THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY, DATE Bloker Design Associates (703) 368-7373
DESIGN BY McCormick Taylor, Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

City Of Harrisonburg, Virginia

RESERVOIR STREET IMPROVEMENTS

VDOT PROJECT # U000-115, R30

UPC # 101209

WATER AND SEWER RELOCATION/ADJUSTMENT PLANS

COMMONWEALTH OF VIRGINIA
RICK JAMES DeLONG
Lic. No. 031642
4/06/15
PROFESSIONAL ENGINEER

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	ROADWAY SHEET NO.
15	INDEX OF SHEETS	N/A
15(A)	WATER & SEWER GENERAL NOTES	N/A
15(B)	WATER & SEWER MATERIAL NOTES	N/A
15(C)	WATER & SEWER TYPICAL DETAILS	N/A
15(D)	WATER & SEWER TYPICAL DETAILS	N/A
15(E)	WATER & SEWER TYPICAL DETAILS	N/A
15(F)	WATER & SEWER TYPICAL DETAILS	N/A
15(G)	WATER & SEWER TYPICAL DETAILS	N/A
15(H)	FIRE HYDRANT PROFILES	N/A
15(3)	WATER - PLA /PROF (STA. 10+00.00 TO 13+00.00)	003
15(4)	WATER - PLA /PROF (STA. 13+00.00 TO 20+00.00)	004
15(5)	WATER - PLAN (STA. 20+00.00 TO 27+00.00)	005
15(6)	WATER - PLA /PROF (STA. 27+00.00 TO 34+00.00)	006
15(7)	WATER - PLA /PROF (STA. 34+00.00 TO 41+00.00)	007
15(8)	WATER - PLA /PROF (STA. 41+00.00 TO 48+00.00)	008
15(9)	WATER - PLA /PROF (STA. 48+00.00 TO 55+00.00)	009
15(9B)	WATER - PLAN (STA. 11+00.00 TO 18+25.00)	009(B)
15(9C)	WATER - PLAN (STA. 11+00.00 TO 14+00.95)	009(C)
15(10)	WATER - PLAN (STA. 55+00.00 TO 61+00.00)	010
15(11)	WATER - PLA /PROF (STA. 61+00.00 TO 65+37.25)	011
15(11B)	WATER - PLA /PROF (STA. 11+00.00 TO 18+00.00)	011(B)
15(11C)	WATER - PLAN (STA. 10+86.00 TO 14+10.37)	011(C)
16(3)	SEWER - PLAN (STA. 10+00.00 TO 13+00.00)	003
16(4)	SEWER - PLA /PROF (STA. 13+00.00 TO 20+00.00)	004
16(6)	SEWER - PLA /PROF (STA. 27+00.00 TO 34+00.00)	006
16(7)	SEWER - PLA /PROF (STA. 34+00.00 TO 41+00.00)	007
16(9)	SEWER - PLA /PROF (STA. 48+00.00 TO 55+00.00)	009
16(10)	SEWER - PLAN (STA. 55+00.00 TO 61+00.00)	010
16(11)	SEWER - PLA /PROF (STA. 61+00.00 TO 65+37.25)	011
16(11B)	SEWER - PLA /PROF (STA. 11+00.00 TO 18+00.00)	011(B)

SUMMARY OF WATER FACILITIES - STANDARD

SHEET NO.	6" D.I. MAIN LF	8" D.I. MAIN LF	12" D.I. MAIN LF	8" X 6" T.S. VALVE & BOX EA.	12" X 6" T.S. VALVE & BOX EA.	12" X 8" T.S. VALVE & BOX EA.	12" X 12" T.S. VALVE & BOX EA.	6" G.V. & BOX EA.	8" G.V. & BOX EA.	12" G.V. & BOX EA.	FIRE HYDRANT EA.	RELOCATE EX. FH EA.	ADJUST EX. VALVE BOX EA.	RELOCATE EX. WM & BOX EA.	3/4" WATER SERVICE LINE LF	1" WATER SERVICE LINE LF	16" STEEL ENCASE. PIPE LF
15(3)	14	93	276	0	0	0	0	1	3	3	2	0	0	0	0	0	0
15(4)	31	60	214	0	0	0	1	0	1	0	0	1	3	7	0	219	0
15(5)	49	0	0	0	1	0	0	0	0	0	1	2	3	9	0	102	0
15(6)	0	89	0	0	0	1	0	1	1	0	1	1	7	6	10	117	0
15(7)	50	130	139	0	0	0	0	2	1	1	1	1	6	3	57	105	0
15(8)	14	300	685	0	0	0	0	1	3	4	1	0	0	1	0	7	0
15(9)	27	0	52	0	0	0	1	0	0	0	0	1	2	4	0	104	0
15(9B)	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	31	0
15(9C)	12	0	0	0	0	0	0	0	0	0	0	1	0	3	20	10	0
15(10)	6	0	0	0	0	0	0	0	0	0	0	1	1	2	0	21	0
15(11)	32	0	142	0	0	0	1	1	0	1	1	0	3	0	0	0	12
15(11B)	21	0	596	1	0	0	0	0	0	5	0	1	3	1	0	14	0
15(11C)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	19	0
TOTAL	256	672	2104	1	1	1	3	6	9	14	7	9	28	41	87	749	12

SUMMARY OF WATER FACILITIES - NON STANDARD

SHEET NO.	RELOCATE EX. DUAL WM & MH EA.	REMOVE EX. FH EA.	REMOVE EX. 6" WATER MAIN LF	REMOVE EX. 12" WATER MAIN LF	REMOVE EX. WM & BOX EA.	REMOVE EX. VALVE & BOX EA.	RECONNECT MAIN EA.	RECONNECT SERVICE EA.
15(3)	0	1	0	0	0	3	1	0
15(4)	0	0	0	20	0	1	2	7
15(5)	0	1	43	0	2	1	1	9
15(6)	2	0	0	0	0	0	2	9
15(7)	2	1	0	0	0	2	2	9
15(8)	0	1	12	0	0	5	2	1
15(9)	0	0	0	0	0	0	2	3
15(9B)	0	0	0	0	0	0	0	3
15(9C)	0	0	0	0	0	0	1	3
15(10)	0	0	0	0	0	0	1	2
15(11)	0	1	7	10	0	2	1	0
15(11B)	0	0	4	25	0	2	3	2
15(11C)	0	0	0	0	0	0	0	2
TOTAL	4	5	66	55	2	16	18	50

SUMMARY OF SEWER FACILITIES - STANDARD

SHEET NO.	4" SANITARY SEWER PIPE LF	8" MAIN SDR 35 PVC LF	8" MAIN SDR 26 PVC LF	8" MAIN CL 52 DI LF	4' MH (STANDARD) LF	4' MH (DOGHOUSE) LF	MH FRAME & COVER (STANDARD) EA	ADJUST EX. FRAME & COVER EA	RECONSTRUCT EX. SAN MH EA	SEWER CLEANOUT EA	4" SANITARY SERVICE LATERAL LF	8" SANITARY DROP CONNECTION LF	12" STEEL ENCASE. PIPE LF
16(3)	0	0	0	0	3.6	0.0	1	0	0	0	0	0	0
16(4)	0	29	0	0	5.1	0.0	1	0	0	0	0	0	0
16(5)	NOT USED												
16(6)	0	120	0	0	15.6	10.9	3	3	2	0	0	6.4	12
16(7)	0	267	0	0	22.3	0.0	4	1	3	0	0	3.3	0
16(8)	NOT USED												
16(9)	21	0	164	0	5.0	0.0	1	1	0	1	0	0	0
16(9B)	NOT USED												
16(9C)	NOT USED												
16(10)	0	0	0	0	0.0	0.0	1	1	0	0	0	0	0
16(11)	0	0	117	0	0.0	8.1	1	0	0	0	0	2.8	14
16(11B)	0	0	679	79	63.3	0.0	5	0	0	2	59	0	0
16(11C)	NOT USED												
TOTAL	21	416	960	79	114.8	19.0	17	6	5	3	59	12.5	26

SUMMARY OF SEWER FACILITIES - NON STANDARD

SHEET NO.	RE-CONNECT EX. LATERAL EA	RE-CONNECT EX. MAIN EA	20" STEEL ENCASE. PIPE LF	CORE DRILL EX. MH EA	MH FRAME & COVER (SHALLOW) EA	ABANDON EX. MH LF	REMOVE EX. MH LF
16(3)	0	0	0	0	0	0	0
16(4)	0	0	0	1	1	0	0
16(5)	NOT USED						
16(6)	3	0	0	1	0	0	0
16(7)	13	0	0	1	0	16.9	0
16(8)	NOT USED						
16(9)	0	0	0	1	0	25.2	0
16(9B)	NOT USED						
16(9C)	NOT USED						
16(10)	0	0	0	0	0	0	0
16(11)	0	0	0	0	0	0	0
16(11B)	3	1	30	1	0	18.5	11.5
16(11C)	NOT USED						
TOTAL	19	1	30	5	1	60.6	11.5

FINAL CONSTRUCTION PLANS
April 6, 2015

PROJECT	SHEET NO.
UPC* 101219	15

$TIME$STAMP$

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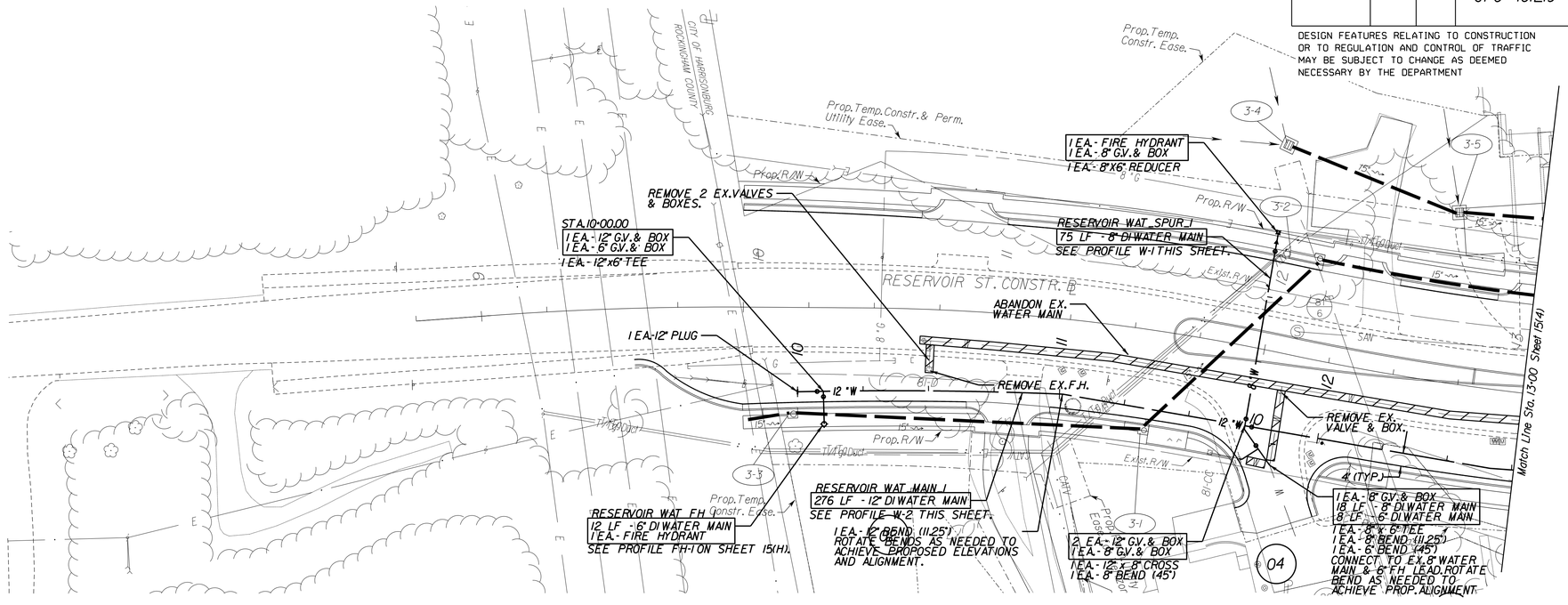
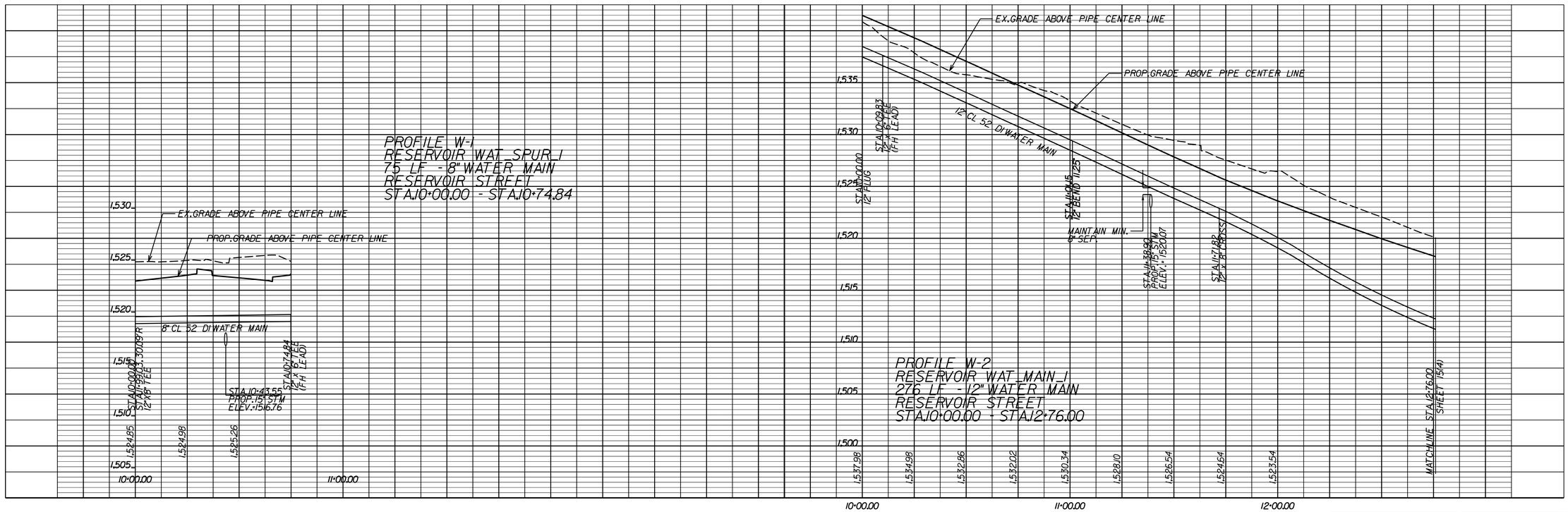
SURVEYED BY, DATE Bloker Design Associates (703) 368-7373
DESIGN BY McCormick Taylor, Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Sewer Plan & Profiles	16(3)
Water/Sewer Details	15(C) - 15(G)
Fire Hydrant Profiles	15(H)



SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	15(3)

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WATER MAIN CONSTRUCTION SEQUENCE:
1. INSTALL T.S.& VALVE
2. CONSTRUCT NEW WATER MAIN
3. PERFORM PRESSURE TEST
4. COLLECT BACTERIA SAMPLES
5. MOVE SERVICES TO NEW WATER MAIN
6. INSTALL TIE-IN CONNECTION PER CITY DETAIL

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Sewer Plan & Profiles	16(4)
Water/Sewer Details	15(C) - 15(G)

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(4)

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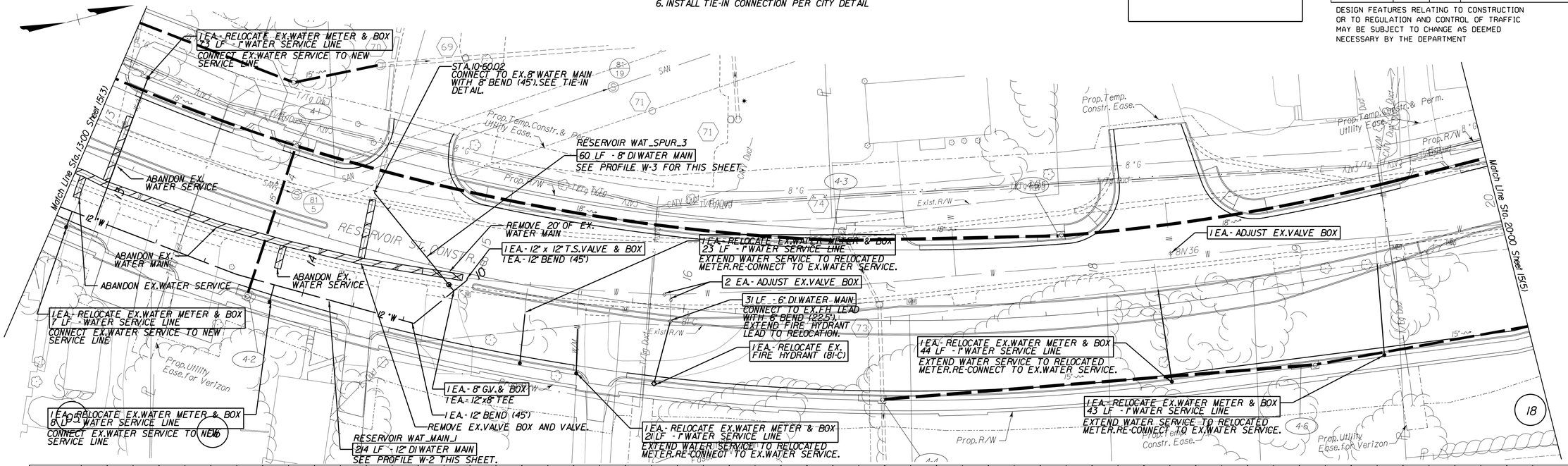

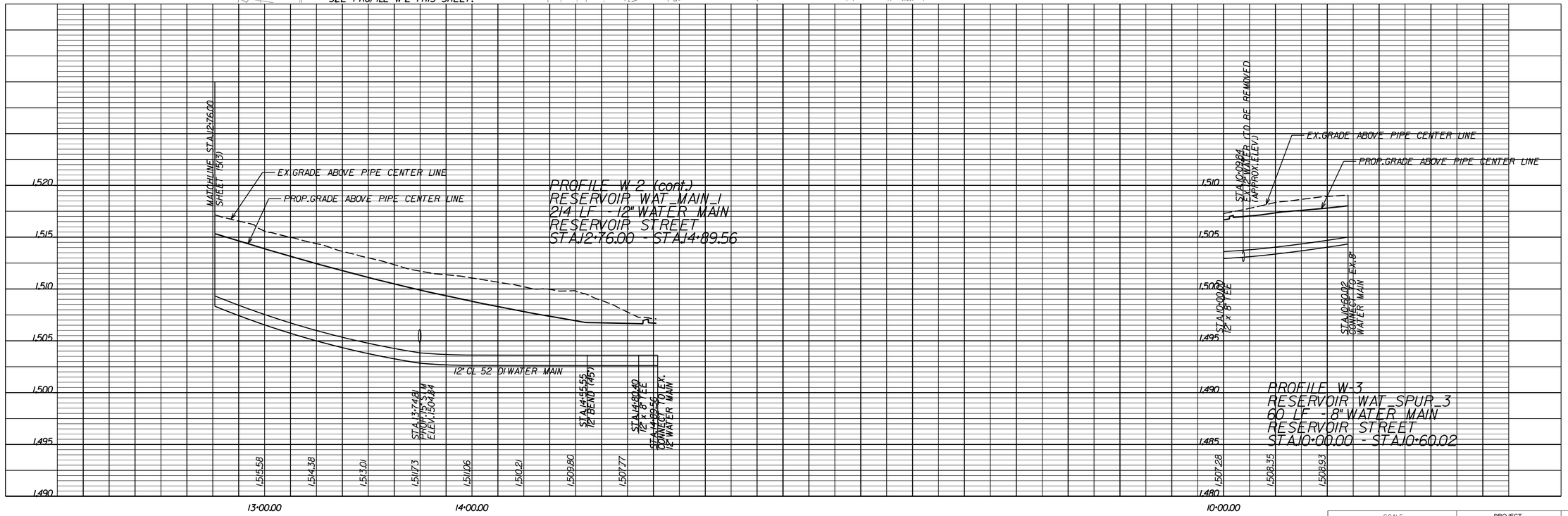

SCALE	PROJECT	SHEET NO.
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REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(5)

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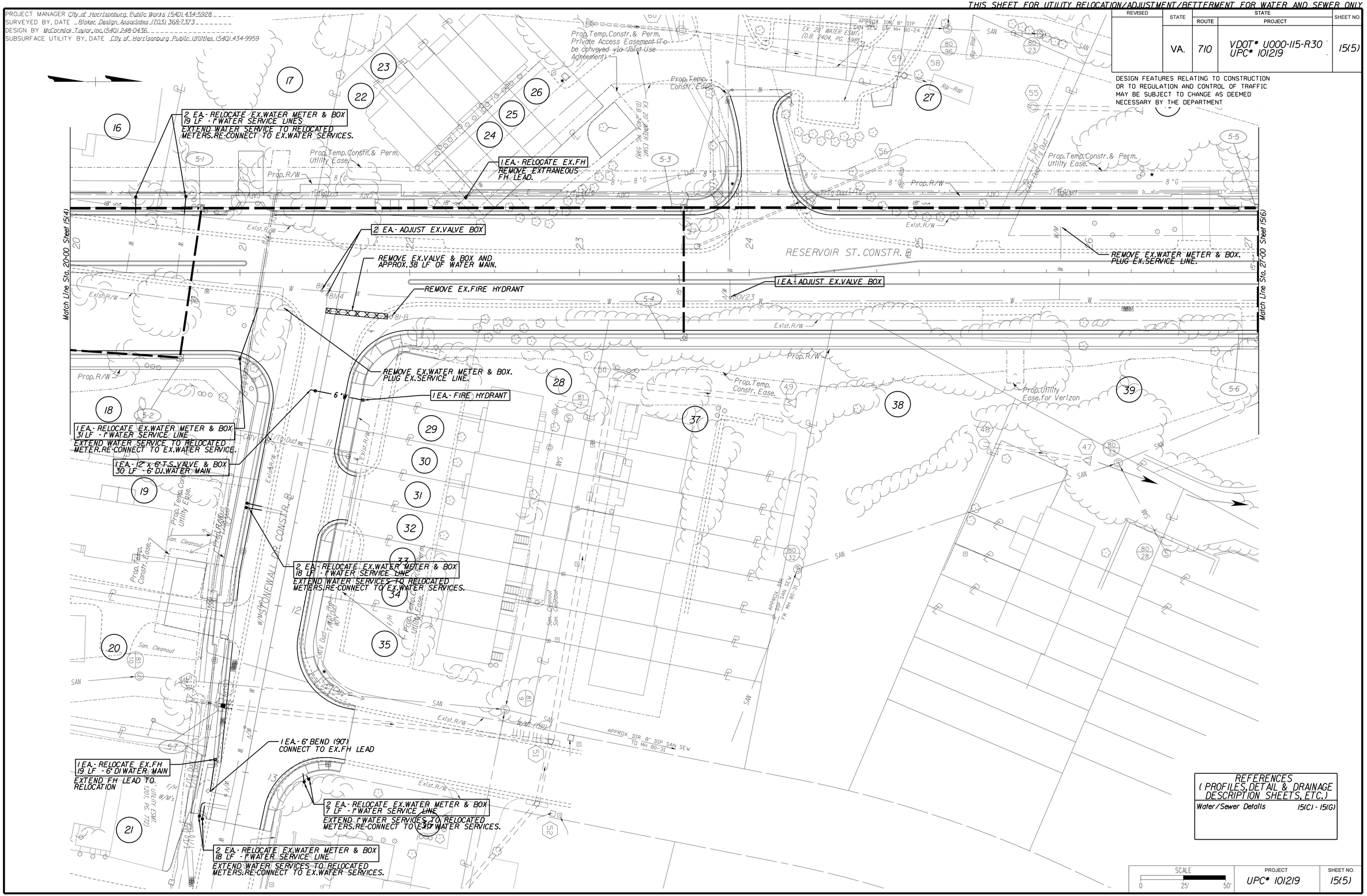

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Water/Sewer Details	15(C) - 15(G)

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REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(6)

