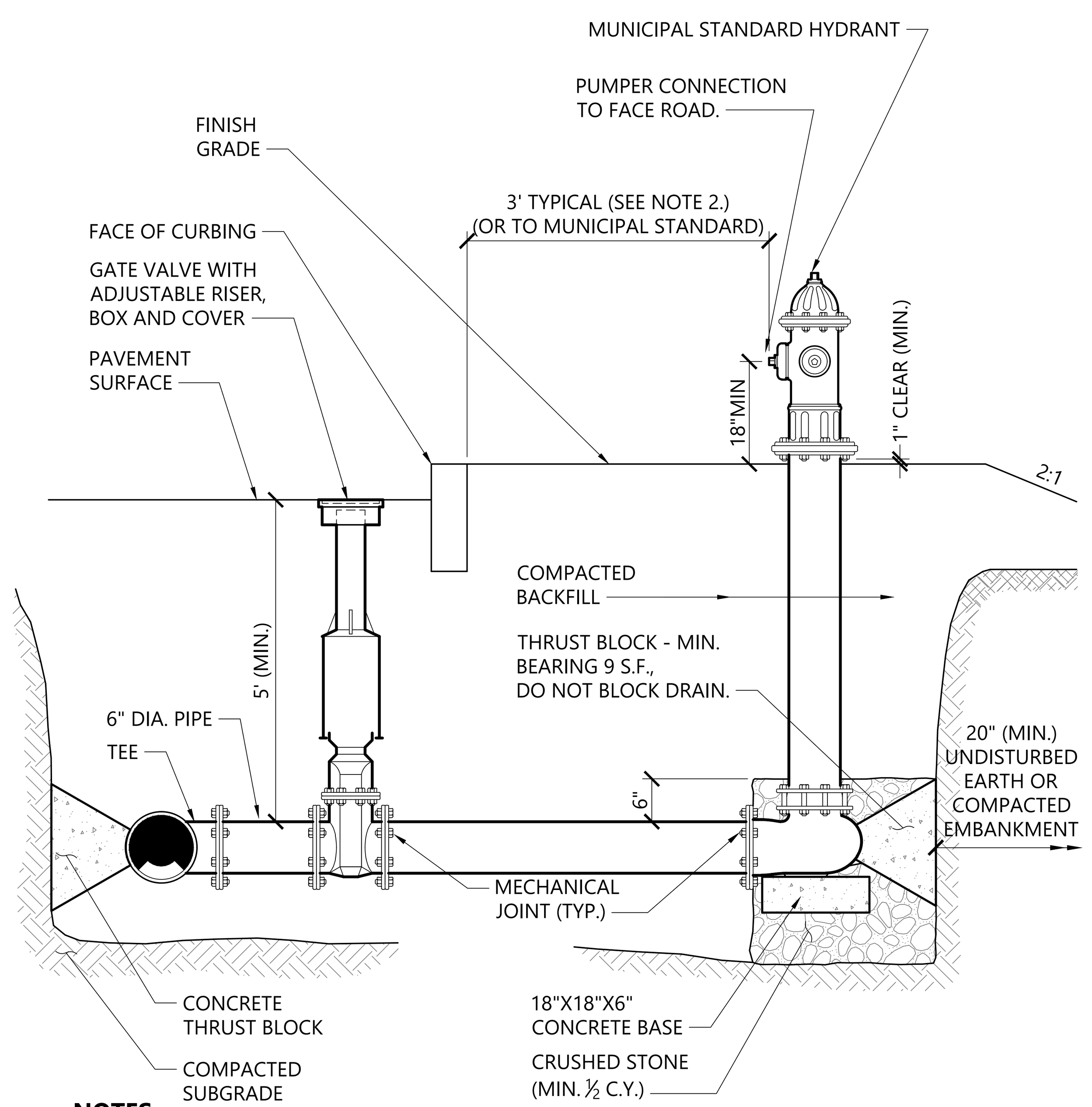
N.T.S. Source: VHB



NOTES:
1. ONLY MANUFACTURED VALVE BOX EXTENSIONS SHALL BE ALLOWED.
2. VALVE OPERATING NUT MUST BE EXTENDED SO THAT THE DEPTH IS NO GREATER THAN 4' (ft.) FROM THE SURFACE USING A MANUFACTURER APPROVED EXTENSION KIT.
3. PRECAST CONCRETE ENCASEMENT IS REQUIRED OUTSIDE OF PAVED AREAS.
4. CONCRETE PROTECTOR RING MAY BE USED IN LIEU OF ENCASEMENT IN UNPAVED AREAS.
5. ALL VALVES SHALL BE PLACED ON 4" THICK 8"X12" CONCRETE BLOCKS.