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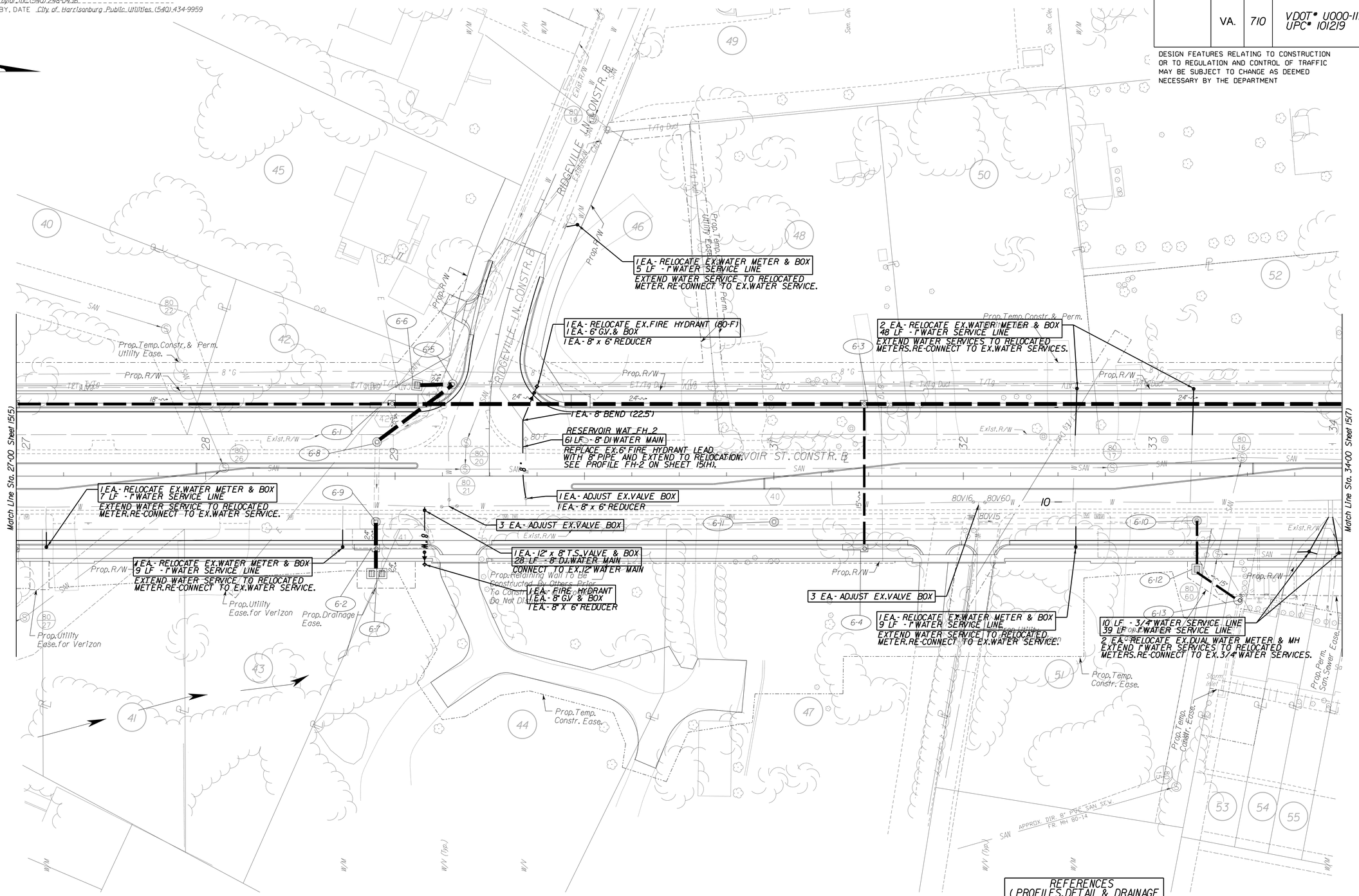

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Sewer Plan & Profiles	16(6)
Water/Sewer Details	15(C) - 15(G)
Fire Hydrant Profiles	15(H)

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WATER MAIN CONSTRUCTION SEQUENCE (FOLEY RD.):
1. INSTALL WATER MAIN (ALL RESTRAINED PIPE)
2. CONSTRUCT TEMPORARY WATER CONNECTION
3. PERFORM PRESSURE TEST
4. COLLECT BACTERIA SAMPLES
5. POUR ANCHOR BLOCK FOR CONNECTION
6. INSTALL TIE-IN CONNECTION PER CITY DETAIL (48 HOUR NOTICE)

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Sewer Plan & Profiles	16(7)
Water/Sewer Details	15(C) - 15(G)
Fire Hydrant Profiles	15(H)

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(7)

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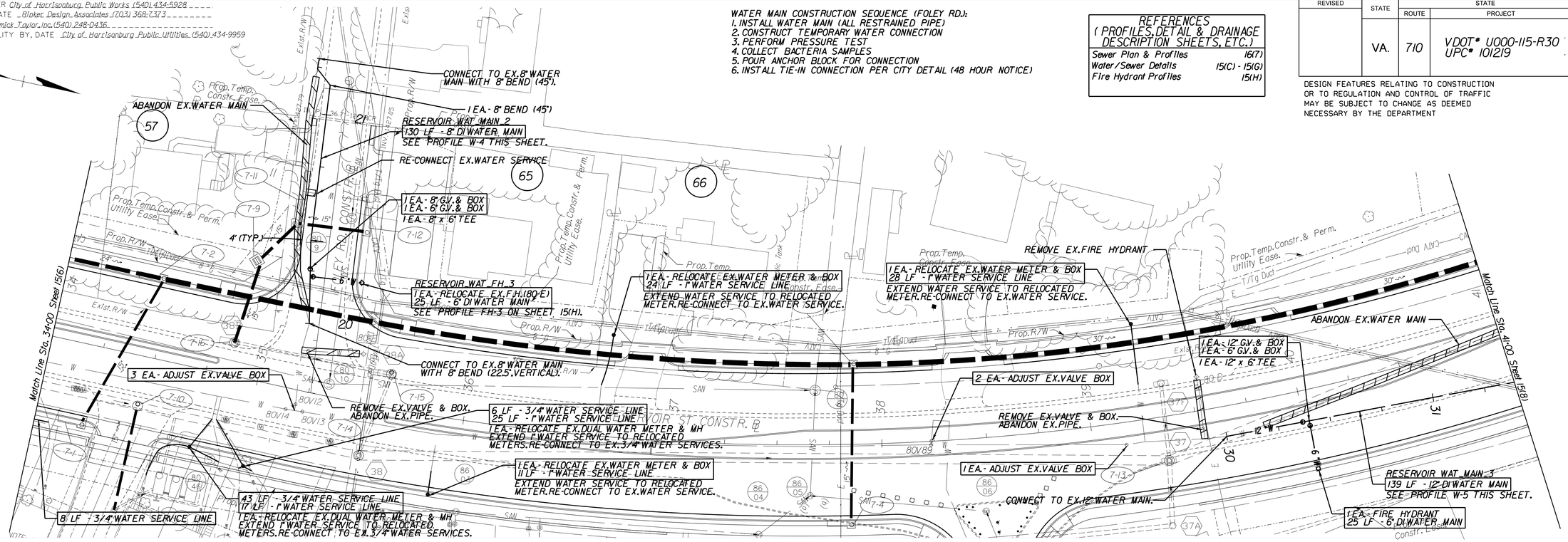

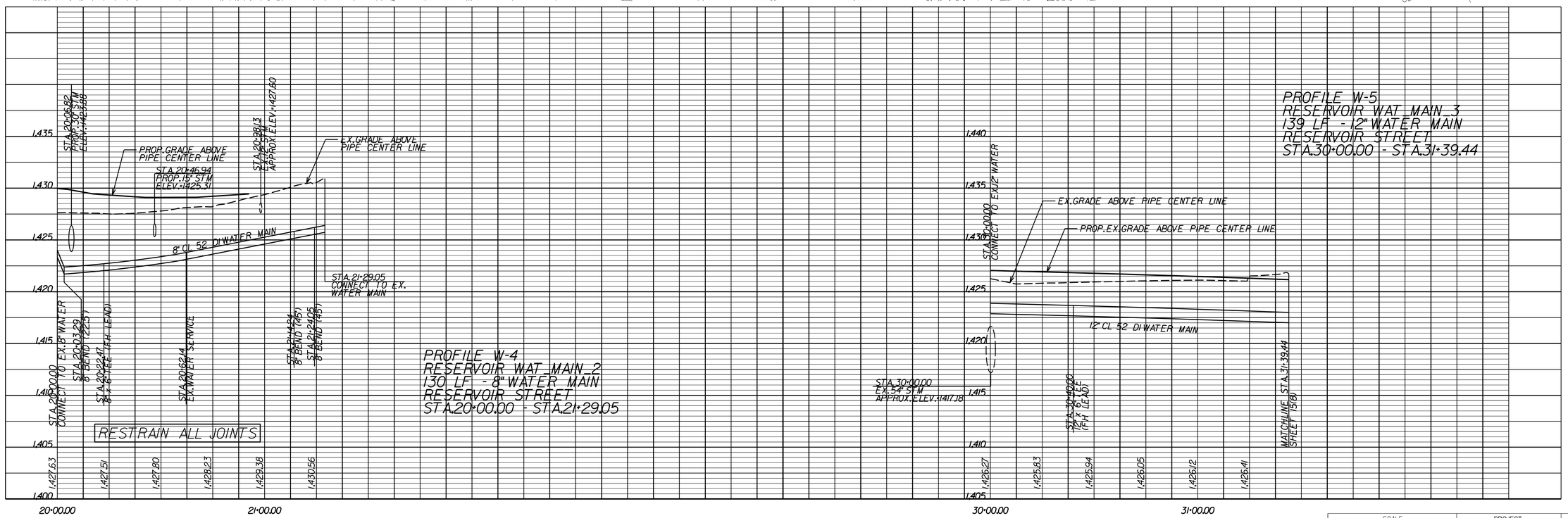

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Water/Sewer Details	15(C) - 15(G)

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(8)

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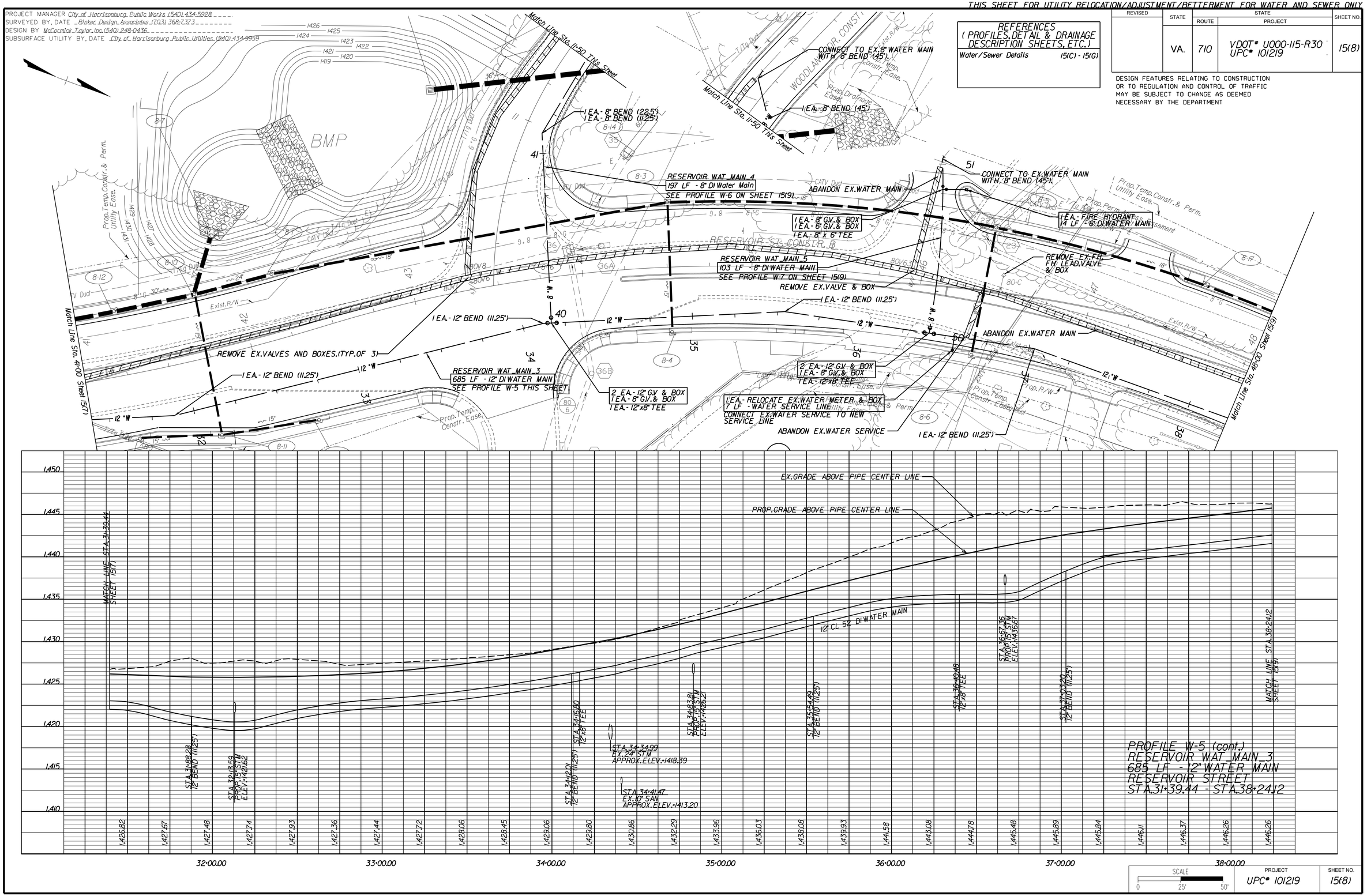

PROFILE W-5 (cont.)
RESERVOIR WAT_MAIN_3
685 LF - 12" WATER MAIN
RESERVOIR STREET
STA.31+39.44 - STA.38+24.12

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REFERENCES
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Sewer Plan & Profiles	16(9)
Water/Sewer Details	15(C) - 15(G)
Fire Hydrant Profiles	15(H)

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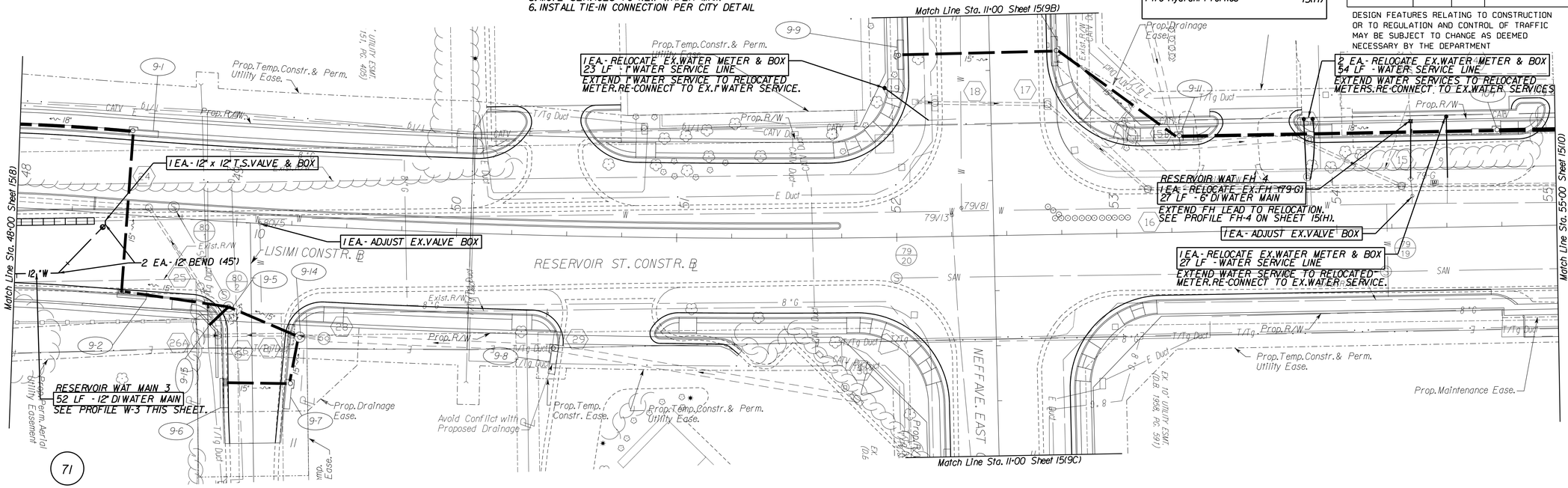

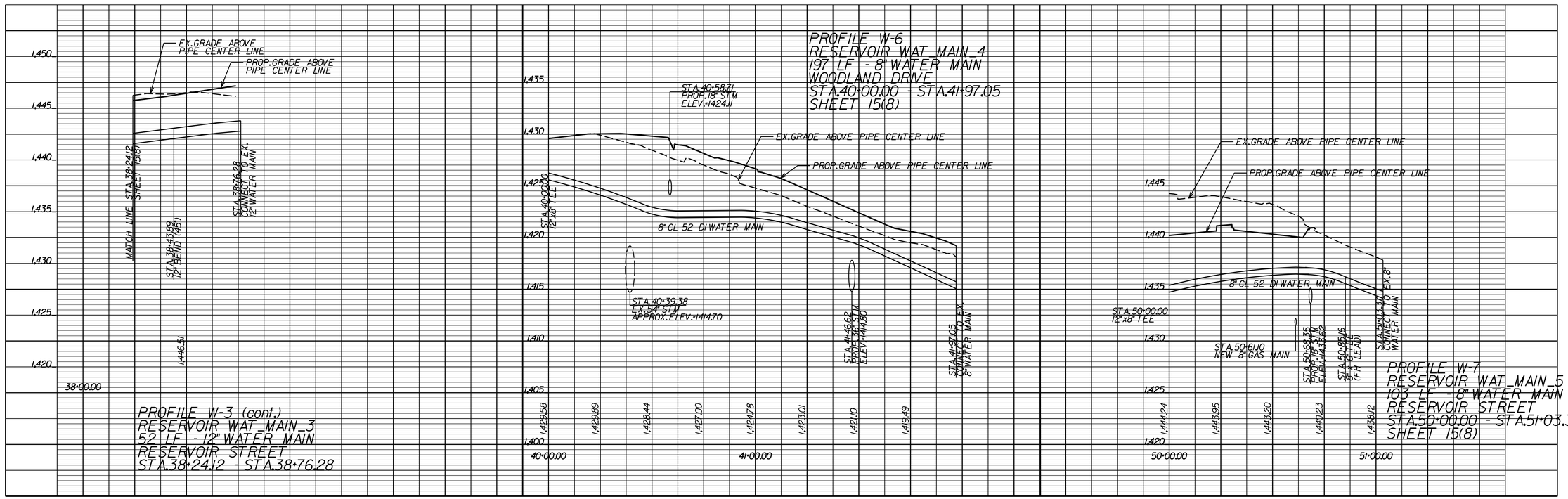

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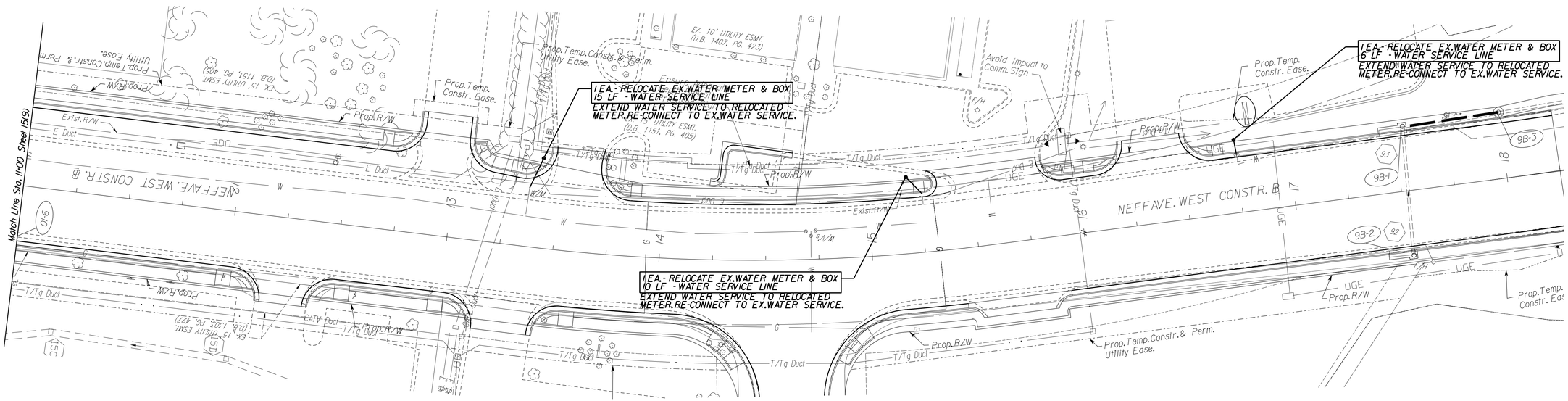

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Water/Sewer Details	15(C) - 15(G)

SCALE	PROJECT	SHEET NO.
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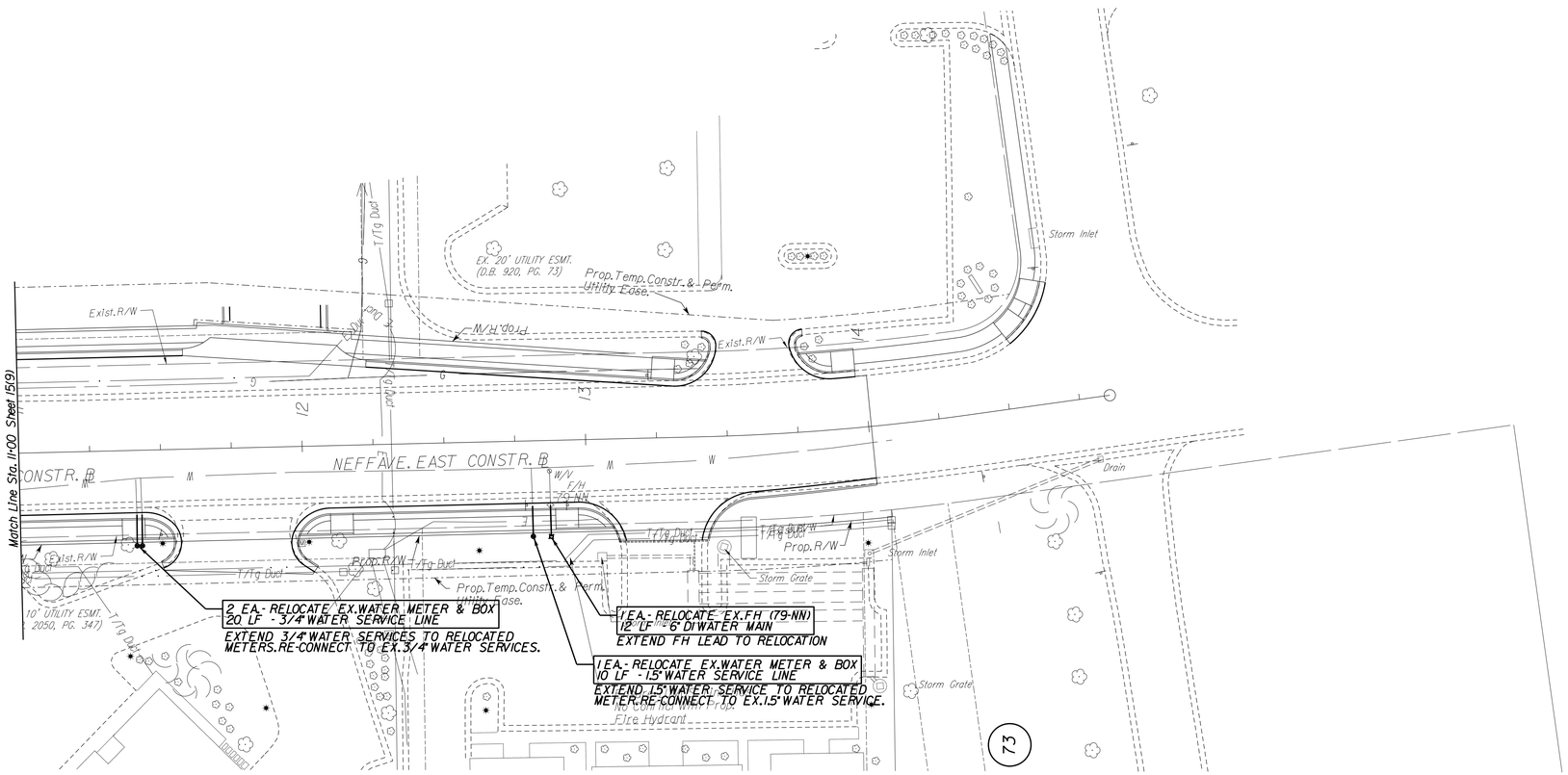

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Water / Sewer Details	15(C) - 15(G)

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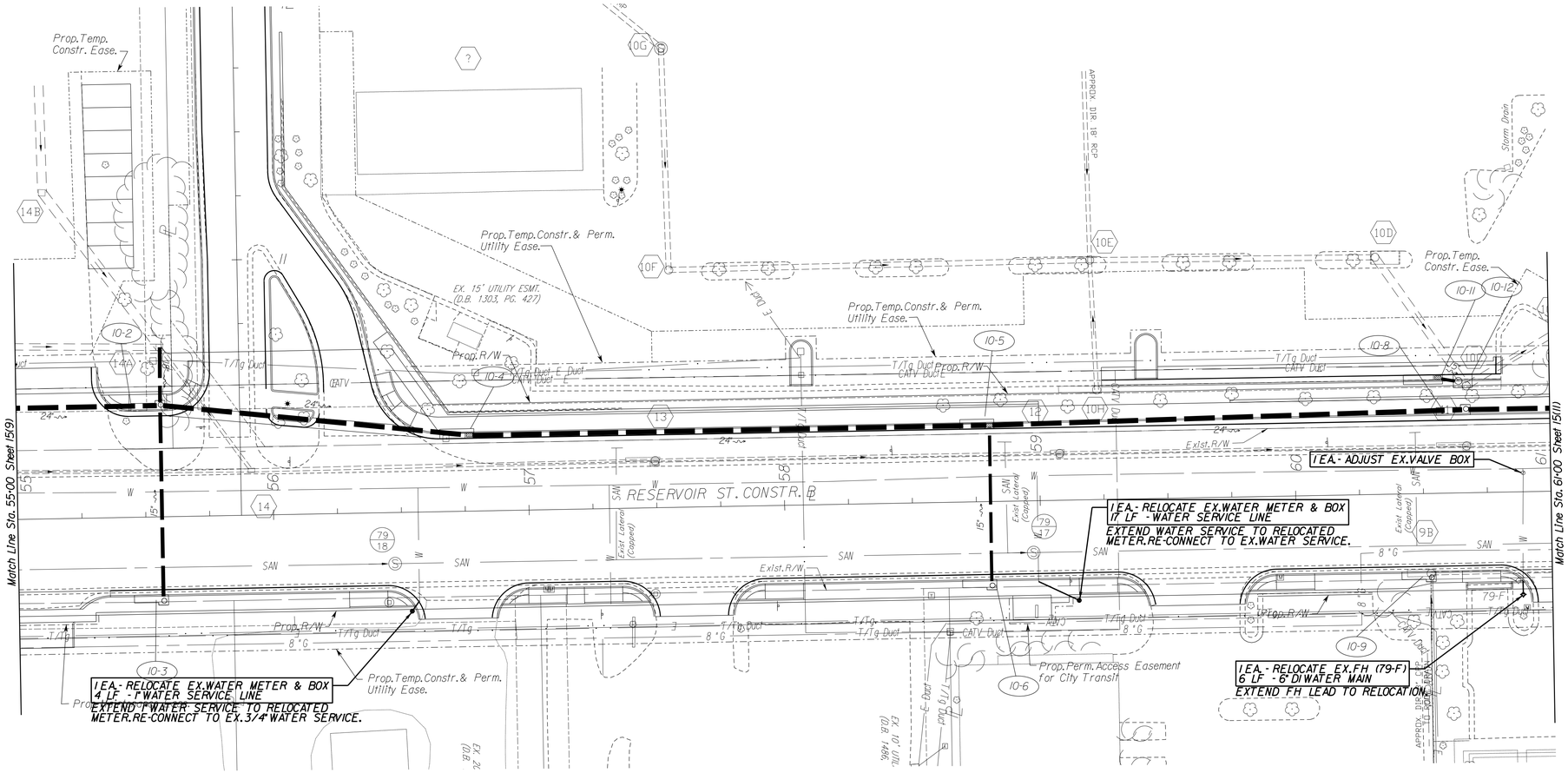
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(10)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Sewer Plan & Profiles	16(10)
Water/Sewer Details	15(C) - 15(G)

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	15(10)

THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY, DATE Bloker Design Associates (703) 368-7373
DESIGN BY McCormick Taylor, Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

WATER MAIN CONSTRUCTION SEQUENCE:
1. INSTALL T.S.& VALVE
2. CONSTRUCT NEW WATER MAIN
3. PERFORM PRESSURE TEST
4. COLLECT BACTERIA SAMPLES
5. MOVE SERVICES TO NEW WATER MAIN
6. INSTALL TIE-IN CONNECTION PER CITY DETAIL

REFERENCES
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Sewer Plan & Profiles	16(11)
Water/Sewer Details	15(C) - 15(G)
Fire Hydrant Profiles	15(H)

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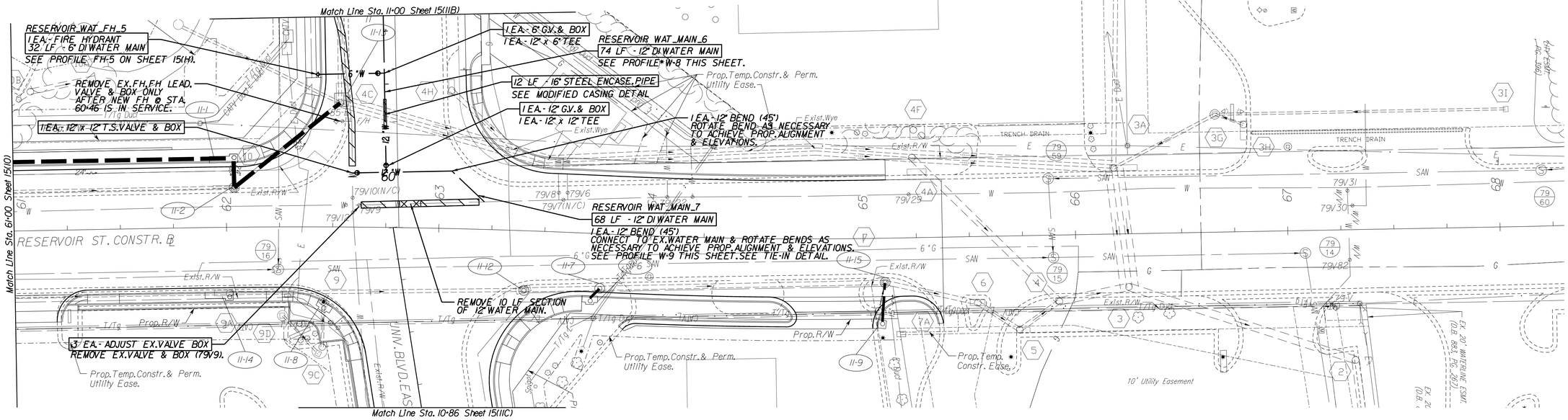
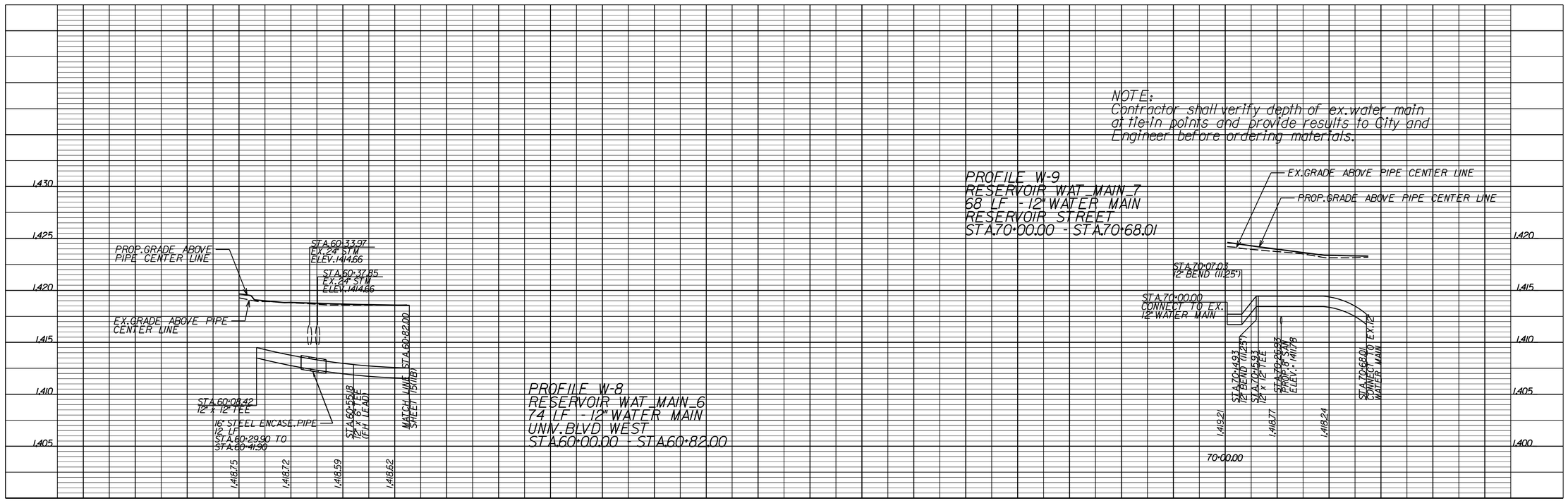


NOTE:
Contractor shall verify depth of ex.water main at tie-in points and provide results to City and Engineer before ordering materials.



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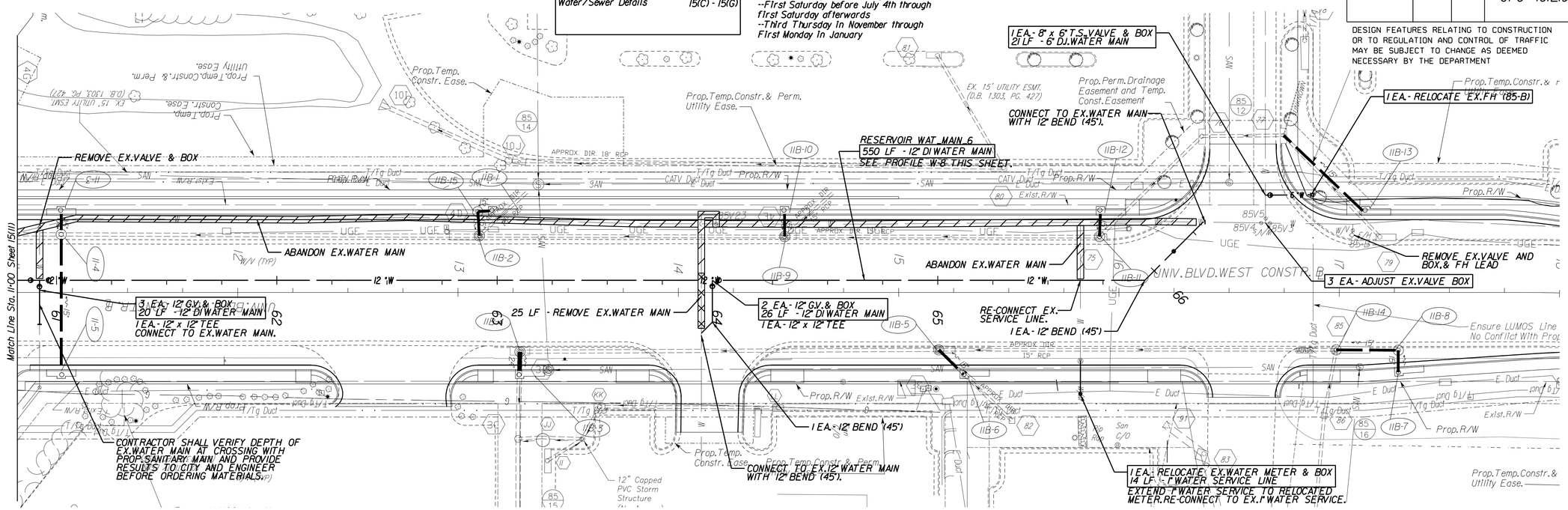
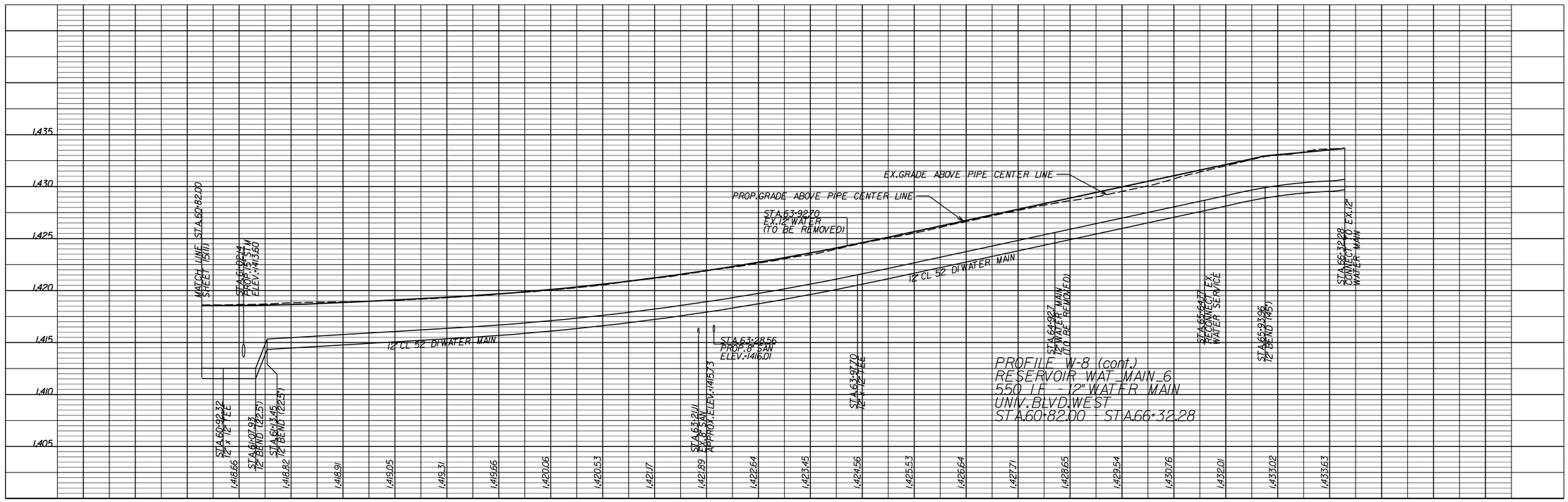
Sewer Plan & Profiles	16(IIB)
Water/Sewer Details	15(C) - 15(G)

NOTE: Costco parking spaces within Temp. Constr. Ease. to remain open and available for Costco parking and unencumbered by construction activity, to the greatest extent possible, during the following weeks:
--First Saturday before July 4th through first Saturday afterwards
--Third Thursday in November through First Monday in January





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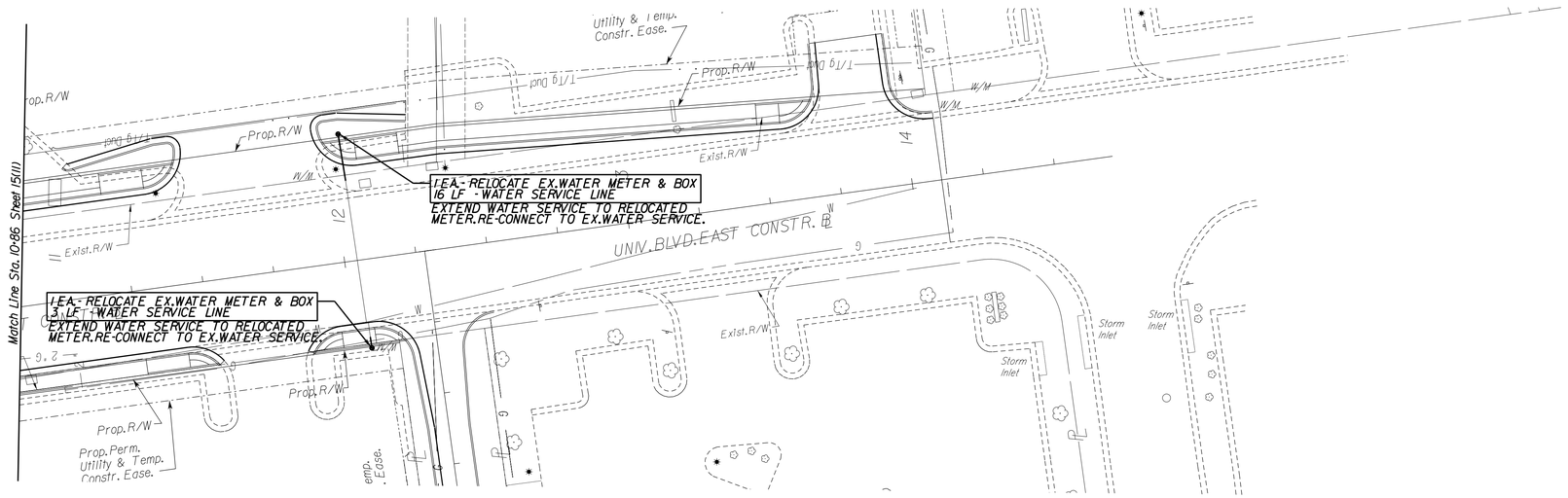

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DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

WATER & SEWER GENERAL NOTES

1. ALL WATER AND SEWER UTILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF HARRISONBURG DESIGN AND CONSTRUCTION STANDARDS MANUAL (CHAPTER 7 WATER AND SEWER UTILITIES CONSTRUCTION STANDARDS). COPIES OF THESE STANDARDS ARE AVAILABLE FOR DOWNLOAD FROM THE CITY'S WEBSITE.

2. MATERIALS USED FOR WATER AND SEWER FACILITIES SHALL BE IN ACCORDANCE WITH APPROVED DRAWINGS AND SPECIFICATIONS. HOWEVER, THE CONTRACTOR MUST CONFORM TO THE CITY OF HARRISONBURG DESIGN AND CONSTRUCTION STANDARDS MANUAL. THE REFERENCED STANDARDS SHALL SUPERCEDE CONFLICTS, AMBIGUITIES OR INTERPRETATIONS ARISING FROM GENERAL APPROVAL OF DRAWING OR SPECIFICATIONS EXCEPT BY SPECIFIC VARIANCE APPROVED IN WRITING BY THE DIRECTOR OF PUBLIC UTILITIES AND DENOTED AS SUCH ON THE DRAWINGS, SPECIFICATIONS, ADDENDUM OR CHANGE ORDER. ALL MATERIALS USED FOR WATER AND SEWER FACILITIES SHALL BE LISTED ON THE LATEST EDITION OF THE APPROVED PRODUCT LIST AVAILABLE ON THE CITY'S WEBSITE. THE CONTRACTOR SHALL NOT MAKE AN INTERPRETATION THAT THE SAID CONTRACTOR WILL BE PERMITTED TO DIRECTLY INTERRUPT ACTIVE WATER OR SEWER SERVICE AT WILL. THE CONTRACTOR SHALL NOT MAKE AN INTERPRETATION THAT CONSTRUCTIONCAN BE PERFORMED IN SUCH A MANNER THAT WILL REQUIRE EXISTING CITY CUSTOMERS TO BE WITHOUT WATER OR SEWER SERVICE FOR AN UNSPECIFIED PERIOD OF TIME. THE CONTRACTOR SHALL BE RESPONSIBLE TO RECOGNIZE POSSIBLE SIGNIFICANT SCHEDULING DELAYS DUE TO COORDINATING TIE-INS AND SHUTDOWNS OF THE EXISTING SYSTEM. THE DIRECTOR OF PUBLIC UTILITIES, OR HIS DESIGNEE, SHALL APPROVE ALL INTERRUPTIONS OF SERVICE ON A CASE BY CASE REVIEW WITH INTENT TO PROVIDE ALL RESIDENTIAL CUSTOMERS A MINIMUM 48 HOURS NOTICE AND ALL COMMERCIAL/PROFESSIONAL CUSTOMERS A MINIMUM 72 HOURS NOTICE. A CONSTRUCTION SCHEDULE TO COINCIDE WITH NONWORKING HOURS WILL BE REQUIRED WHERE INDUSTRIAL CUSTOMERS ARE AFFECTED. THE CONTRACTOR SHALL NOT PLACE A NEW UTILITY EXTENSION INTO ACTIVE SERVICE. EXISTING VALVES SHALL BE OPERATED BY AUTHORIZED CITY PERSONNEL ONLY. THE CONTRACTOR SHALL NOT TAP OR OTHERWISE ALTER ANY EXISTING CITY MAIN. THE CONTRACTOR IS TOTALLY RESPONSIBLE FOR NEW UTILITIES UNTIL FORMALLY CONVEYED TO THE CITY. AFTER ACCEPTANCE OF OWNERSHIP BY THE CITY, ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE CONSIDERED A VIOLATION OF THE "VIRGINIA UNDERGROUND UTILITY DAMAGE PREVENTION ACT". SUBMITTALS TO THE CITY'S PUBLIC UTILITIES DEPARTMENT FOR REVIEW AND APPROVAL ARE REQUIRED BY THE CONTRACTOR FOR ANY PRODUCT NOT SPECIFIED ON THE APPROVED LIST.

3. LOCATION, DEPTH AND SIZE OF EXISTING UTILITIES SHOWN ON THE UTILITY ADJUSTMENT PLANS ARE NOT GUARANTEED. THE CONTRACTOR SHALL FIELD VERIFY WITH TEST HOLES THE LOCATION, ELEVATION, TYPE, ROUNDNESS AND SIZE OF ALL EXISTING UNDERGROUND UTILITIES AND POINTS OF CONNECTION PRIOR TO EXCAVATION, ORDERING OF MATERIALS AND INSTALLATION FOR THIS PROJECT.

4. THE CONTRACTOR SHALL COORDINATE THE VALVE OPERATIONS, CHANGEOVER OR TAPPING OF WATER AND SANITARY SEWER FACILITIES WITH THE CITY OF HARRISONBURG PUBLIC UTILITIES DEPARTMENT 48 HRS. PRIOR TO VALVE OPERATIONS, CHANGEOVER OR TAPPING. CITY EMPLOYEES WILL OPERATE ALL EXISTING VALVES IN CONNECTION WITH CHANGEOVER OF FACILITIES. THE CONTRACTOR SHALL NOTIFY THE CITY PROJECT MANAGER.

5. THE CONTRACTOR SHALL NOT PERFORM ANY GRADING OPERATIONS OVER EXISTING WATER AND SEWER FACILITIES WITHIN THE PROJECT WHICH WOULD IN ANY WAY JEOPARDIZE SERVICES UNTIL THE PROPOSED WATER AND SEWER FACILITIES ARE INSTALLED AND PLACED INTO OPERATION AND EXISTING WATER AND SEWER FACILITIES ARE ABANDONED. ANY DEVIATION MUST BE APPROVED BY THE ENGINEER AND THE DIRECTOR OF PUBLIC UTILITIES.

6. EXISTING MAINS, HYDRANTS AND WATER SERVICES SHALL REMAIN IN SERVICE UNTIL NEW MAINS AND HYDRANTS ARE PLACED IN SERVICE AND APPROVED BY THE ENGINEER. PROPOSED FIRE HYDRANTS SHALL REMAIN COVERED BY MEANS OF SECURELY ATTACHED BURLAP BAGS UNTIL TESTED AND PLACED IN SERVICE.

7. THE CONTRACTOR SHALL NOT INSTALL WATER MAIN JOINTS BENEATH PROPOSED OR EXISTING UTILITIES OR PROPOSED STORM DRAINAGE WHEN CROSSING UNDER THESE STRUCTURES. A MINIMUM OF 2 FEET HORIZONTAL DISTANCE OR VERTICAL SEPARATION BEYOND THE OUTSIDE OF THE FOREIGN PIPE OR UTILITY SHALL BE REQUIRED WHEN PLACING JOINTS, UNLESS OTHERWISE SHOWN ON THE PLANS.

8. INSTALL VALVES WITH OPERATOR STEMS IN THE VERTICAL PLANE THROUGH THE PIPE AXIS AND PERPENDICULAR TO THE PIPE AXIS. LOCATE VALVES AS SHOWN ON DRAWINGS. ALL VALVE BOXES SHALL BE KEPT FREE FROM ALL STONE, SOIL OR OTHER DEBRIS FROM THE BOTTOM OF THE VALVE NUT TO FINISH GRADE. THE VALVE NUT MUST BE VISIBLE AND CENTERED IN THE BOX AT FINAL INSPECTION. CONTRACTOR SHALL BE RESPONSIBLE FOR EXCAVATING, CLEANING AND RESETTING VALVE BOXES WHICH DO NOT MEET THIS CRITERIA, AT NO ADDITIONAL COST TO THE OWNER. VALVE WRENCH TEST SHALL CONSIST OF SETTING WRENCH ON NUT AND BEING ABLE TO TURN WRENCH 360 DEGREES WITHOUT VALVE BOX CONFLICT.

9. VALVE STEM EXTENSIONS SHALL BE PER CITY DESIGN & CONSTRUCTION MANUAL (DCSM), CHAPTER 7, PAGE 17, DRAWING 3.

10. WATER MAINS SHALL HAVE A MINIMUM COVER OF 3 FEET, UNLESS OTHERWISE NOTED ON THE PLANS. WATER MAIN PIPE SHALL BE LAID WITH BELL ENDS FACING THE DIRECTION OF LAYING. WHERE GRADE IS 10 PERCENT OR GREATER, PIPE SHALL BE LAID UPHILL WITH BELL ENDS UPGRADE.

11. CONTRACTOR TO FIELD VERIFY LOCATION AND DEPTH OF ALL OPERATIONAL SANITARY SERVICE LATERALS PRIOR TO CONSTRUCTION OR ADJUSTMENT OF THE UTILITY SYSTEMS. CONTRACTOR TO SCHEDULE SANITARY SEWER LATERAL CONNECTIONS WITH THE PROPERTY OWNER, USER, AND THE CITY OF HARRISONBURG.

12. FOR EXISTING SERVICE TO BE REPLACED OR ABANDONED, THE CONTRACTOR SHALL SEAL AND ABANDON SANITARY SEWER LATERALS AT SANITARY SEWER MAIN AND ABANDON WATER SERVICE BY SHUTTING OFF THE CORPORATION STOP AND DISCONNECTING THE SERVICE PIPE FROM THE MAIN. THE CORPORATION STOP SHALL BE CAPPED WITH A COPPER DISK AND FLARE NUT (BY FORD) OR BRASS CAP (MUELLER H-15540). CONTRACTOR SHALL NOT DISTURB WATER MAIN DURING THE TRANSFER OR ABANDONMENT OF SERVICES.

13. ALL EXISTING VALVE BOXES, SANITARY SEWER MANHOLES AND CLEANOUTS SHALL BE RELOCATED AND/OR ADJUSTED TO FINISH GRADE AS REQUIRED, REGARDLESS IF THEY ARE SHOWN ON THE PLANS. IN PAVED AND SHOULDER AREAS, THESE ITEMS SHALL BE FLUSH TO MINUS 1/4" WITH FINISHED GRADE REGARDLESS OF THE ELEVATIONS SHOWN ON PLANS.

14. THE CONTRACTOR, WITH HIS ASSOCIATED MATERIALS SUPPLIERS, SHALL PROVIDE CERTIFICATIONS ACCEPTABLE TO THE ENGINEER THAT ALL MATERIALS SUPPLIED ON THE PROJECT MEET OR EXCEED THE CITY DESIGN & CONSTRUCTION SPECIFICATIONS.

15. ALL RESTRAINT SYSTEMS INSTALLED UNDER THIS CONTRACT SHALL BE PLACED BEFORE BACKFILLING OF THE TRENCH AND INSPECTED BY THE ENGINEER. TEMPORARY BUTTRESSING FOR TESTING SHALL BE PROVIDED BY THE CONTRACTOR. A JOINT RESTRAINT SYSTEM SHALL BE USED. THE MECHANICAL JOINT RESTRAINTS SHALL BE A STANDARD PRODUCT OF A MANUFACTURER, AND REACTION BLOCKING (THRUST BLOCKS) SHALL BE IN ACCORDANCE WITH CITY DESIGN AND CONSTRUCTION STANDARDS. JOINT RESTRAINTS SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS SHOWN ON THE PLANS.