Valve and Valve Box Installation

N.T.S. Source: VHB



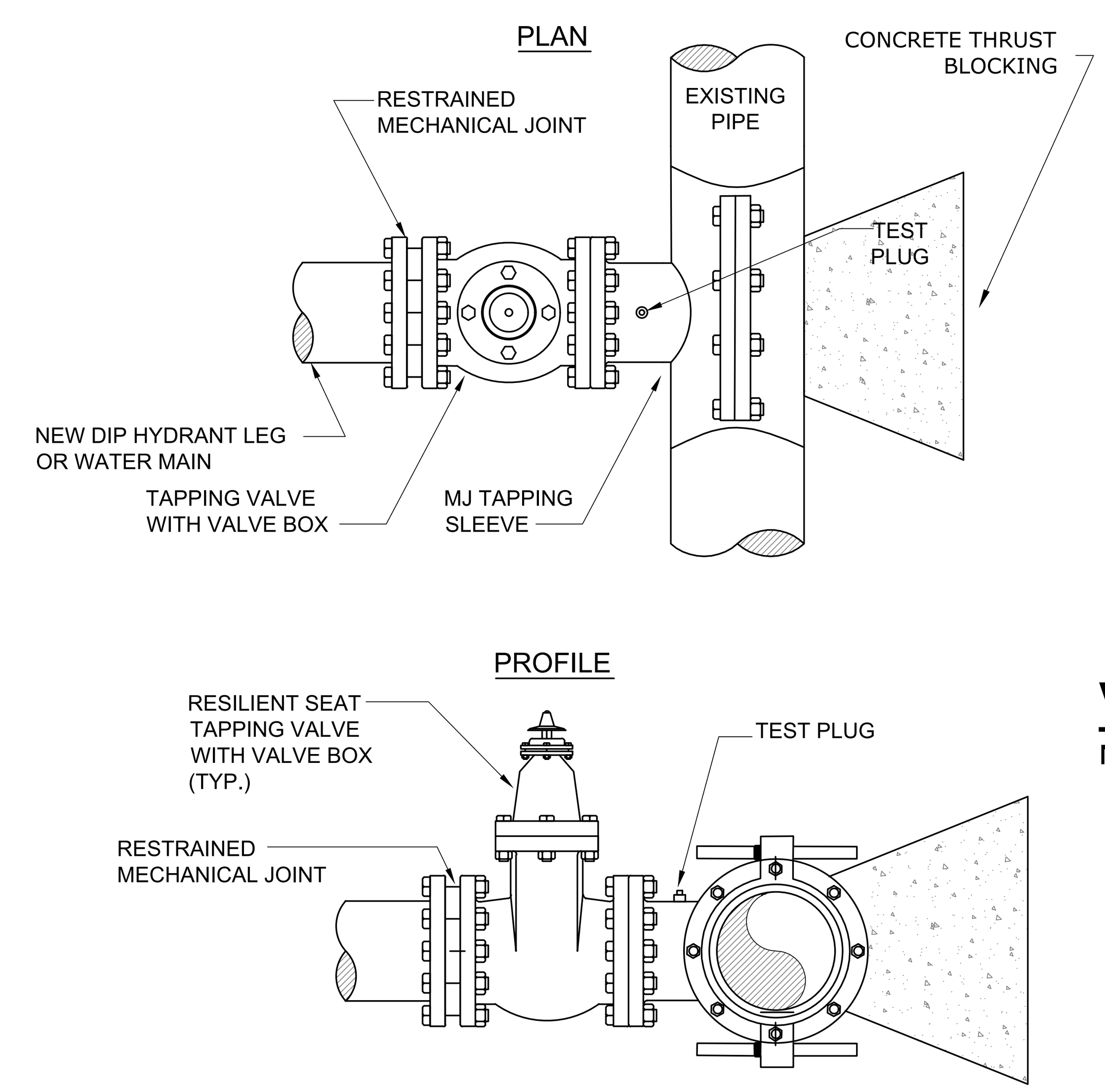
NOTES

1. CONCRETE THRUST BLOCKS TO BE USED ONLY WHERE THEY CAN BEAR ON UNDISTURBED EARTH AS SHOWN. USE CLAMPS AND TIE RODS OR OTHER ACCEPTABLE METHOD OF JOINT RESTRAINT WHERE SOIL CONDITIONS PROHIBIT THE USE OF THRUST BLOCKS.
2. HYDRANT IN SIDEWALK AREAS TO BE LOCATED TO PROVIDE MINIMUM CLEAR SIDEWALK PASSAGE WIDTH OF 3 FEET AT HYDRANT.
3. A 36-INCH CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF THE HYDRANT UNLESS OTHERWISE APPROVED BY AUTHORITY HAVING JURISDICTION.