16. PRESSURE AND LEAKAGE TESTING (WATER MAINS AND ACCESSORIES) SHALL BE IN ACCORDANCE WITH AWWA C600 AND THE CITY'S DESIGN AND CONSTRUCTION STANDARDS. THE TEST PRESSURE FOR WATER LINES 16" AND SMALLER SHALL BE 150 PSI.

17. FLUSHING AND DISINFECTION OF WATER MAINS SHALL BE IN ACCORDANCE WITH AWWA C651 - LATEST REVISION, AND THE CITY'S DESIGN AND CONSTRUCTION STANDARDS.

18. THE CITY OF HARRISONBURG DOES NOT GUARANTEE A 100 PERCENT SHUTDOWN OF THE WATER DISTRIBUTION SYSTEM. THE CONTRACTOR SHALL ANTICIPATE CUT AND PLUG OPERATIONS UNDER PARTIAL PRESSURE.

19. THE CONTRACTOR SHALL COMPLY WITH "MISS UTILITY OF VIRGINIA" REQUIREMENTS PRIOR TO PERFORMING ANY EXCAVATION. CALL 811 OR 800-552-7001.

20. ACCESS TO ALL PUBLIC AND PRIVATE FIRE HYDRANTS IN SERVICE WITHIN THE PROJECT LIMITS SHALL BE MAINTAINED AT ALL TIMES. A MINIMUM CLEAR SPACE OF A 10 FOOT RADIUS AROUND THE HYDRANTS SHALL BE KEPT CLEAR OF ALL SOIL, STONE, MATERIALS, EQUIPMENT AND OTHER OBSTRUCTIONS. THE CONTRACTOR SHALL INFORM THE CITY OF HARRISONBURG 48 HOURS PRIOR TO ANY WORK ON EXISTING FIRE HYDRANTS WITHIN THE PROJECT LIMITS. THE CONTRACTOR SHALL SCHEDULE HYDRANT INSTALLATION SO THAT NO TWO HYDRANTS IN LINE WILL BE OUT OF SERVICE AT THE SAME TIME. THE CONTRACTOR SHALL ALSO SEQUENCE EACH HYDRANT INSTALLATION FOR MINIMAL AMOUNT OF INTERRUPTED SERVICE. ALL POSSIBLE TRENCHING AND ASSEMBLY REQUIRED FOR THE NEW HYDRANT SHALL BE DONE PRIOR TO TAKING THE OLD HYDRANT OFF LINE. PRIOR TO REMOVING EXISTING HYDRANT, VERIFY RESTRAINT OF EXISTING FIRE HYDRANT, VALVE, WATER MAIN, AND PROVIDE RESTRAINT FROM THE EXISTING TEE TO THE EXISTING VALVE. RESTRAIN FROM THE EXISTING VALVE TO THE NEW HYDRANT DURING INSTALLATION. THE CONTRACTOR SHALL COORDINATE WITH THE CITY OF HARRISONBURG FOR TESTING AND PAINTING OF NEW HYDRANTS. PAINT SYSTEM SHALL MATCH OWNER'S STANDARDS.

21. CONTRACTOR IS REQUIRED TO FURNISH ALL MATERIALS, LABOR, EQUIPMENT, POWER, MAINTENANCE, ETC. TO IMPLEMENT A TEMPORARY PUMPING SYSTEM FOR THE PURPOSE OF DIVERTING THE EXISTING SANITARY SEWER SYSTEM CAPACITY AROUND THE WORK AREA FOR THE DURATION OF THE PROJECT.

    THE DESIGN, INSTALLATION AND OPERATION OF THE TEMPORARY PUMPING SYSTEM SHALL BE THE CONTRACTOR'S RESPONSIBILITY. THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER THAT HE AND/OR HIS SUBCONTACTOR SPECIALIZES IN THE DESIGN AND OPERATION OF TEMPORARY BYPASS PUMPING SYSTEMS. THE CONTRACTOR SHALL PROVIDE AT LEAST THREE (3) REFERENCES OF PROJECTS OF A SIMILAR SIZE AND COMPLEXITY AS THIS PROJECT, RECENTLY PERFORMED SUCCESSFULLY. THE BYPASS SYSTEM SHALL MEET THE REQUIREMENTS OF ALL CODES AND REGULATORY AGENCIES HAVING JURISDICTION.

    CONTRACTOR SHALL PROVIDE A COPY OF THE BYPASS PUMPING PLAN TO THE ENGINEER AND THE CITY OF HARRISONBURG PUBLIC UTILITIES DEPARTMENT AT LEAST 5 BUSINESS DAYS PRIOR TO IMPLEMENTATION. A TRIAL RUN FOR LEAKAGE OF THE BYPASS PUMPING DISCHARGE PIPING SHALL BE DEMONSTRATED IN THE PRESENCE OF THE CITY UTILITIES INSPECTOR USING CLEAN WATER PRIOR TO ACTUAL OPERATION. PUMPING SYSTEM MUST BE CONTINUOUSLY MANNED UNTIL GRAVITY PIPE FLOW CAN BE RE-ESTABLISHED.

22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SEWAGE OVERFLOWS OR SPILLAGE DURING SANITARY SEWER SYSTEM SHUTDOWN OR CONNECTIONS. ONCE GRAVITY SANITARY SEWER FACILITIES HAVE BEEN SHUTDOWN OR PUMP STATIONS PUMPED DOWN, THE CONTRACTOR SHALL PROVIDE STANDBY SEWAGE PUMPING AND HAULING OR BY-PASS PUMPING TECHNIQUES FOR THE DISPOSAL OF ALL OVERFLOWS WHICH MAY OCCUR IN THE SHUTDOWN OF THE SANITARY SEWER SYSTEM FACILITIES. THE APPROPRIATE TECHNIQUE SHALL HAVE THE CAPACITY TO HANDLE PEAK FLOWS FROM THE SEWER FACILITIES. A BACKUP PUMP SHALL BE KEPT ON SITE AND AVAILABLE FOR USE IF THE PRIMARY PUMP FAILS. THE METHOD FOR MAINTAINING SEWAGE CONVEYANCE SHALL BE APPROVED BY THE CITY OF HARRISONBURG AND THE ENGINEER PRIOR TO SYSTEM SHUTDOWN. STANDBY SEWAGE PUMPING AND HAULING OR BY-PASS PUMPING SHALL BE CONSIDERED INCIDENTAL TO INSTALLATION OF SANITARY SEWER FACILITIES.

23. CONTRACTOR SHALL FURNISH EIGHT (8) HARD COPIES AND 1 DIGITAL COPY OF ALL SHOP DRAWINGS TO THE ENGINEER AND HAVE THE APPROVAL OF THE HARRISONBURG DEPT. OF PUBLIC UTILITIES PRIOR TO CONSTRUCTION AND/OR INSTALLATION OF CITY OF HARRISONBURG FACILITIES AND RELATED ITEMS. ANY ITEMS INSTALLED PRIOR TO APPROVAL OF SHOP DRAWINGS ARE DONE AT THE CONTRACTOR'S RISK AND MAY BE SUBJECT TO REMOVAL AND CORRECT INSTALLATION AT THE CONTRACTOR'S EXPENSE.

24. THE NUMBER AND TYPE OF FITTINGS REQUIRED FOR THE COMPLETION OF WATER RELOCATION/ADJUSTMENT WORK ARE NOT GUARANTEED AND, THEREFORE, SHALL BE DETERMINED BY ACTUAL CONDITIONS ENCOUNTERED IN THE FIELD DURING CONSTRUCTION. FITTINGS 12" IN SIZE AND LESS SHALL NOT BE MEASURED FOR SEPARATE PAYMENT. THE COST THEREOF SHALL BE INCLUDED IN THE BID PRICE FOR THE ITEM TO WHICH IT PERTAINS.

25. FIRE HYDRANTS TO BE ABANDONED SHALL BE CAREFULLY REMOVED TO AVOID DAMAGE AND RETURNED TO THE CITY OF HARRISONBURG PUBLIC UTILITIES DEPARTMENT.

26. THE CONTRACTOR SHALL CAREFULLY REMOVE ALL EXISTING WATER MAIN VALVES ON LINES THAT ARE TO BE ABANDONED AND RETURN THOSE VALVES TO THE CITY OF HARRISONBURG PUBLIC UTILITIES DEPARTMENT.

27. CONTRACTOR SHALL MAINTAIN A CLEAN RED-LINE MARKED UP SET OF UTILITY PLANS TO SERVE AS A SET OF RECORD DRAWINGS FOR THE PROJECT. THE DRAWINGS SHALL CLEARLY DEPICT CONSTRUCTION CHANGES THAT DIFFER FROM THE UTILITY PLANS, INCLUDING BOTH THE PLAN AND PROFILE VIEWS OF THE DRAWINGS. THE RECORD DRAWINGS SHALL BE DELIVERED TO THE CITY UPON COMPLETION OF THE UTILITY RELOCATION/ADJUSTMENT PORTION OF THE PROJECT.

28. CONTRACTOR SHALL FOLLOW STANDARDS FROM DCSM SECTION 7.1.3 FOR EXISTING WATER MAIN TIE-INS. CONTRACTOR SHALL PRE-ASSEMBLE NEW MAIN AND EXCAVATE TRENCH PRIOR TO CUTTING THE EXISTING MAIN. EFFORT SHALL BE MADE TO MINIMIZE THE DURATION OF WATER SERVICE INTERRUPTION. INSPECTORS FROM THE CITY OF HARRISONBURG SHALL VISUALLY INSPECT ALL NEW WORK AROUND CONNECTIONS TO THE EXISTING WATER MAIN FOR LEAKS PRIOR TO BACKFILLING. CITY OF HARRISONBURG PERSONNEL WILL IDENTIFY AND OPERATE ISOLATION VALVES, NOTIFY IMPACTED CUSTOMERS AND SCHEDULE TIMING OF WORK IN REGARDS TO CONNECTING THE NEW WATER MAIN TO THE EXISTING SYSTEM BASED ON CONTRACTOR'S REQUEST. CONTRACTOR SHALL CAREFULLY COORDINATE PHASING OF THE WORK.

29. ALL WET TAPS FOR 4" TO 12" DIAMETER PIPE SPECIFIED OR REQUESTED ON THIS PROJECT MUST BE APPROVED BY, COORDINATED WITH, AND PERFORMED BY CITY PUBLIC UTILITIES PERSONNEL FOR APPLICABLE CITY CODE FEES. CONTRACTOR SHALL FURNISH AND INSTALL APPROPRIATELY SIZED TAPPING SLEEVE AND VALVE IN AN OSHA SAFE TRENCH AND PROVIDE ALL TRAFFIC CONTROL. A SEPARATE WORK AGREEMENT WITH CITY PUBLIC UTILITIES DEPARTMENT MUST BE SIGNED BY AN AUTHORIZED CONTRACTOR REPRESENTATIVE PRIOR TO SCHEDULING ANY WORK PERFORMED BY PUBLIC UTILITIES PERSONNEL.

30. CONTRACTOR IS RESPONSIBLE THROUGHOUT THE PROJECT TO TAKE THE NECESSARY PRECAUTIONS TO PREVENT THE FREEZING OF WATER MAINS AND SERVICES. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE AND CLAIMS FOR DAMAGE THAT RESULTS FROM FREEZING DUE TO HIS WORK.

THE CONTRACTOR SHALL NOTE THAT THE UTILITY PLANS SHEETS ARE FOR WATER AND SEWER RELOCATION/ ADJUSTMENT WORK ONLY. THE CONTRACTOR SHALL REFER TO THE ROADWAY PLANS FOR ROADWAY AND DRAINAGE DESIGN. THE CONTRACTOR SHALL REFER TO THE MAINTENANCE OF TRAFFIC SHEET FOR SUGGESTED SEQUENCE OF CONSTRUCTION FOR WATER AND SEWER WORK.

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WATER & SEWER MATERIAL NOTES

1. DUCTILE IRON WATER MAIN SHALL CONFORM TO AWWA C151. CLASS OF PIPE SHALL BE THICKNESS CLASS 52 FOR ALL PIPE 16" AND SMALLER. DUCTILE IRON FITTINGS SHALL CONFORM WITH AWWA C110 OR AWWA C153. THE MINIMUM ACCEPTABLE PRESSURE RATING SHALL BE 350 PSI FOR 16" PIPE AND SMALLER.

A. DUCTILE IRON PIPE SHALL BE AS MANUFACTURED BY ONE OF THE FOLLOWING:
- AMERICAN CAST IRON PIPE COMPANY,
- U.S. PIPE AND FOUNDRY COMPANY,
- GRIFFIN PIPE PRODUCTS, OR
- APPROVED EQUAL.

B. JOINTS: USE PUSH-ON OR MECHANICAL JOINTS CONFORMING WITH ALL APPLICABLE PROVISIONS OF AWWA C111, OR RESTRAINED JOINTS AS SPECIFIED BELOW. WHERE FLANGED JOINT PIPE OR FLANGED FITTINGS ARE REQUIRED FOR CONNECTIONS, VERIFY AND COORDINATE BOLT HOLE DRILLING WITH MANUFACTURER. USE ANSI CLASS 125 BOLT PATTERN. FLANGED JOINTS SHALL NOT BE USED FOR BURIED PIPE.

C. DEFLECTION: ALLOWABLE DEFLECTION SHALL BE 80% OF THE MAXIMUM DEFLECTION ALLOWED BY THE PIPE MANUFACTURER. MECHANICAL JOINTS WITH METAL TIE RODS WILL BE PROHIBITED IN AREAS WHERE PIPE IS DEFLECTED.

D. EXTERIOR COATING OF ALL DUCTILE IRON PIPE, JOINTS AND FITTINGS SHALL BE PROVIDED AS REQUIRED BY AWWA C110, C111, C115, C151 OR C153 AS APPLICABLE. ALL PIPES, JOINTS AND FITTINGS SHALL BE EXAMINED AFTER LAYING TO DETERMINE IF THE COATING HAS BEEN DAMAGED DURING INSTALLATION. ANY DAMAGED AREAS AND ALL JOINTS SHALL BE COATED WITH APPROXIMATELY 1 MIL. OF A BITUMINOUS COATING.

E. INTERIOR LINING FOR WATER MAINS SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH AWWA C104, STANDARD THICKNESS INCLUDING ASPHALTIC SEAL.

F. PIPE RESTRAINING LENGTH SHALL BE IN ACCORDANCE WITH THE SCHEDULE ON THE CONTRACT DOCUMENTS. RESTRAINED PIPE SHALL MEET THE FOLLOWING CRITERIA:

1. MECHANICAL JOINT PIPE WITH RESTRAINED JOINTS:
ALL PIPE WHERE RESTRAINED JOINTS ARE INSTALLED SHALL HAVE A BRINELL HARDNESS NUMBER (BHN) OF 140-200 TO ALLOW PROPER ACTIVATION OF GLAND. RESTRAINED JOINTS SHALL BE U.L. LISTED AS MANUFACTURED BY: EBAA IRON INC., SERIES 1100 "MEGALUG (MEGA-BOND COATED)," ROMAC ROMAGRIP (EPOXY COATED), FORD UNIFLANGE OR APPROVED EQUAL. USE OF THESE DEVICES WILL NOT BE ALLOWED ON EXISTING CAST IRON PIPE.

G. CONNECTIONS: UNLESS OTHERWISE NOTED, CONNECTIONS TO EXISTING MAINS SHALL BE MADE USING MJ SOLID SLEEVE FITTINGS. SLEEVES SHALL BE LONG PATTERN, SOLID TYPE MADE OF GRAY-IRON OR DUCTILE IRON WITH A MINIMUM PRESSURE RATING OF 250 PSI. SLEEVES SHALL HAVE MECHANICAL JOINT ENDS SUITABLE FOR USE WITH APPROVED RESTRAINING DEVICES. SLEEVES SHALL BE MANUFACTURED BY THE DUCTILE IRON PIPE MANUFACTURER. THE CONTRACTOR IS REQUIRED TO VERIFY THE OUTSIDE DIAMETER IF ANY, TO THE SLEEVE AND GLAND (MACHINING AND OTHERWISE) WITH THE MANUFACTURER. CONTRACTOR SHALL HAVE ALL MATERIALS NEEDED TO MAKE CONNECTION ON SITE PRIOR TO COMMENCING WITH THE CONNECTION. A CONCRETE ANCHOR BLOCK SHALL BE INSTALLED ON THE SAME JOINT OF EXISTING PIPE THAT THE CONNECTION IS MADE ON. THRUST BLOCKS SHALL BE INSTALLED TO SUPPORT ANY PIPE BENDS IN THE PROPOSED PIPE JUST PRIOR TO THE POINT OF CONNECTION. SEE APPLICABLE DETAIL (CITY STANDARD DWG. NO. 20 OR 20A) ON THE PLANS. ALL WORK NECESSARY TO MAKE CONNECTIONS (CONCRETE ANCHORS, ETC.) SHALL BE INCLUDED IN THE UNIT PRICE FOR THE WATER MAIN. NO SEPARATE PAYMENT SHALL BE MADE.

H. BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH CITY DESIGN AND CONSTRUCTION STANDARD DWG. NO. 1 SHOWN ON THE PLANS.

I. THE COST FOR CONCRETE ANCHORS REQUIRED AT WATER MAIN TIE-INS AND DEAD-ENDS SHALL BE INCLUDED IN THE PRICE FOR THE D.I. WATER MAIN. NO SEPARATE PAYMENT SHALL BE MADE.

J. OFFSETS OF EXISTING PIPE (D.I. WATER MAIN) SHALL BE IN ACCORDANCE WITH DETAILS ON THE PLANS. PIPE MATERIAL SHALL BE AS SPECIFIED ON THIS SHEET. PIPE SHALL BE RESTRAINED IN ACCORDANCE WITH THE PLANS.

2. GATE VALVES AND BOXES FOR WATER MAINS FROM 3" UP TO 16" IN DIAMETER SHALL CONFORM TO AWWA C509 - LATEST REVISION. GATE VALVES SHALL BE RESILIENT SEATED, HAVING AN ENCAPSULATED DISC, RATED FOR 250 PSI WORKING PRESSURE. VALVES SHALL BE EQUIPPED WITH O-RING SEALS, MECHANICAL JOINTS, IRON BODY, AND SUITABLE FOR BURIED SERVICE. GATE VALVES SHALL BE VERTICAL NUT-OPERATED WITH TWO INCH OPERATING NUT, NON-RISING STEM TYPE. HARDWARE (SUCH AS NUTS AND BOLTS) ON BURIED VALVES SHALL BE STAINLESS STEEL.

GATE VALVES ON PIPE UP TO 16" IN DIAMETER SHALL BE ONE OF THE FOLLOWING:

- KENNEDY 8571.
- MUELLER COMPANY MODEL A-2370-20 OR A-2360-20.
- AMERICAN FLOW CONTROL SERIES 2500.

ALL GATE VALVES FOR WATER MAINS SHALL OPEN LEFT (COUNTER CLOCKWISE).

WATER VALVE BOXES AND BOX INSTALLATION/ADJUSTMENT SHALL BE IN ACCORDANCE WITH STANDARD DETAILS SHOWN ON THE PLANS. VALVE BOX CASTINGS SHALL RECEIVE AN ASPHALTIC COATING. VALVE BOXES SHALL BE CAST IRON CONFORMING TO ASTM A-48 SLIDING TYPE ONLY.

3. FIRE HYDRANTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY DESIGN AND CONSTRUCTION STANDARD DWG. NO. 6 SHOWN ON THE PLANS.

FIRE HYDRANTS SHALL BE 5½" DRY BARREL TYPE AND SHALL BE MANUFACTURED IN COMPLETE ACCORDANCE WITH AWWA C502 - LATEST REVISION. HYDRANTS SHALL HAVE FULL 360 DEGREE REVOLVING HEADS AND SHALL OPEN BY TURNING THE OPERATING NUT TO THE LEFT (COUNTER CLOCKWISE). HYDRANTS SHALL BE ONE OF THE FOLLOWING:

- AMERICAN FLOW CONTROL B-84-B
- MUELLER CENTURION A-423
- AVK 2780 SERIES
- KENNEDY GUARDIAN K81D

HYDRANT NOZZLES, THREADS, AND OPERATING NUTS SHALL CONFORM TO LOCAL FIRE DEPARTMENT STANDARDS. CITY REQUIRES ONE 4½" PUMPER NOZZLE AND TWO 2½" HOSE NOZZLES. HYDRANTS SHALL BE RED AS PROVIDED BY EACH APPROVED MANUFACTURER. HARDWARE (SUCH AS NUTS AND BOLTS) BELOW GROUND SHALL BE STAINLESS STEEL.

4. WATER SERVICE LINES AND METER BOXES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY DESIGN AND CONSTRUCTION STANDARD DRAWING NO. 28 SHOWN ON THE PLANS. WATER SERVICE LINE SHALL BE TYPE K COPPER CONFORMING TO ASTM B88.

5. WATER METERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY DESIGN AND CONSTRUCTION STANDARDS AND PRODUCT MANUAL. ALL MATERIALS SHALL BE OF NEW CONSTRUCTION, BUT WHERE EXISTING METERS ARE LOCATED THE CITY WILL RELOCATE EXISTING METER TO NEW METER BOX. A NEW METER SHALL BE PROVIDED WHERE NEW SERVICES ARE SHOWN.

6. SANITARY SEWER PIPE SHALL BE IN ACCORDANCE WITH TABLE 4-0 OF THE DESIGN AND CONSTRUCTION STANDARDS MANUAL. CONTRACTOR SHALL HAVE THE CHOICE OF PIPE BASED ON THE PARTICULAR APPLICATION LISTED IN THE TABLE. PIPE TYPE SHALL NOT CHANGE BETWEEN MANHOLES. SDR 35 PVC AND SDR 26 PVC SHALL CONFORM TO ASTM D3034. GASKETS SHALL CONFORM TO ASTM F477. DUCTILE IRON PIPE FOR SANITARY SEWER PIPE SHALL CONFORM TO MATERIAL NOTE #1, EXCEPT PIPE SHALL BE CLASS 51. BEDDING AND BACKFILL FOR SANITARY SEWER SHALL BE IN ACCORDANCE WITH THE CITY DESIGN AND CONSTRUCTION STANDARDS DWG. NO 1 SHOWN ON THE PLANS.

7. SANITARY SEWER SERVICE LATERALS 6" DIAMETER AND SMALLER SHALL BE MADE OF SDR 26 PVC. LATERALS LARGER THAN 6" DIAMETER SHALL BE CONSTRUCTED OF THE SAME MATERIAL AS THE SEWER MAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR THE EXPLORATION TO LOCATE AND CONNECT TO EXISTING SANITARY SERVICE LATERALS. THIS COST SHALL BE CONSIDERED INCIDENTAL TO THE COST OF PROPOSED SANITARY SERVICE LATERAL INSTALLATION. ALL LATERALS SHALL BE CONSTRUCTED TO MEET THE REQUIREMENTS OF THE D&CSM.

8. SANITARY SEWER MANHOLES SHALL BE IN ACCORDANCE WITH CITY DESIGN AND CONSTRUCTION STANDARD DWG. NO. 35 SHOWN ON THE PLANS. STANDARD MANHOLE FRAME & COVER (F&C-1) AND SHALLOW HEIGHT FRAME & COVER SHALL BE IN ACCORDANCE WITH FRAME AND COVER DETAILS SHOWN ON THE PLANS. FRAME AND COVER SHALL BE SET FLUSH WITH PROPOSED GRADE INCLUDING CROSS SLOPES OF PAVEMENTS.

9. SEWER CLEANOUTS SHALL BE IN ACCORDANCE WITH THE D&CSM. CLEANOUTS IN TRAFFIC BEARING AREAS SHALL HAVE THE HEAVY DUTY FRAME AND COVER. CLEANOUT PLUG SHALL BE A COUNTERSUNK BRASS PLUG.

10. STEEL ENCASEMENT PIPE SHALL BE IN ACCORDANCE WITH CITY DESIGN AND CONSTRUCTION STANDARD DWG. NO. 23 SHOWN ON THE PLANS. ENDS OF CASING PIPE SHALL BE SEALED IN ACCORDANCE WITH CITY DESIGN STANDARDS. CASINGS BENEATH HIGHWAYS SHALL CONFORM TO VDOT STANDARDS. THE ASSOCIATED WATER OR SEWER PIPE IS PAID UNDER A SEPARATE PAY ITEM.

11. PLUGS AND/OR CAPS FOR WATER MAIN SHALL BE IN ACCORDANCE WITH CITY DESIGN AND CONSTRUCTION STANDARD DWG. NO. 16 SHOWN ON THE PLANS.

12. TAPPING SLEEVE SHALL BE DUCTILE IRON WITH OUTLET FLANGE DIMENSIONS AND DRILLING THAT COMPLY WITH ANSI-B16.1, CLASS 125, AND WITH MSS SP-60 AND CERTIFIED TO ANSI/NSF 61. SEE CITY APPROVED PRODUCT LIST FOR ALLOWABLE MAKES AND MODELS. TAPPING VALVE SHALL CONFORM TO AWWA C509. TAPPING SLEEVE AND VALVE SHALL BE RATED FOR 250 PSI WORKING PRESSURE.

DISINFECTION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS (AWWA C651)

THE FOLLOWING PROCEDURES APPLY PRIMARILY WHEN EXISTING MAINS ARE WHOLLY OR PARTIALLY DEWATERED. AFTER THE APPROPRIATE PROCEDURES HAVE BEEN COMPLETED, THE EXISTING MAIN SHALL BE RETURNED TO SERVICE PRIOR TO COMPLETION OF BACTERIOLOGICAL TESTING IN ORDER TO MINIMIZE THE TIME CUSTOMERS ARE OUT OF WATER. LEAKS OR BREAKS THAT ARE REPAIRED WITH CLAMPING DEVICES WHILE THE MAINS REMAIN FULL OF PRESSURIZED WATER MAY PRESENT LITTLE DANGER OF CONTAMINATION AND THEREFORE MAY NOT REQUIRE DISINFECTION.