Hydrant Construction

12/18

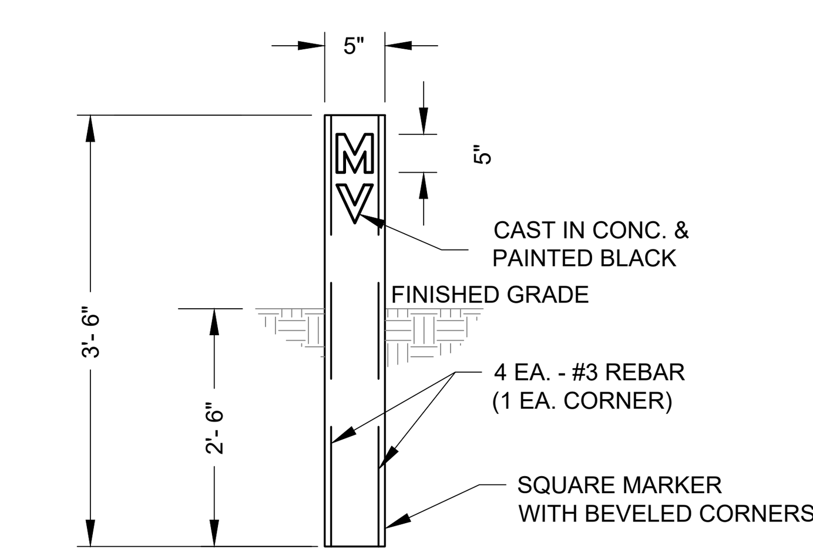
N.T.S. Source: VHB LD_250



NOTES:
1. TAPPING SLEEVE SHALL BE FABRICATED OF TYPE 304 S.S. AND PROVIDE A 360° SEAL AROUND EXISTING PIPE WITH FULL CIRCUMFERENTIAL GASKET.