SECTION 10.1 TRENCH TREATMENT

WHEN AN EXISTING MAIN IS OPENED, EITHER BY ACCIDENT OR BY DESIGN, THE EXCAVATION WILL LIKELY BE WET AND MAY BE BADLY CONTAMINATED FROM NEARBY SEWERS. LIBERAL QUANTITIES OF HYPOCHLORITE APPLIED TO OPEN TRENCH AREAS WILL LESSEN THE DANGER FROM SUCH POLLUTION. TABLETS COULD HAVE THE ADVANTAGE IN SUCH A SITUATION BECAUSE THEY DISSOLVE SLOWLY AND CONTINUE TO RELEASE HYPOCHLORITE AS WATER IS PUMPED FROM THE EXCAVATION.

SECTION 10.2 SWABBING WITH HYPOCHLORITE SOLUTION

THE INTERIOR OF ALL PIPE AND FITTINGS (PARTICULARLY COUPLINGS AND SLEEVES) USED IN MAKING THE REPAIR SHALL BE SWABBED OR SPRAYED WITH A 1% HYPOCHLORITE SOLUTION BEFORE THEY ARE INSTALLED.

SECTION 10.3 FLUSHING

THOROUGH FLUSHING IS THE MOST PRACTICAL MEANS OF REMOVING CONTAMINATION INTRODUCED DURING REPAIRS. IF VALVE AND HYDRANT LOCATIONS PERMIT, FLUSHING TOWARD THE WORK LOCATION FROM BOTH DIRECTIONS IS RECOMMENDED. FLUSHING SHALL BE STARTED AS SOON AS THE REPAIRS ARE COMPLETED AND SHALL BE CONTINUED UNTIL DISCOLORED WATER IS ELIMINATED.

SECTION 10.4 SLUG CHLORINATION

WHEN PRACTICAL, IN ADDITION TO THE FLUSHING PROCEDURES ABOVE, THE SECTION OF MAIN IN WHICH THE BREAK IS LOCATED SHALL BE ISOLATED, ALL SERVICE CONNECTIONS SHUT OFF, AND THE SECTION FLUSHED AND CHLORINATED AS DESCRIBED IN AWWA C651 SECTION 5, EXCEPT THAT THE DOSE MAY BE INCREASED TO AS MUCH AS 300 mg/L AND THE CONTACT TIME REDUCED TO AS LITTLE AS 15 MINUTES. AFTER CHLORINATION, FLUSHING SHALL BE RESUMED AND CONTINUED UNTIL DISCOLORED WATER IS ELIMINATED AND THE WATER IS FREE OF NOTICEABLE CHLORINE ODOR.

SECTION 10.5 SAMPLING

BACTERIOLOGICAL SAMPLES FOLLOWING AWWA C651 AND CITY D&CSM PROCEDURES SHALL BE TAKEN AFTER REPAIRS ARE COMPLETED TO PROVIDE A RECORD FOR DETERMINING THE PROCEDURE'S EFFECTIVENESS. IF THE DIRECTION OF FLOW IS UNKNOWN, THEN SAMPLES SHALL BE TAKEN ON EACH SIDE OF THE MAIN BREAK. IF POSITIVE BACTERIOLOGICAL SAMPLES ARE RECORDED, THEN THE SITUATION SHALL BE EVALUATED BY THE CONTRACTOR, CITY INSPECTOR AND PUBLIC UTILITIES TO DETERMINE CORRECTIVE ACTION. DAILY SAMPLING SHALL BE CONTINUED UNTIL TWO CONSECUTIVE NEGATIVE SAMPLES ARE RECORDED.

TRANSFER OF EXISTING WATER SERVICE TO NEW METER BOX

1. SERVICE TRANSFER SHALL BE CLOSELY COORDINATED BY CONTRACTOR WITH CITY CUSTOMER AND CITY INSPECTOR/PUBLIC UTILITIES AFTER SUCCESSFUL BACTERIOLOGICAL TESTING.
2. SERVICE TO NEW METER SHALL BE TESTED WITH NEW WATER MAIN PER CITY STANDARDS.
3. TRANSFER PIPING WILL BE VISUALLY INSPECTED (BY CITY INSPECTOR) FOR LEAKS PRIOR TO BACKFILLING. NO LEAKAGE IS ALLOWED.
4. METER BOX LOCATION SHALL BE SET TO CONFORM TO CITY DESIGN AND CONSTRUCTION STANDARDS MANUAL CHAPTER 4, SECTION 4.4.9.1.4.
5. CITY SHALL MOVE EXISTING METER TO NEW METER BOX.
6. CONTRACTOR SHALL RETURN YOKES AND METER BOX FRAMES AND COVER FROM EXISTING SERVICES TO PUBLIC UTILITIES.

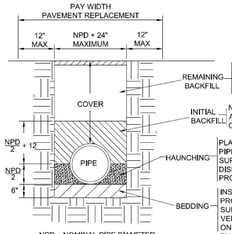
THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER _City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY _Bloker Design Associates (703) 368-7373
DESIGN SUPERVISED BY _McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE _City of Harrisonburg Public Utilities (540) 434-9959

WATER & SEWER TYPICAL DETAILS

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(C)



PAYMENT REPLACEMENT PAY AREA AT MANHOLES = 8 FT DIAMETER CIRCLE

TOPSOIL IS NOT ALLOWED UNDER PAVEMENT, SIDEWALK, ROAD, OR BUILDING:
NO STONE LARGER THAN 5" IN ANY DIMENSION:
COMPACTED IN 24" MAXIMUM LIFTS

NO STONE LARGER THAN 1" IN ANY DIMENSION:
COMPACTED IN 6" LIFTS

PLACE AND COMPACT UNDER PIPE TO PROVIDE SIDE SUPPORT. AVOID DISPLACEMENT OF PIPE FROM PROPER ALIGNMENT.

INSTALL & SHAPE TO PROVIDE CONTINUOUS PIPE SUPPORT AT HORIZONTAL & VERTICAL ALIGNMENT SHOWN ON PLANS: WHERE ROCK IS ENCOUNTERED IN THE TRENCH BOTTOM IT SHALL BE EXCAVATED TO A MINIMUM OF 6" BELOW THE PIPE.

LAYING CONDITION	BEDDING	HAUNCHING	INITIAL BACKFILL	REMAINING BACKFILL
1	CONCRETE ENCASEMENT (SEE CITY STANDARD DETAIL)			
2	CRA #68	CRA #68	CRA #68	#21A AGGREGATE
3	CRA #68	CRA #68	CRA #68	LM (85% NO LOAD - 95% LIVE LOAD)
4	CRA #68	CRA #68	SLM (95%)	LM (85% NO LOAD - 95% LIVE LOAD)
5	SH (95%)	(REFER TO LAYING CONDITION 6 OR 7)		
6	SLM (95%)	SLM (95%)	SLM (95%)	LM (85% NO LOAD - 95% LIVE LOAD)
7	SLM (95%)	SLM (95%)	SLM (95%)	#21A AGGREGATE

PIPE TRENCH APPLICATIONS:

DUCTILE IRON WATER PIPE	LAYING CONDITION 6
DUCTILE IRON WATER PIPE IN EXISTING PAVEMENT	LAYING CONDITION 7
DUCTILE IRON WATER PIPE WITH ROCK UNDERCUT	LAYING CONDITION 5
DUCTILE IRON SEWER PIPE	LAYING CONDITION 4
DUCTILE IRON SEWER PIPE IN EXISTING PAVEMENT	LAYING CONDITION 2
PVC SEWER PIPE	LAYING CONDITION 3
PVC SEWER PIPE IN EXISTING PAVEMENT	LAYING CONDITION 2

NOTES:

A) COMPACTION SHOWN IN PARENTHESES SHALL BE DETERMINED BY ASTM D 698

B) MINIMUM SPECIFICATION: TRENCHES UNDER PAVEMENTS, SIDEWALKS, ROADS, & BUILDINGS SHALL BE COMPACTED TO 95% DENSITY AS DETERMINED BY ASTM D 698, 6 INCH MAXIMUM LIFTS.

C) IF NOT SPECIFIED OTHERWISE, MINIMUM COMPACTION SHALL BE BY ROLLING WITH EARTH-MOVING EQUIPMENT.

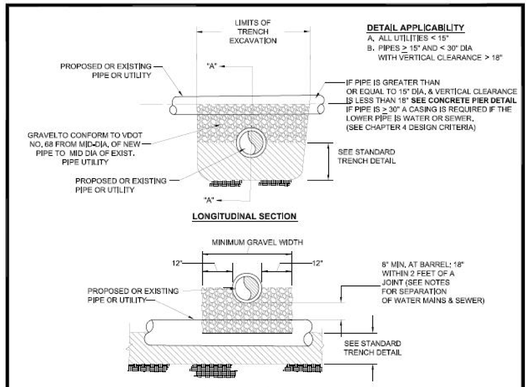
D) CRA SHALL BE VIBRATED USING A PLATE VIBRATOR OR SIMILAR EQUIPMENT TO REDUCE VOIDS AND LIMIT SETTLEMENT.

DESIGNATION	DESCRIPTION OF BACKFILL MATERIALS
CRA	COARSE AGGREGATE: VDOT SIZE AS SHOWN IN PARENTHESES
SLM	SELECT LOCAL MATERIAL: FREE OF DEBRIS, ROOTS, FROZEN MATERIALS, ORGANIC MATTER, STONES GREATER THAN 1" DIAMETER, UNIFIED SOILS CLASSIFICATION MLCLMHCH
LM	LOCAL MATERIALS: FREE OF STONES GREATER THAN 5" DIAMETER AND FOREIGN MATERIALS
SH	WHERE USED AS BEDDING FOR ROCK UNDERCUT, USE MATERIAL WITH SOME PLASTIC TENDENCIES SUCH TO SEAL ROCK FISSURES, SUCH AS SHALE-CLAY MIX.

NOT TO SCALE

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	PIPE TRENCH DETAIL
2.	2/22/06	VDEQ REVIEW COMMENTS	DHG	

DWG. NO. 1
PAGE 15



DETAIL APPLICABILITY
A. ALL UTILITIES < 15"
B. PIPES ≥ 15" AND < 30" DIA WITH VERTICAL CLEARANCE > 18"

IF PIPE IS GREATER THAN OR EQUAL TO 15" DIA. & VERTICAL CLEARANCE IS LESS THAN 18" **SEE CONCRETE PIER DETAIL**
IF PIPE IS ≥ 30" A CASING IS REQUIRED IF THE LOWER PIPE IS WATER OR SEWER. (SEE CHAPTER 4 DESIGN CRITERIA)

NOTES
1. SEPARATION OF WATER MAINS AND SEWERS AS FOLLOWS:
   A. UNDER NORMAL CONDITIONS WATER LINES CROSSING SEWERS SHALL BE LAID TO PROVIDE A SEPARATION OF AT LEAST 18 INCHES BETWEEN THE BOTOM OF THE WATER LINE AND THE TOP OF THE SEWER WHENEVER POSSIBLE.
   B. UNDER UNUSUAL CONDITIONS WHEN LOCAL CONDITIONS PREVENT A VERTICAL SEPARATION DESCRIBED IN A. (ABOVE) THE FOLLOWING CONSTRUCTION SHALL BE USED:
      1. SEWERS PASSING OVER OR UNDER WATER MAINS SHALL BE CONSTRUCTED OF THE MATERIALS REQUIRED FOR WATER MAIN CONSTRUCTION AND PRESSURE TESTED IN PLACE TO 30 PSI WITHOUT LEAKAGE.
      2. WATER LINES PASSING UNDER SEWERS SHALL, IN ADDITION, BE PROTECTED BY PROVIDING:
         A. A VERTICAL SEPARATION OF AT LEAST 18 INCHES BETWEEN THE BOTTOM OF THE SEWER AND THE TOP OF THE WATER LINE:
         B. ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS TO TO PROTECT EXCESSIVE DEFLECTION OF THE JOINTS AND THE SETTLING ON AND BREAKING OF THE WATER LINE; AND
         C. THAT THE LENGTH OF THE WATER AND SEWER LINE BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS SHALL BE EQUIDISTANT AND SEPARATED AS FAR AS POSSIBLE.

NOT TO SCALE

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	UTILITY AND PIPE CROSSINGS
2.	2/22/06	VDEQ REVIEW COMMENTS	DHG	

DWG. NO. 18
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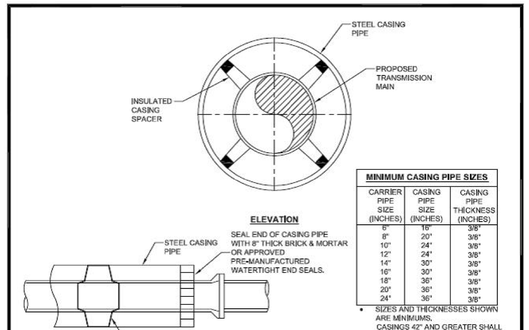

MINIMUM CASING PIPE SIZES

CARRIER PIPE SIZE (INCHES)	CASING PIPE SIZE (INCHES)	CASING PIPE THICKNESS (INCHES)
6"	16"	3/8"
8"	20"	3/8"
10"	24"	3/8"
12"	24"	3/8"
14"	30"	3/8"
16"	30"	3/8"
18"	36"	3/8"
20"	36"	3/8"
24"	36"	3/8"

- SIZES AND THICKNESSES SHOWN ARE MINIMUMS. CASINGS 42" AND GREATER SHALL BE 1/2" THICK MINIMUM.
- FOR SIZES OTHER THAN SHOWN OR WHERE SITE CONDITIONS INDICATE A NEED FOR SPECIAL CONSIDERATIONS, DESIGNER SHALL SUBMIT SIZING CALCULATIONS INCLUDING CORROSION ALLOWANCE.

NOTES:
1. CONTRACTOR IS REQUIRED TO SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION. REFER TO THE PUBLIC UTILITES PRODUCT MANUAL FOR APPROVED ITEMS.
2. CASINGS BENEATH RAILROADS SHALL CONFORM TO A.R.E.A STANDARDS. CASINGS BENEATH HIGHWAYS SHALL CONFORM TO VDOT STANDARDS.
3. THE CONTRACTOR SHALL WELD A RUNNER OF APPROPRIATE HEIGHT INTO THE BOTTOM OF THE CASING TO PREVENT THE CARRIER PIPE FROM SPINNING DURING INSTALLATION.
4. INSTALLATION OF CARRIER PIPE SHALL CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS FOR THE TYPE OF JOINT EMPLOYED.
5. VENTING, DRAINING, AND/OR CATHODIC PROTECTION ON THE ENCASING CONDUIT MAY BE REQUIRED BY THE DIRECTOR ON A CASE-BY-CASE BASIS.
6. CASING DESIGNS SHALL PROVIDE A 20' CLEAR ACCESS AREA TO ALLOW PIPE REMOVAL.
7. DESIGNER TO SUBMIT STEEL CASING CALCULATIONS PER AWWA M11 UPON REQUEST

NOT TO SCALE

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	DHG	STANDARD CASING INSTALLATION
2.	02/22/06	ADDED NOTE 6 & 7	DHG	
3.	05/15/09	ADDED BULLETS & TEXT	SDC	

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ALLOWABLE LEAKAGE PER 1000 FEET OF PIPELINE IN GALLONS PER HOUR

AVG. TEST PRESSURE PSI	NOMINAL PIPE DIAMETER - IN 3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450	0,48	0,64	0,95	1,27	1,59	1,91	2,23	2,55	2,87	3,18	3,82	4,78	5,73	6,69	7,64	8,60
400	0,45	0,60	0,90	1,20	1,50	1,80	2,10	2,40	2,70	3,00	3,60	4,50	5,41	6,31	7,21	8,11
350	0,42	0,56	0,84	1,12	1,40	1,69	1,97	2,25	2,53	2,81	3,37	4,21	5,06	5,90	6,74	7,58
300	0,39	0,52	0,78	1,04	1,30	1,56	1,82	2,00	2,34	2,60	3,12	3,90	4,68	5,46	6,24	7,00
275	0,37	0,50	0,75	1,00	1,24	1,49	1,74	1,99	2,24	2,49	2,99	3,73	4,48	5,23	5,98	6,72
250	0,36	0,47	0,71	0,95	1,19	1,42	1,66	1,90	2,14	2,37	2,85	3,56	4,27	4,99	5,70	6,41
225	0,34	0,45	0,68	0,90	1,13	1,35	1,58	1,80	2,03	2,25	2,70	3,38	4,05	4,73	5,41	6,03
200	0,32	0,43	0,64	0,85	1,06	1,28	1,48	1,70	1,91	2,12	2,55	3,19	3,82	4,46	5,09	5,73
175	0,30	0,40	0,59	0,80	0,99	1,19	1,39	1,59	1,79	1,98	2,38	2,98	3,58	4,17	4,77	5,36
150	0,28	0,37	0,55	0,74	0,92	1,10	1,29	1,47	1,66	1,84	2,21	2,76	3,31	3,86	4,41	4,97
125	0,25	0,34	0,50	0,67	0,84	1,01	1,18	1,34	1,51	1,68	2,01	2,52	3,02	3,53	4,03	4,53
100	0,23	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	1,50	1,80	2,25	2,70	3,15	3,60	4,05

NOTES:
1. ALL NEW WATER MAINS SHALL BE TESTED IN ACCORDANCE WITH AWWA C600, AFTER BACKFILLING TO A HYDROSTATIC PRESSURE OF NOT LESS THAN 15 PSI ABOVE THE DESIGN WATER PRESSURE FOR THE SYSTEM OR 150 PSI, WHICHEVER IS GREATER. ALL HIGH POINTS IN THE PORTION OF THE SYSTEM UNDER TEST SHALL BE VENTED AND ALL AIR SHALL BE EXPELLED FROM THE SYSTEM PRIOR TO BEGINNING THE TEST. THIS IS ACCOMPLISHED THROUGH THE USE OF AIR RELEASE VALVES PLACED AT HIGH POINTS ALONG THE WATER MAIN. WHERE CONCRETE THRUST BLOCKS ARE USED, THEY SHALL HAVE ATTAINED THEIR FINAL SET STRENGTH PRIOR TO TESTING.
2. AFTER THE PORTION OF OF THE SYSTEM BEING TESTED HAS REACHED THE REQUIRED PRESSURE, THE PRESSURE SHALL BE MAINTAINED FOR TWO HOURS. AT THE CONCLUSION OF THE PRESSURE TEST, VOLUME OF MAKEUP WATER REQUIRED TO REFILL THE PIPELINE SHALL BE DETERMINED BY MEASUREMENT WITH A DISPLACEMENT METER OR BY PUMPING FROM A VESSEL OF KNOWN VOLUME. ANY JOINTS OR FITTINGS AT WHICH LEAKAGE OCCURS SHALL BE REPAIRED TO ENSURE TIGHTNESS.
3. LEAKAGE SHALL NOT EXCEED THE VALUES FOR THE APPROPRIATE SIZE PIPELINE USING THE TABLE PROVIDED. THIS TABLE IS BASED ON THE EQUATION:

$$L = (ND\sqrt{P})/8900$$

WHERE L=ALLOWABLE LEAKAGE IN GALLONS PER HOUR, N=NO. OF JOINTS IN THE LENGTH OF PIPELINE TESTED, D=NOMINAL DIAMETER OF THE PIPE IN INCHES, AND P=AVERAGE TEST PRESSURE DURING THE LEAKAGE TEST IN PSI GAUGE. IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS. THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH PIPE.
4. LEAK SHALL BE REPAIRED AND RETESTED UNTIL THE LEAKAGE IS WITHIN THE LIMIT SET. METHODS OF REPAIR PRIOR TO RETESTING WILL BE DONE WITH THE DIRECTOR'S APPROVAL AND INSPECTION.

(TO OBTAIN LEAKAGE RATES IN LITERS PER HOUR, MULTIPLY THE VALUES IN THE TABLE BY 3.785)

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	WATER MAIN LEAKAGE TESTING

DWG. NO.
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MINIMUM HOLDING TIME IN MINUTES REQUIRED FOR PRESSURE DROP FROM 3.5 TO 3.0 PSI

PIPE DIAMETERS

LENGTH OF PIPE IN FEET	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"
25	2,8	4,2	5,7	7,1	8,5	10,6	12,7	14,8	17,0	19,2	21,2	23,3	25,5
50												23,3	25,5
75										19,2	21,2	24,3	28,8
100								14,8	17,0	21,8	26,8	32,2	38,5
125							12,7	16,3	21,2	27,0	33,3	40,1	48,2
150						10,6	14,3	19,6	25,5	32,6	40,1	48,3	57,6
175						11,6	16,7	22,8	29,7	37,9	46,7	56,2	67,3
200					8,5	13,3	19,1	26,1	34,0	43,3	53,3	64,4	77,0
225				7,1	9,5	15,0	21,5	29,4	38,2	48,7	60,1	72,3	86,7
250				7,4	10,6	16,7	24,0	32,6	42,5	54,0	66,9	80,5	96,1
275				8,1	11,7	18,3	26,3	35,9	46,7	59,6	73,5	88,4	105,8
300			5,7	8,9	12,7	20,0	28,7	39,1	51,0	65,0	80,3	96,6	115,5
350			6,6	10,4	14,9	23,4	33,4	45,7	59,5	75,7	93,7	112,7	134,8
400		4,2	7,5	11,9	17,0	26,7	38,2	52,2	68,0	86,6	107,1	128,8	154,0
450		4,8	8,5	13,4	19,1	30,0	43,0	58,7	76,5	97,4	120,5	144,9	173,1
500	2,8	5,3	9,3	14,9	21,2	33,3	47,8	65,3	85,0	108,3	133,9	161,0	192,5

NOTES:
1. TEST PLUGS SHALL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR WITHIN THE PIPE AT EACH MANHOLE OR AT SUITABLE LOCATIONS TO TEST A SECTION OF THE PIPE. EACH PLUG SHALL BE SECURELY BRACED.
2. THE CONTRACTOR SHALL ALLOW THE AIR TEMPERATURE TO STABILIZE FOR AT LEAST TWO MINUTES TO ENSURE ACCURATE GAUGE PRESSURE READING. THEREAFTER ADDING ONLY THE AMOUNT OF AIR REQUIRED TO MAINTAIN AN INITIAL FOUR PSI PRESSURE, ADJUSTED FOR GROUND WATER. (SEE NOTE 4)
3. IF THE INTERNAL AIR PRESSURE DECREASES, THE TIME REQUIRED FOR THE PRESSURE DROP FROM 3.5 TO 3.0 PSI GREATER THAN THE AVERAGE GROUND WATER BACK PRESSURE WILL BE OBSERVED AND RECORDED. THE TIME INTERVAL SHALL BE COMPARED WITH THE ESTABLISHED STANDARDS IN ACCORDANCE WITH THE APPROVED TABLE OF TIME AND LENGTH FOR VARIOUS DIAMETERS OF SEWER SHOWN ABOVE. THE TABLE IS BASED ON RAMSEIER'S EQUATION T=0.085 DKQ, WHERE Q=0.0010 CFM. FOR TESTING 4" LATERALS WITH THE SEWER MAIN, ADD 2.8 MINUTES TO THE APPROPRIATE SEWER MAIN TEST TIME.
4. THE GROUND WATER ADJUSTMENT SHALL BE MADE IN ACCORDANCE WITH THE EQUIVALENCY TABLE SHOWN BELOW. THE TABLE IS BASED ON 1.0 V.F.T. OF WATER EQUAL TO 0.4335 PSI. THE APPROPRIATE PSI ALLOWANCE FOR AVERAGE VERTICAL FOOT OF GROUND WATER SHALL BE ADDED TO THE BASE STARTING PRESSURE OF 4.0 PSI, BUT IN NO CASE SHALL THE RESULTING PRESSURE BE MORE THAN 9.0 PSI. FOR EXAMPLE, THE HEIGHT OF GROUND WATER ABOVE THE PIPE INVERT IS 3 FEET: THE PSI REQUIRED TO MAINTAIN 4 PSI PRESSURE=5.30 PSI (4 PSI + 1.30 PSI=5.30 PSI). INTERPOLATION IS NEEDED FOR FRACTIONS OF A FOOT OF WATER.

EQUIVALENT PSI	HEIGHT OF GROUND WATER ABOVE PIPE INV. (FT)
0.43	1
0.87	2
1.30	3
1.73	4
2.17	5
2.60	6
3.03	7
3.47	8
3.90	9
4.34	10
4.77	11
4.98	11.5
FOR ANYTHING ABOVE 11.5 VF, ALLOW MAXIMUM 5.0 PSI.	

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	SEWER MAIN AIR TESTING

DWG. NO.
PAGE T-4

NOTES:

MANHOLES SHALL BE VACUUM TESTED IN ACCORDANCE WITH ASTM C 1244. GENERALLY:

1. MANHOLES SHALL BE TESTED AFTER ASSEMBLY AND PRIOR TO BACKFILLING.
2. STUB-OUTS, MANHOLE BOOTS AND PIPE PLUGS SHALL BE SECURED TO PREVENT MOVEMENT WHILE THE VACUUM IS DRAWN.
3. INSTALLATION AND OPERATION OF VACUUM EQUIPMENT AND INDICATING DEVICES SHALL BE IN ACCORDANCE WITH EQUIPMENT SPECIFICATIONS FOR WHICH PERFORMANCE INFORMATION HAS BEEN PROVIDED BY THE MANUFACTURER AND APPROVED BY THE DIRECTOR.
4. A MEASURED VACUUM OF 10" OF MERCURY SHALL BE ESTABLISHED IN THE MANHOLE. THE TIME FOR THE VACUUM TO DROP TO 9" OF MERCURY SHALL BE RECORDED.
5. ACCEPTANCE STANDARDS FOR LEAKAGE SHALL BE ESTABLISHED FROM THE ELAPSED TIME FOR A NEGATIVE PRESSURE CHANGE FROM 10" TO 9" OF MERCURY. THE MAXIMUM ALLOWABLE LEAKAGE RATE FOR A FOUR FOOT DIAMETER MANHOLE SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

MANHOLE DEPTH	MINIMUM ELAPSED TIME FOR PRESSURE CHANGE OF 1 INCH OF MERCURY
10 FT OR LESS	60 SECONDS
10 FT BUT LESS THAN 15 FT	75 SECONDS
15 FT BUT LESS THAN 25 FT	90 SECONDS

FOR MANHOLES FIVE FEET IN DIAMETER, ADD AN ADDITIONAL 15 SECONDS AND FOR MANHOLES SIX FEET IN DIAMETER, ADD AN ADDITIONAL 10 SECONDS TO THE TIME REQUIREMENTS FOR FOUR FOOT DIAMETER MANHOLES.

6. IF THE MANHOLE FAILS THE TESTS, NECESSARY REPAIRS SHALL BE MADE: THE VACUUM TEST AND REPAIRS SHALL BE REPEATED UNTIL THE MANHOLE PASSES THE TEST OR THE MANHOLE SHALL BE TESTED IN ACCORDANCE WITH THE STANDARD EXFILTRATION TEST AND RATED ACCORDINGLY.
7. IF A MANHOLE JOINT MASTIC IS COMPLETELY PULLED OUT DURING THE VACUUM TEST, THE MANHOLE SHALL BE DISASSEMBLED AND THE MASTIC REPLACED.

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	AIR VACUUM TESTING OF SEWER MANHOLES
2.	5/11/06	VDEQ REVIEW COMMENTS	DHG	

DWG. NO.
PAGE T-5

NOTES:

1. INFLATABLE STOPPERS SHALL BE USED TO PLUG ALL LINES INTO AND OUT OF THE MANHOLE BEING TESTED.
2. THE STOPPERS SHALL BE POSITIONED IN THE LINES FAR ENOUGH FROM THE MANHOLES TO ENSURE TESTING TO THOSE PORTIONS OF THE LINES NOT AIR TESTED.
3. THE MANHOLE SHALL THEN BE FILLED WITH WATER AND A MAXIMUM 12-HOUR SOAK SHALL BE ALLOWED.
4. LEAKAGE SHALL NOT EXCEED ONE-HALF GALLON PER HOUR PER FOUR FEET VERTICAL SECTION. MANHOLES DETERMINED TO BE SUSPECTED OF POOR QUALITY, JOINTING OR CONSTRUCTION PRACTICES BY THE DIRECTOR OR INSPECTOR SHALL BE TESTED TO THE TOP OF THE MANHOLE AND REPAIRED AS NECESSARY.

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	EXFILTRATION TESTING OF SEWER MANHOLES
2.	2/22/06	VDEQ REVIEW COMMENTS	DHG	

DWG. NO.
PAGE T-6

VR 355-18-012.11 SECTION 3.58 DISINFECTION OF WATER MAINS

A. ALL WATER MAINS SHALL BE DISINFECTED PRIOR TO BEING PLACED IN OPERATION.
B. PRIOR TO DISINFECTION, ALL WATER MAINS SHALL BE FLUSHED UNLESS THE TABLET METHOD OF DISINFECTION IS USED. ALL VALVES AND HYDRANTS SHALL BE OPERATED DURING THIS OPERATION. FLUSHING VELOCITIES SHOULD NOT BE LESS THAN 2.5 FT/SEC.
C. METHODS OF CHLORINE APPLICATION:
   1. CONTINUOS FEED METHOD - POTABLE WATER SHALL BE INTRODUCED INTO THE PIPE MAIN AT A CONSTANT FLOW RATE. CHLORINE SHALL BE ADDED AT A CONSTANT RATE TO THIS FLOW SO THAT THE CHLORINE CONCENTRATION IN THE WATER IN THE PIPE IS AT LEAST 50 MG/L. THE CHLORINATED WATER SHALL REMAIN IN THE MAIN AT LEAST 24 HOURS. AFTER WHICH THE CHLORINE CONCENTRATION IN THE WATER SHALL BE AT LEAST 10 MG/L. ALL VALVES AND APPURTENANCES SHALL BE OPERATED WHILE THE CHLORINATED WATER REMAINS IN THE WATER MAIN.
   2. SLUG METHOD - POTABLE WATER SHALL BE INTRODUCED INTO THE MAIN AT A CONSTANT FLOW RATE. THE WATER SHALL RECEIVE A CHLORINE DOSAGE WHICH WILL RESULT IN A CHLORINE CONCENTRATION OF 100 MG/L IN A "SLUG" OF THE WATER. THE CHLORINE SHALL BE ADDED LONG ENOUGH TO INSURE THAT ALL PORTIONS OF THE MAIN ARE EXPOSED TO THE 100 MG/L CHLORINE SOLUTION FOR AT LEAST 3 HOURS. THE CHLORINE RESIDUAL SHALL BE CHECKED AT REGULAR INTERVALS NOT TO EXCEED 2000 FEET TO INSURE THAT ADEQUATE RESIDUAL IS MAINTAINED. AS THE CHLORINATED WATER PASSES VALVES AND APPURTENANCES, THEY SHALL BE OPERATED TO INSURE DISINFECTION OF THESE APPURTENANCES.
   3. TABLET METHOD - THIS METHOD SHALL NOT BE USED IF NONPOTABLE WATER OR FOREIGN MATERIALS HAVE ENTERED THE MAINS OR IF THE WATER TEMPERATURE IS BELOW 5°C (41°F). THE TABLETS SHALL BE PLACED IN EACH SECTION AND IN ALL APPURTENANCES. ENOUGH TABLETS SHALL BE USED TO INSURE THAT A CHLORINE CONCENTRATION OF 25 MG/L IS PROVIDED IN THE WATER. THEY SHALL BE ATTACHED BY AN ADHESIVE TO THE TOP OF THE PIPE SECTIONS AND CRUSHED OR RUBBED IN ALL APPURTENANCES. THE ADHESIVE SHALL BE ACCEPTABLE TO THE DIVISION. THE VELOCITY OF THE POTABLE WATER IN THE MAIN SHALL BE LESS THAN 1 FT/SEC. THE WATER SHALL THEN REMAIN IN CONTACT WITH THE PIPE FOR 24 HOURS. ALL VALVES AND APPURTENANCES SHALL BE OPERATED WHILE THE CHLORINATED WATER IS IN THE WATER MAIN.
D. FINAL FLUSHING - AFTER THE REQUIRED RETENTION PERIOD, THE CHLORINATED WATER SHALL BE FLUSHED FROM THE MAIN USING POTABLE WATER.
E. TESTING - AFTER THE MAINS HAVE BEEN FLUSHED, THE WATER MAINS SHALL BE TESTED AS OUTLINED BELOW:
   1. AFTER FINAL FLUSHING AND BEFORE THE WATER MAIN IS PLACED IN SERVICE, SAMPLES SHALL BE COLLECTED AND TESTED FOR BACTERIOLOGIC QUALITY AND SHALL SHOW THE ABSENCE OF COLIFORM ORGANISMS. AT LEAST TWO SAMPLES SHALL BE COLLECTED AT LEAST 24 HOURS APART AT INTERVALS NOT EXCEEDING 1200 FEET, AND TESTED BY A STATE HEALTH DEPARTMENT APPROVED LABORATORY.
   2. SAMPLES FOR BACTERIOLOGICAL ANALYSIS SHALL BE COLLECTED IN STERILE BOTTLES TREATED WITH SODIUM THIOSULFATE. IF THE LABORATORY RESULTS INDICATE THE PRESENCE OF COLIFORM BACTERIA, THE SAMPLES ARE UNSATISFACTORY AND DISINFECTION SHALL BE REPEATED UNTIL THE SAMPLES ARE SATISFACTORY.
   3. A SAMPLING TAP CONSISTS OF A CORPORATION COCK WITH METAL PIPE. THE CORPORATION STOP INLET SHALL BE MALE, 1 INCH IN SIZE, PURSUANT TO CHAPTER 7, SECTION 7.5. (UPON COLLECTION OF SAMPLING THE CONTRACTOR SHALL CONSTRUCT A PARTIAL WATER SERVICE, CHAPTER 7, DWG. 26, P. 48, OR MANUAL AIR RELEASE, DWG. 32, P. 52, COMPLETE AND READY FOR USE.)
F. SAMPLES SHALL BE COLLECTED BY CITY PERSONNEL UPON PRIOR SCHEDULING BY THE CONTRACTOR WITH THE APPROPRIATE CITY DEPARTMENT PERSONNEL.
REPAIRS - CLEANING, DISINFECTING, FLUSHING, TESTING, OR SIMILAR OPERATIONAL ACTIONS SHALL BE IN ACCORDANCE WITH THE MOST CURRENT STANDARD ISSUED BY AWWA. (AWWA C651)

REVISIONS				
NO.	DATE	DESCRIPTION	INIT.	
1.	7/01/04	2004 D/CSM UPDATE	SDC	DISINFECTION OF WATER MAINS

DWG. NO.
PAGE T-7

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	15(C)

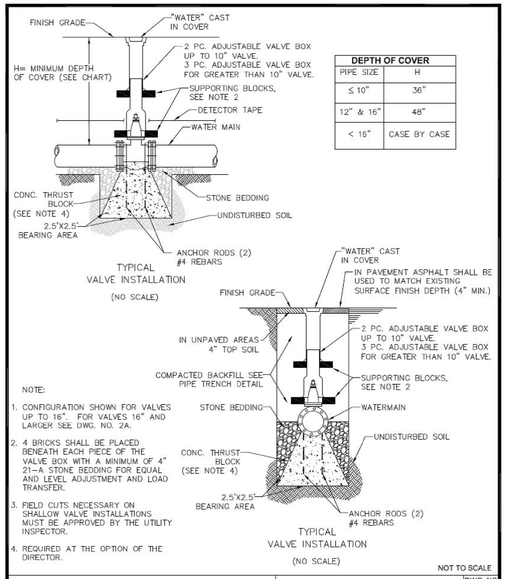
THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER _City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY _Bloker Design Associates (703) 368-7373
DESIGN SUPERVISED BY _McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE _City of Harrisonburg Public Utilities (540) 434-9959

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(D)

WATER & SEWER TYPICAL DETAILS



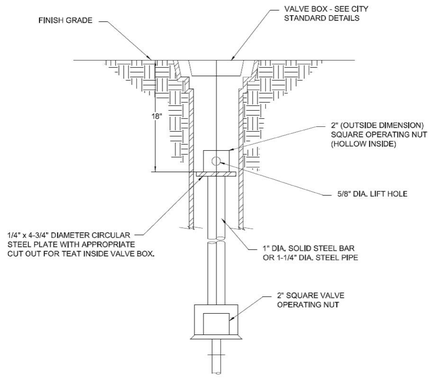
DEPTH OF COVER	
PIPE SIZE	H
≤ 10"	36"
12" & 16"	48"
< 16"	CASE BY CASE

NOTE:
1. CONFIGURATION SHOWN FOR VALVES UP TO 16". FOR VALVES 16" AND LARGER SEE DWG. NO. 2A.
2. 4 BRICKS SHALL BE PLACED BENEATH EACH PIECE OF THE VALVE BOX WITH A MINIMUM OF 4" 21-A STONE BEDDING FOR EQUAL AND LEVEL ADJUSTMENT AND LOAD TRANSFER.
3. FIELD CUTS NECESSARY ON SHALLOW VALVE INSTALLATIONS MUST BE APPROVED BY THE UTILITY INSPECTOR.
4. REQUIRED AT THE OPTION OF THE DIRECTOR.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/21/04	2004 D/CSM UPDATE	SDC

TYPICAL GATE VALVE AND VALVE BOX INSTALLATION — DWG. NO 2 — PAGE 16



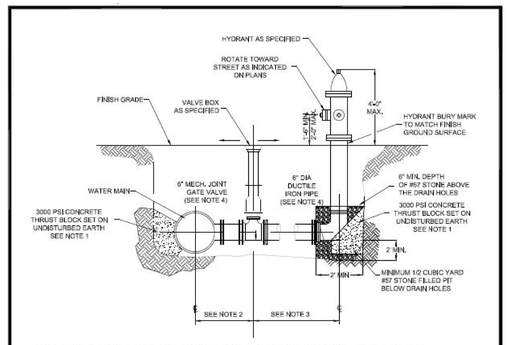
NOTE:
VALVE STEM EXTENSION TO BE USED **ONLY** WHEN VALVE NUT IS LOCATED MORE THEN THREE (3) FEET DEEP.

NOT TO SCALE

REVISIONS

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	SDC

VALVE STEM EXTENSION — DWG. NO. 3 — PAGE 17



NOTES:
1) CONCRETE THRUST BLOCKS AT THE TEE AND HYDRANT ARE REQUIED ON ALL INSTALLATIONS EXCEPT WHERE REQUIRED BEARING SUPPORT CANNOT BE OBTAINED. BEARING AREA REQUIRED FOR FIRE HYDRANT THRUST BLOCK SHALL BE EQUAL TO CITY STANDARD FOR 90° BEND.

2) VALVE MUST BE ANCHORED TO THE MAIN TEE BY ONE OF THE FOLLOWING METHODS

A) USE OF APPROVED HYDRANT TEE (WITH LOCKING SWIVEL FLANGE)
B) USE OF APPROVED MECHANICAL JOINT RESTRAINING GLANDS ON EACH JOINT
C) RODDING OR OTHER SPECIAL RESTRAINT DEVICE ONLY WHERE SPECIFICALLY APROVED BY DIRECTOR OF PUBLIC UTILITIES

3) WHERE REQUIRED BEARING SUPPORT FOR HYDRANT THRUST BLOCK CANNOT BE OBTAINED, JOINTS FROM VALVE TO HYDRANT SHALL BE RESTRAINED ACCORDING TO 2B.

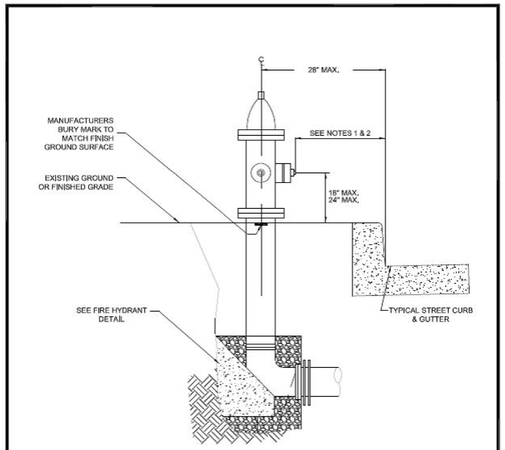
4) DESIGNS REQUIRING FIRE HYDRANT LEAD LINES AND VALVES GREATER THAN 6" SIZE SHALL BE REDUCED TO 6" DIRECTLY ADJACENT TO THE FIRE HYDRANT. THRUST BLOCKS SHALL BE SIZED BASED ON THE LEAD LINE SIZE.

5.) FIRE HYDRANT WEEP HOLES SHALL NOT BE INSTALLED BELOW THE GROUND WATER TABLE. WHERE FIELD EXCAVATION REVEALS THIS CONDITION, REDESIGN WILL BE REQUIRED TO ADDRESS THE POTENTIAL CROSS CONNECTION.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/24/04	2004 D/CSM UPDATE	SDC
2.	3/28/06	VDH REVIEW AND COMMENT	DHG

FIRE HYDRANT — DWG. NO 6 — PAGE 20



TYPICAL SECTION
STREET WITH CURB AND GUTTER

NOTES: 1) THE CLOSEST PART OF THE HYDRANT SHALL BE A MINIMUM OF 14" FROM THE FLOW LINE OF THE CURB.

2) DO NOT EXCEED 18" IF HYDRANT BARREL IS WITHIN SIDEWALK THAT DIRECTLY ADJOINS THE CURB.

NOT TO SCALE

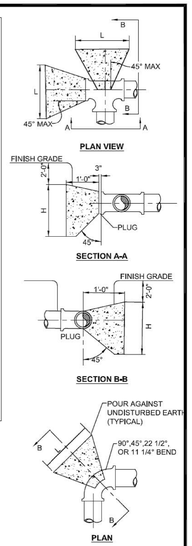
NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	SDC

LOCATION OF FIRE HYDRANTS — DWG. NO 7 — PAGE 21

MINIMUM CONCRETE ANCHOR BLOCK DIMENSIONS - FEET

PIPE SIZE INCHES	DEGREE OF BEND	100 PSI WORKING PRESSURE L	100 PSI WORKING PRESSURE H	150 PSI WORKING PRESSURE L	150 PSI WORKING PRESSURE H	VOLUME OF CONCRETE CU. YD. (1)
6"	90°	2.5	1.5	2.5	2.0	0.24
	45°	2.0	1.0	2.5	1.0	0.13
	22 1/2°	1.0	1.0	1.5	1.0	0.06
	11 1/4°	1.0	1.0	1.5	1.0	0.06
	TEE/PLUG	2.5	1.5	2.5	2.0	0.24
8"	90°	2.5	2.5	4.0	2.0	0.40
	45°	2.0	1.5	2.5	2.0	0.19
	22 1/2°	1.5	1.0	2.5	1.0	0.10
	11 1/4°	1.5	1.0	2.0	1.0	0.09
	TEE/PLUG	2.5	2.5	4.0	2.0	0.40
12"	90°	4.0	3.0	5.0	4.0	0.76
	45°	3.5	2.0	4.0	2.5	0.46
	22 1/2°	2.5	1.5	2.5	1.0	0.24
	11 1/4°	2.5	1.5	2.0	1.5	0.16
	TEE/PLUG	4.0	3.0	5.0	4.0	0.76
16"	90°	5.5	4.0	7.5	4.5	1.43
	45°	4.0	3.0	5.0	3.5	0.76
	22 1/2°	3.0	2.0	3.0	3.0	0.30
	11 1/4°	3.0	2.0	4.5	3.0	0.20
	TEE/PLUG	5.5	4.0	7.5	4.5	1.43
20"	90°	6.5	5.5	8.5	6.0	1.99
	45°	5.0	4.0	6.0	4.5	1.11
	22 1/2°	3.5	3.0	4.5	3.0	0.58
	11 1/4°	3.5	3.0	4.5	3.0	0.58
	TEE/PLUG	6.5	5.5	8.5	6.0	1.99
24"	90°	8.0	6.0	11.0	6.5	2.37
	45°	5.5	5.0	7.0	5.5	1.36
	22 1/2°	4.0	3.5	5.0	4.0	0.50
	11 1/4°	4.0	3.5	5.0	4.0	0.50
	TEE/PLUG	8.0	6.0	11.0	6.5	2.37

(1) APPROXIMATE VOLUME OF CONCRETE BASED ON 100 PSI WORKING PRESSURE

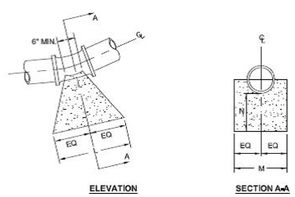


NOTES:
1. CONCRETE SHALL HAVE 3,000 PSI STRENGTH AT 28 DAYS.
2. THE ABOVE TABLE IS BASED ON 2,000 PSF SOIL BEARING CAPACITY AND WORKING PRESSURE AS INDICATED.
3. ANCHOR BLOCK DESIGN FOR OTHER DESIGN CIRCUMSTANCES OR PIPE LARGER THAN 24" SHALL BE REVIEWED ON AN INDIVIDUAL BASIS BY THE DIRECTOR.
4. HEIGHT OF CONCRETE ANCHOR BLOCK ABOVE PIPE CENTERLINE IS 1/3 THE H DIMENSION.
5. PROVIDE A 10 MIL PLASTIC BARRIER BETWEEN CONCRETE AND PIPE. OBTAIN INSPECTOR'S APPROVAL PRIOR TO PLACEMENT OF CONCRETE.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG

THRUST BLOCKS — DWG. NO 10 — PAGE 24



BUTTRESS FOR LOWER VERTICAL BENDS											
DEGREE OF BEND		SIZE 3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
11 1/4°	L	6"	6"	6"	8"	8"	8"	1'-1"	1'-5"	1'-10"	2'-6"
	M	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-0"	3'-6"
	N	6"	8"	8"	8"	8"	8"	9"	10"	1'-2"	1'-2"
22 1/2°	L	6"	8"	10"	1'-1"	1'-3"	1'-4"	2'-1"	2'-9"	3'-7"	5'-3"
	M	1'-0"	1'-0"	1'-2"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-0"
	N	8"	8"	8"	8"	9"	9"	12"	1'-2"	1'-4"	1'-6"
45°	L	10"	1'-0"	1'-2"	1'-6"	2'-0"	2'-6"	4'-0"	5'-6"	6'-0"	8'-2"
	M	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-0"	4'-0"
	N	8"	8"	8"	8"	12"	1'-2"	1'-6"	2'-0"	2'-6"	3'-0"

NOTES:
1. CONCRETE SHALL HAVE 3,000 PSI STRENGTH AT 28 DAYS.
2. CARRY ALL BEARING SURFACES TO UNDISTURBED EARTH OR FIRM SUBGRADE.
3. THE ABOVE TABLE IS BASED ON 2,000 PSF SOIL BEARING CAPACITY AND 150 PSI WORKING PRESSURE.
4. ANCHOR BLOCK DESIGN FOR OTHER DESIGN CIRCUMSTANCES OR PIPE LARGER THAN 30" SHALL BE REVIEWED ON AN INDIVIDUAL BASIS BY THE DIRECTOR.
5. PROVIDE A 10 MIL PLASTIC BARRIER BETWEEN CONCRETE AND PIPE. OBTAIN INSPECTOR'S APPROVAL PRIOR TO PLACEMENT OF CONCRETE.

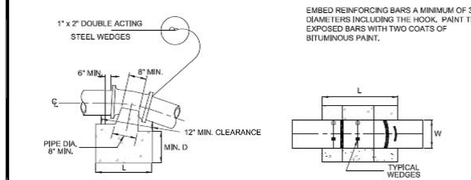
NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG

BUTTRESSES FOR 11 1/4°, 22 1/2°, AND 45° LOWER VERTICAL BENDS — DWG. NO. 11 — PAGE 25

WHERE FOUR REINFORCING BARS ARE USED SYMETRICALLY PLACE TWO BARS AT THE BEND AND OTHERS AS DEPICTED IN THE ELEVATION VIEW

EMBED REINFORCING BARS A MINIMUM OF 36 DIAMETERS INCLUDING THE HOOK. PAINT THE EXPOSED BARS WITH TWO COATS OF BITUMINOUS PAINT.