Tapping Sleeve & Valve Assembly

N.T.S. Source: VHB

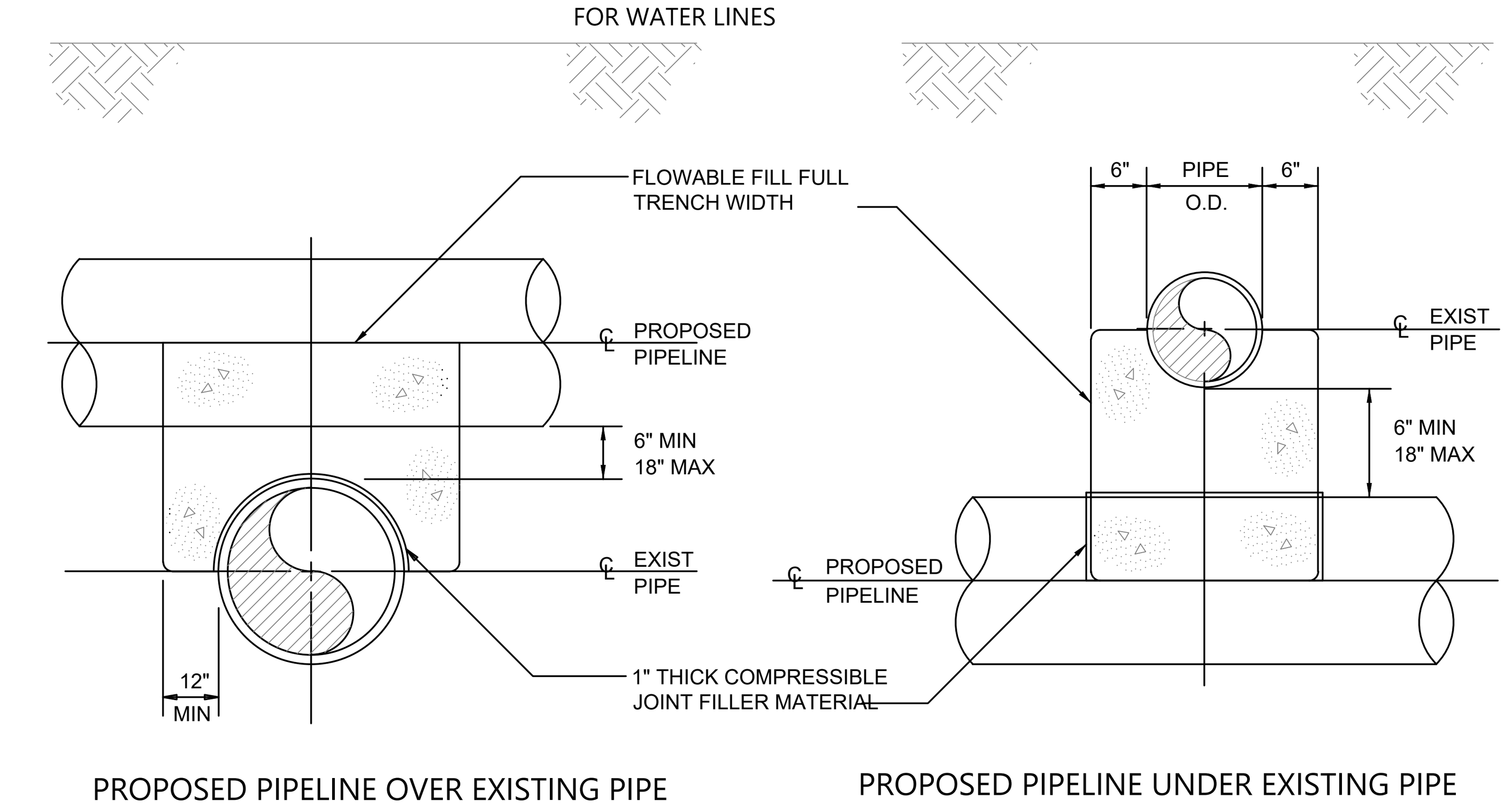


NOTES:
1. VALVE MARKERS SHALL BE PLACED AT R/W.
2. LETTERS SHALL FACE TOWARDS VALVE.
3. MARKER SHALL HAVE BRASS OR BRONZE EMBED ON TOP OR SIDE.
4. CONTRACTOR SHALL STAMP DISTANCE TO CENTER OF VALVE INTO EMBED.
5. MAIN LINE VALVES SHALL HAVE MARKER WITH "MV" CASTED IN IT.
6. BLOW-OFF ASSEMBLY SHALL INCLUDE MARKER W/ "BO" CASTED IN IT.

Valve Marker

N.T.S. Source: VHB

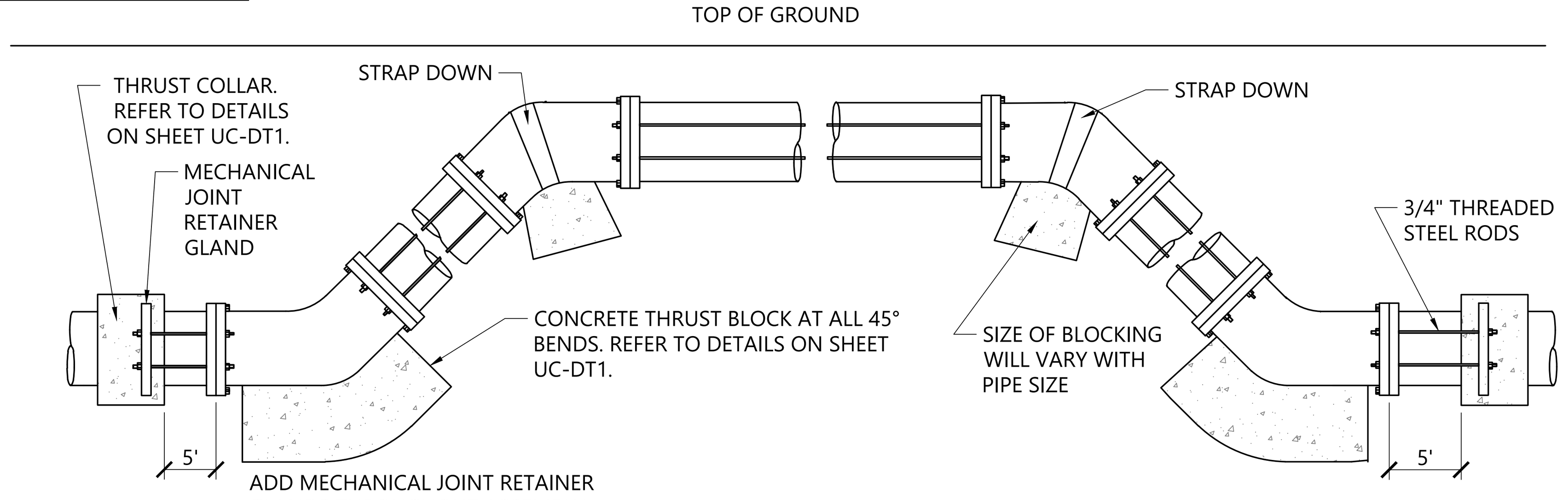
NOTE: NO ENCASEMENT REQUIRED FOR SPACE GREATER THAN 18" FOR WATER LINES



Concrete Cradle Protection for Water and Force Main Crossings

5/9

N.T.S. Source: VHB



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

Standard Vertical Bend

5/9

N.T.S. Source: VHB

Tuesday, April 12, 2022 ANSI A (8.50 X 11.00 Inches)
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4/12/2022
Mark Edwards