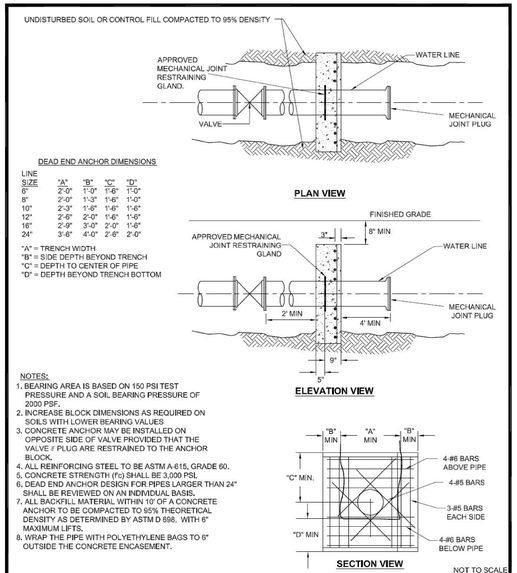
BUTTRESS FOR LOWER VERTICAL BENDS											
DEGREE OF BEND		SIZE 3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
11 1/4°	L	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	3'-3"	4'-0"	4'-6"	5'-0"
	W	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	3'-3"	4'-0"	4'-6"	5'-0"
	D	1'-6"	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	2'-6"	3'-0"	3'-0"
REINF. BARS		3#7	3#7	3#7	3#8	3#8	3#8	3#8	3#10	3#10	3#10
22 1/2°	L	1'-6"	2'-0"	2'-6"	2'-6"	3'-0"	4'-0"	4'-6"	5'-6"	6'-0"	7'-0"
	W	1'-6"	2'-0"	2'-6"	2'-6"	3'-0"	4'-0"	4'-6"	5'-6"	6'-0"	7'-0"
	D	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	3'-0"	3'-6"	4'-0"	4'-0"
REINF. BARS		3#7	3#7	3#7	3#8	3#8	4#8	4#8	3#10	4#10	4#10
45°	L	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	6'-0"	7'-6"	8'-6"	10'-0"
	W	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	6'-0"	7'-6"	8'-6"	10'-0"
	D	1'-6"	2'-0"	2'-0"	2'-0"	3'-0"	3'-0"	3'-6"	4'-0"	4'-0"	5'-0"
REINF. BARS		3#7	3#7	3#7	3#8	4#8	4#8	4#10	4#10	4#10	4#11

NOTES:
1. CONCRETE SHALL HAVE 3,000 PSI STRENGTH AT 28 DAYS.
2. CARRY ALL BEARING SURFACES TO UNDISTURBED EARTH OR FIRM SUBGRADE.
3. THE ABOVE TABLE IS BASED ON 2,000 PSF SOIL BEARING CAPACITY AND 150 PSI WORKING PRESSURE.
4. ANCHOR BLOCK DESIGN FOR OTHER DESIGN CIRCUMSTANCES OR PIPE LARGER THAN 30" SHALL BE REVIEWED ON AN INDIVIDUAL BASIS BY THE DIRECTOR.
5. PROVIDE A 10 MIL PLASTIC BARRIER BETWEEN CONCRETE AND PIPE. OBTAIN INSPECTOR'S APPROVAL PRIOR TO PLACEMENT OF CONCRETE.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG

ANCHORAGE FOR 11 1/4°, 22 1/2°, AND 45° UPPER VERTICAL BENDS — DWG. NO. 12 — PAGE 26



DEAD END ANCHOR DIMENSIONS

LINE SIZE	"A"	"B"	"C"	"D"
6"	2'-0"	1'-0"	1'-6"	1'-0"
8"	2'-0"	1'-3"	1'-6"	1'-0"
10"	2'-3"	1'-6"	1'-6"	1'-6"
12"	2'-6"	2'-0"	1'-6"	1'-6"
16"	2'-9"	3'-0"	2'-0"	1'-6"
24"	3'-6"	4'-0"	2'-6"	2'-0"

"A" = TRENCH WIDTH
"B" = SIDE DEPTH BEYOND TRENCH
"C" = DEPTH TO CENTER OF PIPE
"D" = DEPTH BEYOND TRENCH BOTTOM

NOTES:
1. BEARING AREA IS BASED ON 150 PSI TEST PRESSURE AND A SOIL BEARING PRESSURE OF 2000 PSF.
2. INCREASE BLOCK DIMENSIONS AS REQUIRED ON SOILS WITH LOWER BEARING VALUES
3. CONCRETE ANCHOR MAY BE INSTALLED ON OPPOSITE SIDE OF VALVE PROVIDED THAT THE VALVE / PLUG ARE RESTRAINED TO THE ANCHOR BLOCK.
4. ALL REINFORCING STEEL TO BE ASTM A-615, GRADE 60.
5. CONCRETE STRENGTH (f'c) SHALL BE 3,000 PSI.
6. DEAD END ANCHOR DESIGN FOR PIPES LARGER THAN 24" SHALL BE REVIEWED ON AN INDIVIDUAL BASIS.
7. ALL BACKFILL MATERIAL WITHIN 10' OF A CONCRETE ANCHOR TO BE COMPACTED TO 95% THEORETICAL DENSITY AS DETERMINED BY ASTM D 698. WITH 6" MAXIMUM LIFTS.
8. WRAP THE PIPE WITH POLYETHYLENE BAGS TO 6" OUTSIDE THE CONCRETE ENCASEMENT.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/21/04	2004 D/CSM UPDATE	SDC
2.	02/10/09	REVISE DEPTH BELOW GRADE	SDC

DEAD END ANCHOR FOR MAIN EXTENSION — DWG. NO. 16 — PAGE 30

SCALE 0 25' 50' — PROJECT UPC# 101219 — SHEET NO. 15(D)

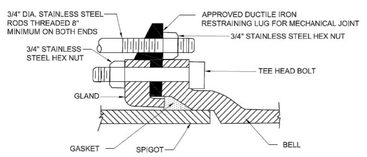
THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER _City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY _Bloker Design Associates (703) 368-7373
DESIGN SUPERVISED BY _McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE _City of Harrisonburg Public Utilities (540) 434-9959

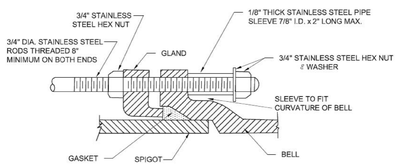
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(E)

WATER & SEWER TYPICAL DETAILS



STANDARD CONNECTION



ALTERNATE CONNECTION

NOTES

1. ALL RODS, NUTS, WASHERS // SLEEVES TO BE 304 STAINLESS STEEL.
2. OTHER DESIGNS FOR CONNECTIONS MUST BE SUBMITTED FOR REVIEW // APPROVAL AND EQUAL OR EXCEED THIS STANDARD FOR STRUCTURAL AND CORROSION CHARACTERISTICS.
3. USE RODDING OR OTHER RESTRAINT DEVICE ONLY WHERE SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC UTILITIES.

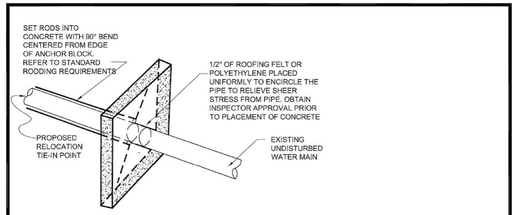
VALVE SIZE	NUMBER OF 3/4" DIA RODS REQUIRED
3"	2
4"	2
6"	2
8"	2
10"	4
12"	6
16"	8
20"	12
24"	16
30"	20

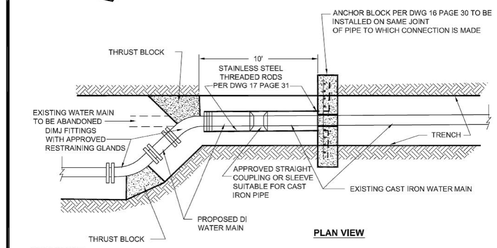
NOT TO SCALE

REVISIONS

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 DICSM UPDATE	SDC

RODDING — DWG. NO. 17 — PAGE 31





PLAN VIEW

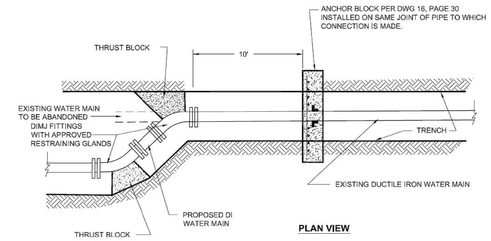
PROCEDURE:
1. CONSTRUCT ANCHOR BLOCK AT LEAST **SEVEN (7) DAYS** PRIOR TO WATER TIE-IN. (3 DAYS USING HIGH EARLY STRENGTH CONCRETE)
2. OBTAIN CITY APPROVAL OF ANCHOR BLOCK AND SCHEDULE DATE OF TIE-IN.
3. EXCAVATE AND ASSEMBLE ALL FITTINGS PRIOR TO WATER SHUTDOWN.
4. OBTAIN CITY APPROVAL OF PREARRANGED FITTINGS.
5. **CITY** SHALL TURN OFF THE WATER; CONTRACTOR SHALL DISINFECT PIPE PER REPAIR PROCEDURES.
6. CONNECT AND INSTALL PRE-ASSEMBLED ARRANGEMENT WITH ALL JOINTS RESTRAINED.
7. POUR CONCRETE AND REACTION BLOCKS. ALLOW **FOUR HOUR** SETTING TIME BEFORE BACKFILLING.
8. CITY RESTORES WATER SERVICE AND CHECKS FOR LEAKS BEFORE BACKFILLING IS COMPLETED BY THE CONTRACTOR.
9. ALL BACKFILL MATERIAL WITHIN 10' OF A CONCRETE ANCHOR TO BE COMPACTED TO 95% THEORETICAL DENSITY AS DETERMINED BY ASTM D 698, WITH 6" MAXIMUM LIFTS.

NOT TO SCALE

REVISIONS

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 DICSM UPDATE	SDC
2.	01/30/09	MODIFY TEXT	SDC

WATER MAIN TIE-IN TO EXISTING CAST IRON — DWG. NO. 20 — PAGE 34



PLAN VIEW

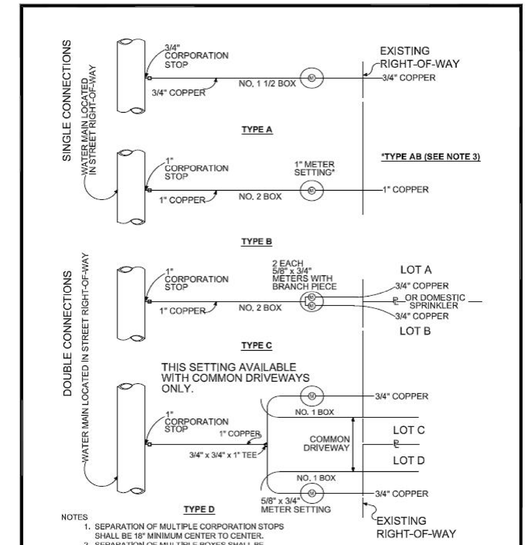
PROCEDURE:
1. CONSTRUCT ANCHOR BLOCK AT LEAST **SEVEN (7) DAYS** PRIOR TO WATER TIE-IN. (3 DAYS USING HIGH EARLY STRENGTH CONCRETE)
2. OBTAIN CITY APPROVAL OF ANCHOR BLOCK AND SCHEDULE DATE OF TIE-IN.
3. EXCAVATE AND ASSEMBLE ALL FITTINGS PRIOR TO WATER SHUTDOWN.
4. OBTAIN CITY APPROVAL OF PREARRANGED FITTINGS.
5. **CITY** SHALL TURN OFF THE WATER; CONTRACTOR SHALL DISINFECT PIPE PER REPAIR PROCEDURES.
6. CONNECT AND INSTALL PRE-ASSEMBLED ARRANGEMENT WITH ALL JOINTS RESTRAINED.
7. POUR CONCRETE AND REACTION BLOCKS. ALLOW **FOUR HOUR** SETTING TIME BEFORE BACKFILLING.
8. CITY RESTORES WATER SERVICE AND CHECKS FOR LEAKS BEFORE BACKFILLING IS COMPLETED BY THE CONTRACTOR.
9. ALL BACKFILL MATERIAL WITHIN 10' OF A CONCRETE ANCHOR TO BE COMPACTED TO 95% THEORETICAL DENSITY AS DETERMINED BY ASTM D 698, WITH 6" MAXIMUM LIFTS.

NOT TO SCALE

REVISIONS

NO.	DATE	DESCRIPTION	INIT.
1.	02/09/09	NEW DETAIL	SDC

WATER MAIN TIE-IN TO EXISTING DUCTILE IRON — DWG. NO. 20A — PAGE 34A

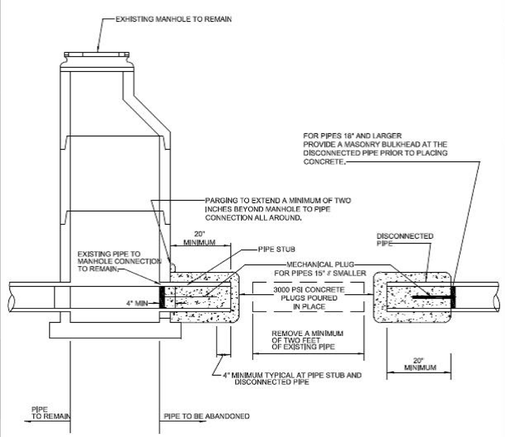


NOTES
1. SEPARATION OF MULTIPLE CORPORATION STOPS SHALL BE 18" MINIMUM CENTER TO CENTER.
2. SEPARATION OF MULTIPLE BOXES SHALL BE 3-4" MINIMUM CENTER TO CENTER.
3. TO ADAPT 5/8" x 3/4" METER TO 1" YOKE SPECIFY **TYPE AB**

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 DICSM UPDATE	SDC

5/8" x 3/4" AND 1" WATER SERVICE LAYOUTS — DWG. NO. 28 — PAGE 42

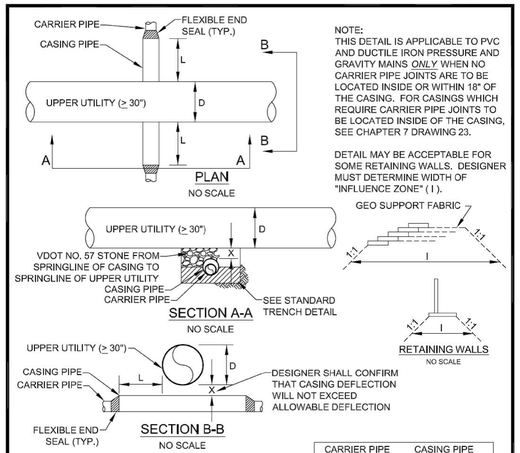


NOT TO SCALE

REVISIONS

NO.	DATE	DESCRIPTION	INIT.
1.	9/21/04	2004 DICSM UPDATE	SDC

SANITARY SEWER PIPE ABANDONMENT AT A MANHOLE — DWG. NO. 43 — PAGE 57



NOTE:
THIS DETAIL IS APPLICABLE TO PVC AND DUCTILE IRON PRESSURE AND GRAVITY MAINS *ONLY* WHEN NO CARRIER PIPE JOINTS ARE TO BE LOCATED INSIDE OR WITHIN 18" OF THE CASING. FOR CASINGS WHICH REQUIRE CARRIER PIPE JOINTS TO BE LOCATED INSIDE OF THE CASING, SEE CHAPTER 7 DRAWING 23.

DETAIL MAY BE ACCEPTABLE FOR SOME RETAINING WALLS. DESIGNER MUST DETERMINE WIDTH OF "INFLUENCE ZONE" (I).

NOTES:
1. D = DIAMETER OF UPPER UTILITY (≥30")
2. X = VERTICAL SEPARATION
3. L = LENGTH OF CASING EXTENSION
4. L = X + D
5. MINIMUM CASING LENGTH = 8'
6. DESIGNER TO SUBMIT STEEL CASING CALCULATIONS PER AWWA M11 UPON REQUEST.
7. DESIGN OF PVC MAINS IN CASINGS SHALL BE IN ACCORDANCE WITH THE UNI-BELL HANDBOOK.
8. CASING DESIGNS SHALL PROVIDE A 20' CLEAR ACCESS AREA TO ALLOW PIPE REMOVAL

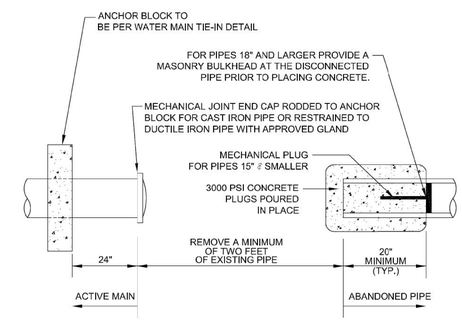
CARRIER PIPE SIZE, (IN.)	CASING PIPE SIZE, (IN.)
4	8
6	10
8	12
10	14
12	16

DESIGNS OF CASINGS FOR CARRIER PIPES LARGER THAN 12" SHALL BE SUBMITTED TO THE DIRECTOR FOR REVIEW AND APPROVAL.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/24/04	2004 DICSM UPDATE	SDC
2.	02/22/06	P.U. MODIFICATIONS	DHG

MODIFIED CASING FOR LARGE UTILITY CROSSINGS — DWG. NO. 55 — PAGE 69

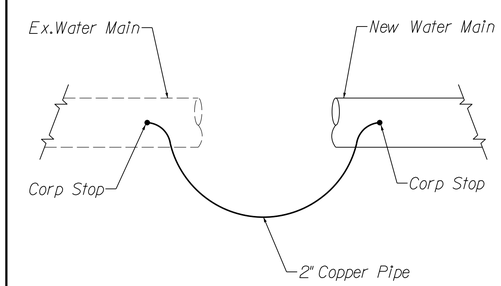


NOTE: IN ALL CASES WHERE A SECTION OF ABANDONED WATER LINE IS TO BE CUT AND REMOVED THE EXPOSED ENDS SHALL BE SEALED PER "ABANDONED PIPE" DETAIL ABOVE.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/24/04	2004 DICSM UPDATE	SDC

TYPICAL WATERMAIN ABANDONMENT DETAIL — DWG. NO. 56 — PAGE 70



Notes:
1. Use 1" Corp Stop for 8" pipe and smaller. Use 2" Corp Stop for 12" pipe.
2. Place Corp Stops near tie-in point so connecting copper pipe is no more than 10 feet in length.

Temporary Water Main Testing Detail
Not To Scale

SCALE 0 25' 50' — PROJECT UPC# 101219 — SHEET NO. 15(E)

THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

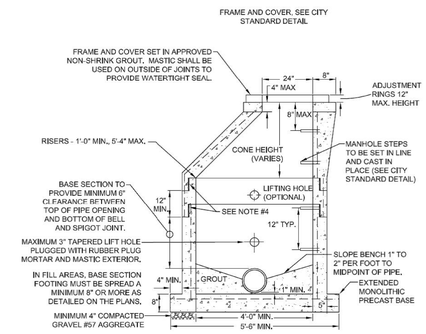
PROJECT MANAGER _City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY _Bloker Design Associates (703) 368-7373
DESIGN SUPERVISED BY _McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE _City of Harrisonburg Public Utilities (540) 434-9959

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(F)

WATER & SEWER TYPICAL DETAILS

1. MANHOLE TO MEET CURRENT REQUIREMENTS OF ASTM C-478.
2. ALL REINFORCING TO MEET CURRENT REQUIREMENTS OF ASTM A-615.
3. CONCRETE TO BE CLASS A-4.
4. JOINT TO MEET CURRENT REQUIREMENTS OF ASTM C-443.
5. PIONEER 301 MASTIC OR APPROVED EQUAL SHALL BE USED IN ADDITON TO THE JOINT SPECIFIED.
6. INVERT SHAPING TO CONFORM TO CITY STANDARD DETAIL.
7. FLEXIBLE JOINTS, MEETING CURRENT REQUIREMENTS OF ASTM C-923, ARE REQUIRED ON ALL PIPE CONNECTIONS TO MANHOLES. WHERE FIELD CONDITIONS WILL NOT PERMIT THE USE OF A SLEEVE, A MAXIMUM 24" STUB MAY BE USED.
8. JOINT CONFIGURATION MAY BE CAST BELL-UP OR SPIGOT-UP.
9. MANUFACTURER'S NAME TO BE ON INSIDE FACE OF CONE.
10. EXTERIOR OF MANHOLE TO BE ASPHALT-COATED. TWO (2) COATS REQUIRED.

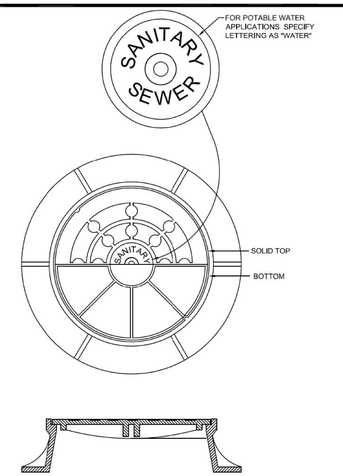


NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG
2.	05/15/09	UPDATE ASTM REFERENCES	SDC

4'-0" I.D. SANITARY SEWER MANHOLE

DWG. NO. 35
PAGE 49



NOTES:

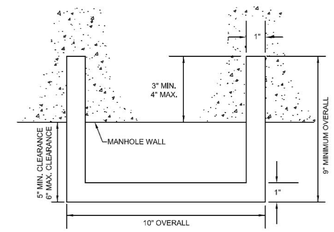
1. REFER TO PUBLIC UTILITIES PRODUCT MANUAL FOR APPROVED FRAME AND COVERS
2. FRAME AND COVER TO BE RATED FOR HIGHWAY TRAFFIC LOADS (HS-20)

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG
2.	2/22/06	VDEQ REVIEW COMMENTS	DHG

MANHOLE FRAME AND LID

DWG. NO. 38
PAGE 52



PLAN

NOTES:
1. APPROVED PLASTIC COATED STEEL REINFORCED MANHOLE SAFETY STEP (SEE PUBLIC UTILITIES PRODUCT MANUAL).
2. MANHOLE STEPS TO BE CAST IN PLACE AND ORIENTED IN A SINGLE VERTICAL LINE UNLESS OTHERWISE APPROVED.

NOT TO SCALE

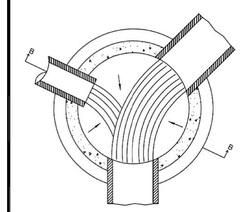
NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG

MANHOLE STEP DETAIL

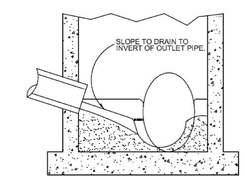
DWG. NO. 39
PAGE 53

NOTES:

1. MANHOLE TO BE FORMED AND CONSTRUCTED IN ACCORDANCE WITH THE APPLICABLE STANDARD OR SPECIAL DRAWING. THE INVERT SHAPING AS DETAILED HEREON IS TO CONSIST OF PORTLAND CEMENT CONCRETE MIX CONFORMING TO CLASS A-3 OR CLASS C-1, EXCEPT THAT 25% OF COURSE AGGREGATE MAY BE UP TO 4" IN DIAMETER AND CONSIST OF STONE, BROKEN BRICK, BROKEN CONCRETE, OR BROKEN CONCRETE BLOCK. THE SURFACE SHALL BE LEFT SMOOTH BY MEANS OF HAND TROWELLING. NONE OF THE COARSE AGGREGATE SHALL REMAIN EXPOSED. BENCHES ARE TO HAVE A LIGHT BROOM FINISH.
2. DETAILS OF INVERT SHAPING AS SHOWN HEREON ARE FOR EXAMPLE PURPOSES ONLY. EACH MANHOLE IS TO BE SHAPED INDIVIDUALLY TO BEST FIT THE PARTICULAR INLET AND OUTLET CONFIGURATION AND FLOW LINES.



PLAN



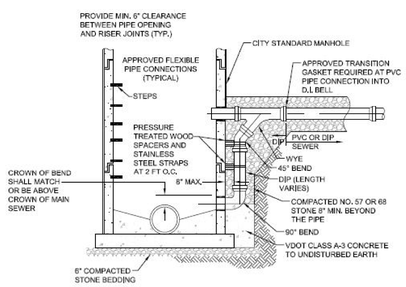
SECTION B-B

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	SDC

SANITARY SEWER MANHOLE INVERT SHAPING

DWG. NO. 40
PAGE 54



NOTES:

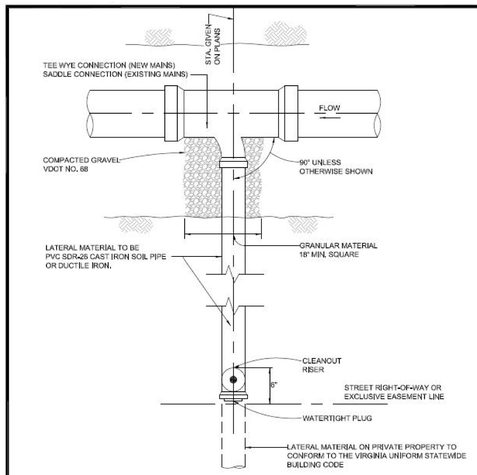
1. SEE APPLICABLE STANDARD DRAWINGS FOR ALL MANHOLE REQUIREMENTS.
2. USE DROP CONNECTION WHEN DROP EXCEEDS TWO FEET.
3. PIPE AND FITTINGS FOR DROP TO BE SAME SIZE AS INCOMING SEWER.
4. DROP CONNECTION MAY NOT INTERFERE WITH MANHOLE STEPS.
5. VDOT CLASS A-3 CONCRETE TO FILL DROP CONNECTION TRENCH TO LIMITS SHOWN. DROP CONNECTION CONCRETE WIDTH TO BE THE SAME AS APPROACH TRENCH.
6. MATERIAL SEE PUBLIC UTILITIES PRODUCT MANUAL.
7. STRAPS TO BE 2" WIDE X 1/8" THICK **STAINLESS STEEL**, ANCHORED TO MANHOLE WALL WITH 1/2" **STAINLESS STEEL** ANCHOR BOLTS, EMBEDDED 2 1/2" MINIMUM INTO THE WALL.
8. ALL DROP PIPE AND FITTINGS MUST BE DUCTILE IRON FOR THIS DESIGN.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	7/01/04	2004 D/CSM UPDATE	DHG

OUTSIDE DROP CONNECTION ALTERNATE A

DWG. NO. 44A
PAGE 58A



PLAN VIEW
(4" CONNECTION SHOWN)

NOTES:

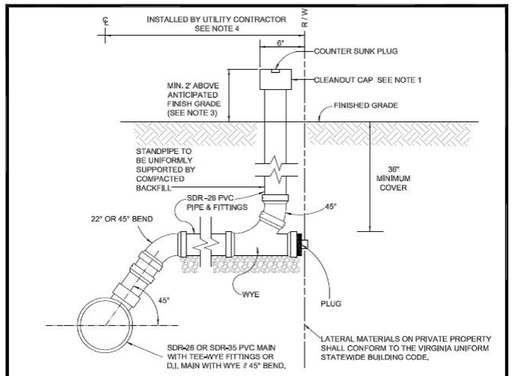
1. UNLESS OTHERWISE APPROVED BY THE DIRECTOR, NO SIX INCH LATERALS WILL BE PERMITTED TO CONNECT TO SEWER MAINS, EXCEPT BY INSTALLATION OF A MANHOLE.
2. WHERE SIDEWALK IS TO BE CONSTRUCTED, THE CLEANOUT SHALL BE BETWEEN THE SIDEWALK AND RIGHT-OF-WAY LINE.
3. SEE CHAPTER 4 AND PUBLIC UTILITIES PRODUCT MANUAL.

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/22/04	2004 D/CSM UPDATE	SDC

SANITARY SEWER LATERAL PLAN

DWG. NO. 48
PAGE 62



ELEVATION
(4" CONNECTION SHOWN)

NOTES:

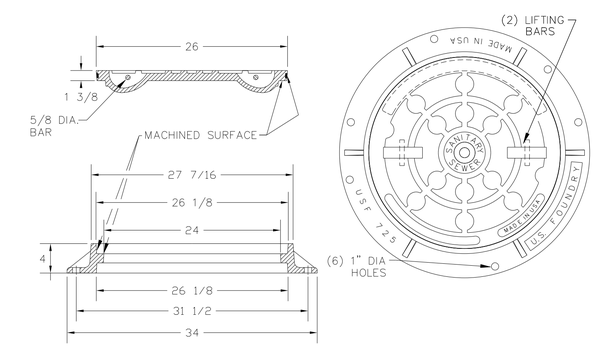
1. CLEANOUT CAP SHALL BE AN APPROVED 4" CAST IRON CAP WITH A BRASS COUNTER-SUNK PLUG. PLASTIC PLUGS ARE NOT PERMITTED. (SEE PUBLIC UTILITIES PRODUCT MANUAL)
2. THIS DETAIL APPLIES TO CLEANOUTS NOT SUBJECT TO TRAFFIC LOADING. (SEE CITY STANDARD "HEAVY DUTY SEWER LATERAL CLEANOUT" FOR TRAFFIC LOCATIONS)
3. THE SEWER LATERAL AND CLEANOUT SHALL BE INSTALLED WITHIN THE RIGHT-OF-WAY OR EASEMENT AS SHOWN ABOVE BY UTILITY CONTRACTOR, PLUGGED AND STAKED. THE PLUMBER SHALL INSTALL THE SEWER LATERAL TO THE BUILDING AND SHALL ADJUST CLEANOUT TO FINISH GRADE.
4. CITY FORCES BECOME THE UTILITY CONTRACTOR WHEN TAPPING INTO AN EXISTING ACTIVE SEWER MAIN. WHERE TEE-WYE FITTINGS ARE NOT AVAILABLE FOR CONNECTION OF A PROPOSED 4" SEWER LATERAL, CITY FORCES SHALL MAKE THE TAP TO THE ACTIVE MAIN USING AN APPROVED SADDLE.
5. **4" DIAMETER PRECAST MANHOLE REQUIRED AT PUBLIC MAIN CONNECTION FOR 6" LATERALS.**

NOT TO SCALE

NO.	DATE	DESCRIPTION	INIT.
1.	9/22/04	2004 D/CSM UPDATE	SDC
2.	02/22/06	P.U. MODIFICATIONS	DHG

SANITARY SEWER LATERAL (PROFILE)

DWG. NO. 49
PAGE 63



NOTES: 1. BASED ON US FOUNDRY MODEL USF 725.
2. DIMENSIONS SHOWN ARE IN INCHES.

SHALLOW HEIGHT FRAME & COVER
Not to Scale

SCALE 0 25' 50'

PROJECT UPC* 101219

SHEET NO. 15(F)

THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER _City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY _Bloker Design Associates (703) 368-7373
DESIGN SUPERVISED BY _McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE _City of Harrisonburg Public Utilities (540) 434-9959

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	15(G)

WATER & SEWER TYPICAL DETAILS

Schedule for Minimum Restrained Length of Pipe

L (feet)

Pipe Size (inches)	11.25°			22.5°			45°			90°			Reducer	Dead End or Valve
	Horiz.	Vert. Up	Vert. Down	Horiz.	Vert. Up	Vert. Down	Horiz.	Vert. Up	Vert. Down	Horiz.	Vert. Up	Vert. Down		
6	2	2	4	4	4	8	8	8	16	18	18	39	10	20
8	3	3	6	5	5	11	10	10	22	24	24	52	11	26
10	3	3	7	6	6	13	12	12	26	29	29	63	11	32
12	4	4	8	7	7	15	14	14	31	34	34	75	11	38

NOTES:

1. CONTRACTOR SHALL RESTRAIN ALL FITTINGS. PIPE LENGTH IN SCHEDULE DESIGNATES THE LENGTH IN FEET TO BE RESTRAINED ON EACH SIDE OF THE FITTING.

2. ALL JOINTS ON BOTH SIDES OF THE FITTING SHALL BE RESTRAINED FOR THE LENGTH SHOWN.

3. RESTRAINED LENGTHS SHOWN IN CHART WERE CALCULATED USING THE THRUST RESTRAINT DESIGN PROGRAM DEVELOPED BY THE DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) AND WERE BASED ON THE FOLLOWING: 3 FEET OF PIPE COVER, DUCTILE IRON PIPE AT TEST PRESSURE OF 150 PSI, SOIL TYPE CLAY 2, LAYING CONDITION 5, AND A SAFETY FACTOR OF 1.5. IF FIELD CONDITIONS DIFFER FROM THOSE LISTED, CONTRACTOR SHALL CONTACT THE CITY INSPECTOR AND ENGINEER TO DETERMINE REQUIRED RESTRAINED LENGTH.

4. THRUST RESTRAINTS SHALL BE SUITABLE FOR A WORKING PRESSURE OF 250 PSI AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION.

5. PIPE ADJACENT TO TEES SHALL BE RESTRAINED BASED ON RESTRAINED LENGTH FOR 90° HORIZONTAL BENDS.

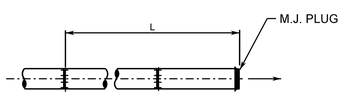
6. REDUCERS SHALL BE RESTRAINED ON THE LARGER PIPE AS INDICATED IN THIS SCHEDULE.

7. FOR IN-LINE VALVES, RESTRAIN JOINTS ON BOTH SIDES OF THE VALVE.

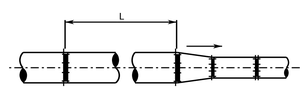
8. IF A CASING PIPE FALLS WITHIN THE RESTRAINED LENGTH "L", THE REQUIRED RESTRAINED LENGTH SHALL BE INCREASED BY THE LENGTH OF THE CASING.

9. RESTRAINT OF EXISTING WATER MAIN AT AND NEAR CONNECTION POINTS AND PLUGS SHALL BE IN ACCORDANCE WITH CITY STANDARDS.

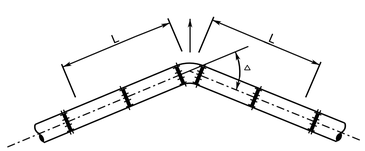
10. WHERE LENGTHS ON THIS SCHEDULE DIFFER FROM OTHER DETAILS ON THE PLANS, THE MOST STRINGENT SHALL APPLY.



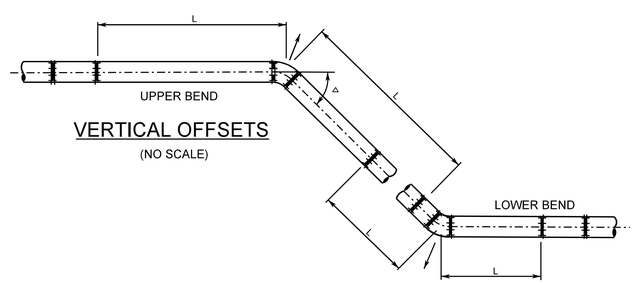
DEAD END
(NO SCALE)



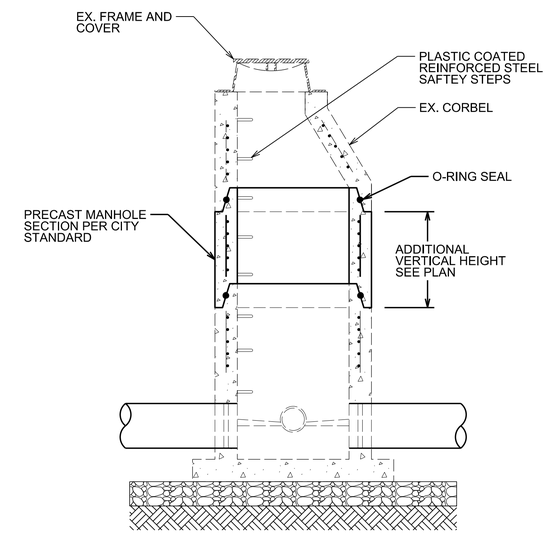
REDUCER
(NO SCALE)



HORIZONTAL BENDS
(NO SCALE)



VERTICAL OFFSETS
(NO SCALE)



EX. MANHOLE
HEIGHT ADJUSTMENT
(NO SCALE)

NOTES:

1. CONTRACTOR TO VERIFY EX. MANHOLE CONSTRUCTION AND DIMENSIONS BEFORE ORDERING MATERIAL.

2. TWO (2) COATS OF SEALER SHALL BE APPLIED ON JOINTS AND SEAMS.

3. CITY INSPECTOR SHALL BE ON SITE FOR ALL MANHOLE REHABILITATION WORK.

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	15(G)

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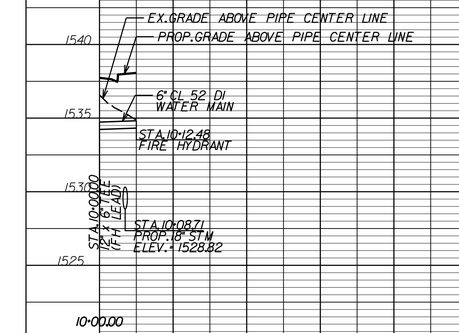
PROJECT MANAGER City of Harrisonburg Public Works (540) 434-5928
SURVEYED BY, DATE Bloker Design Associates (703) 368-7373
DESIGN BY McCormick Taylor Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

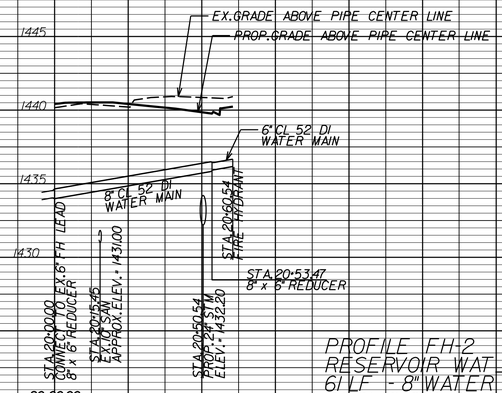
FIRE HYDRANT PROFILES

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	15(H)

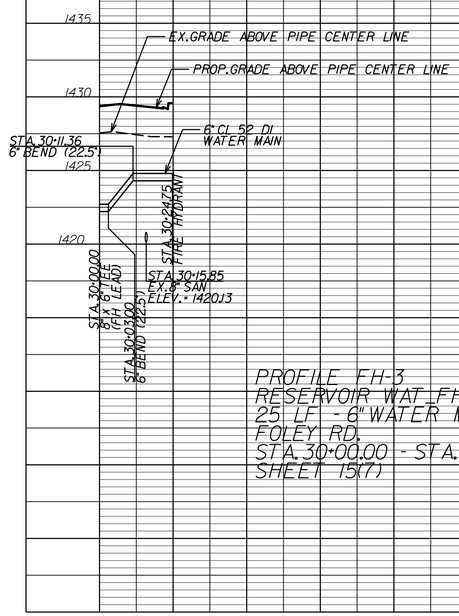
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



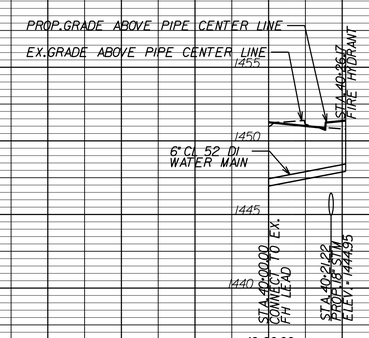
PROFILE FH-1
RESERVOIR WAT_FH_1
13 LF - 6" WATER MAIN
RESERVOIR STREET
STA.10+00.00 - STA.10+12.48
SHEET 15(3)



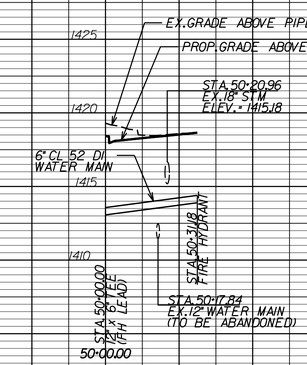
PROFILE FH-2
RESERVOIR WAT_FH_2
61 LF - 8" WATER MAIN
RESERVOIR STREET
STA.20+00.00 - STA.20+60.54
SHEET 15(6)



PROFILE FH-3
RESERVOIR WAT_FH_3
25 LF - 6" WATER MAIN
FOLEY RD.
STA.30+00.00 - STA.30+24.75
SHEET 15(7)



PROFILE FH-4
RESERVOIR WAT_FH_4
27 LF - 6" WATER MAIN
RESERVOIR STREET
STA.40+00.00 - STA.40+26.17
SHEET 15(9)



PROFILE FH-5
RESERVOIR WAT_FH_5
32 LF - 6" WATER MAIN
UNIV. BLVD. WEST
STA.50+00.00 - STA.50+31.18
SHEET 15(11)

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC# 101219	15(H)

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PROJECT MANAGER City of Harrisonburg Public Works (540) 434-5928
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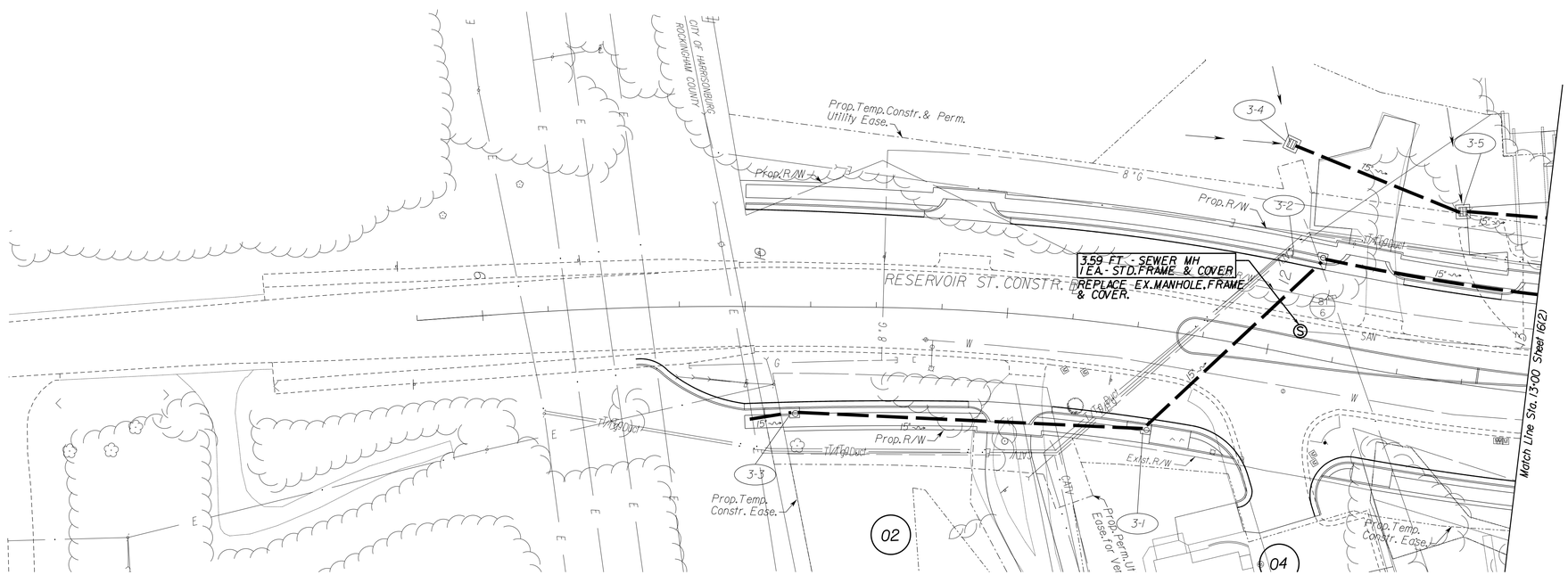
DESIGN BY McCormick Taylor, Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	16(3)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(3)
Water/Sewer Details	15(C) - 15(G)

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	16(3)

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Plotted By: localuser

THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

PROJECT MANAGER City of Harrisonburg Public Works (540) 434-5928
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DESIGN BY McCormick Taylor, Inc. (540) 248-0436
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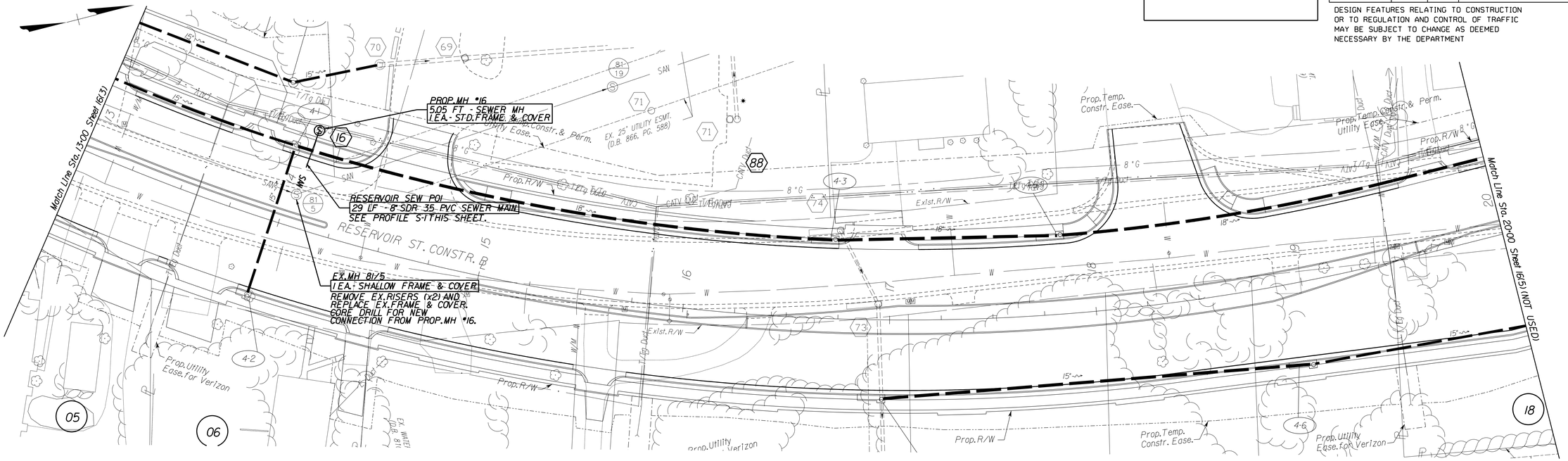
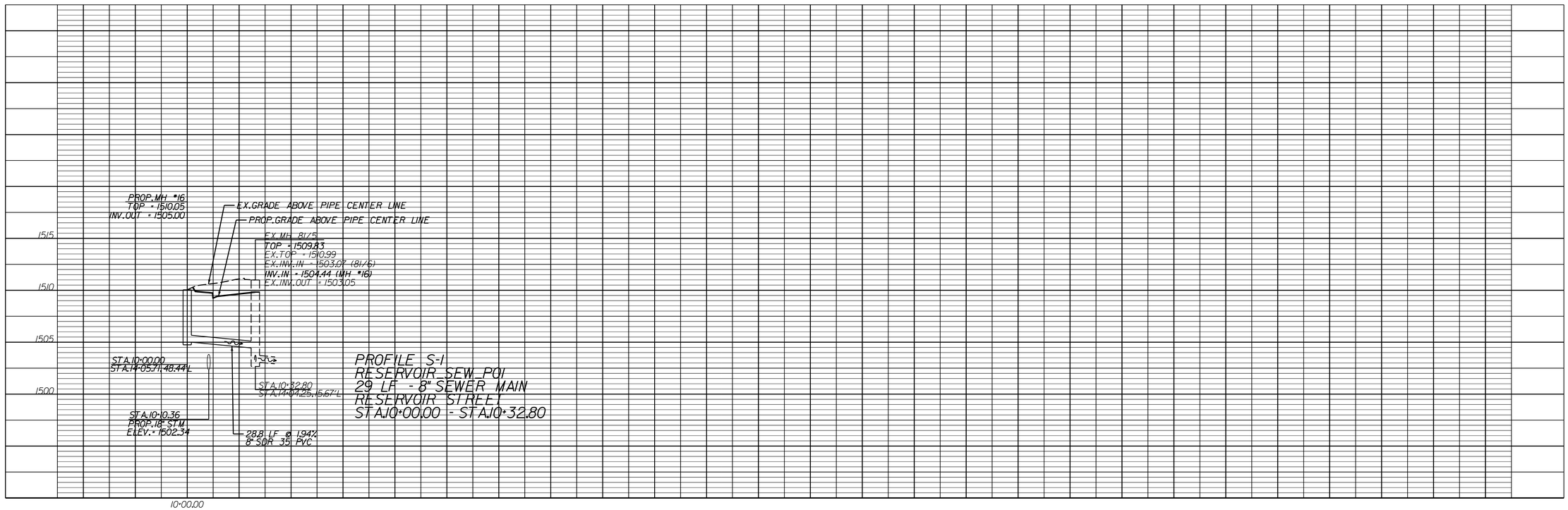
REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(4)
Water/Sewer Details	15(C) - 15(G)

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	16(4)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT





SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	16(4)

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SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

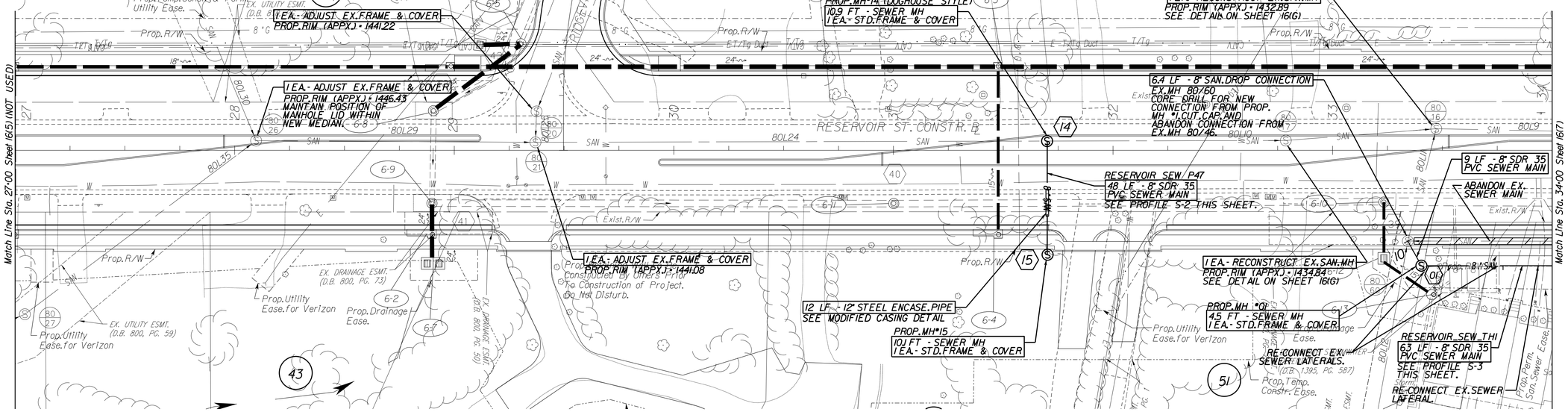
REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(6)
Water/Sewer Details	15(C) - 15(G)

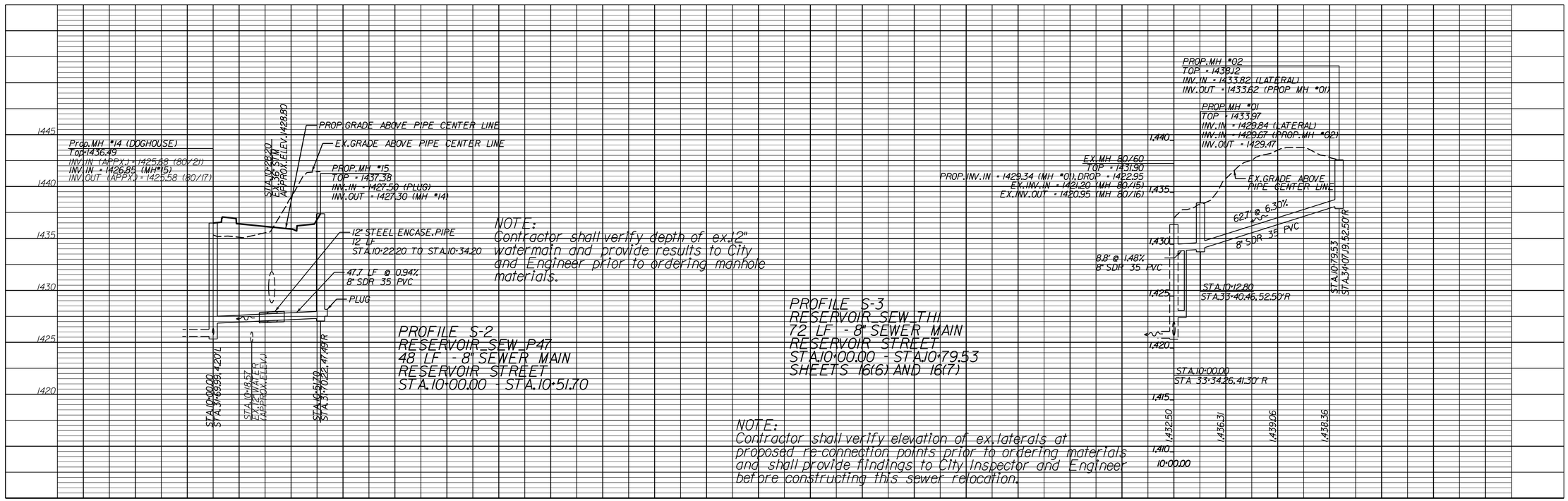
Contractor's Notes:

1. Manholes to be core drilled shall be done so in the presence of City Utility Inspector.
2. Contractor shall verify physical characteristics and condition of ex. sanitary pipe and provide results to City and Engineer prior to ordering doghouse manhole materials.
3. Contractor to verify ex. manhole construction and dimensions before ordering height adjustment material.

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	16(6)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT





NOTE:
Contractor shall verify depth of ex.12" watermain and provide results to City and Engineer prior to ordering manhole materials.

PROFILE S-2
RESERVOIR_SEW_P47
48 LF - 8" SEWER MAIN
RESERVOIR STREET
STA.10+00.00 - STA.10+51.70

PROFILE S-3
RESERVOIR_SEW_TH1
72 LF - 8" SEWER MAIN
RESERVOIR STREET
STA.10+00.00 - STA.10+79.53
SHEETS 16(6) AND 16(7)

NOTE:
Contractor shall verify elevation of ex. laterals at proposed re-connection points prior to ordering materials and shall provide findings to City Inspector and Engineer before constructing this sewer relocation.

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC# 101219	16(6)

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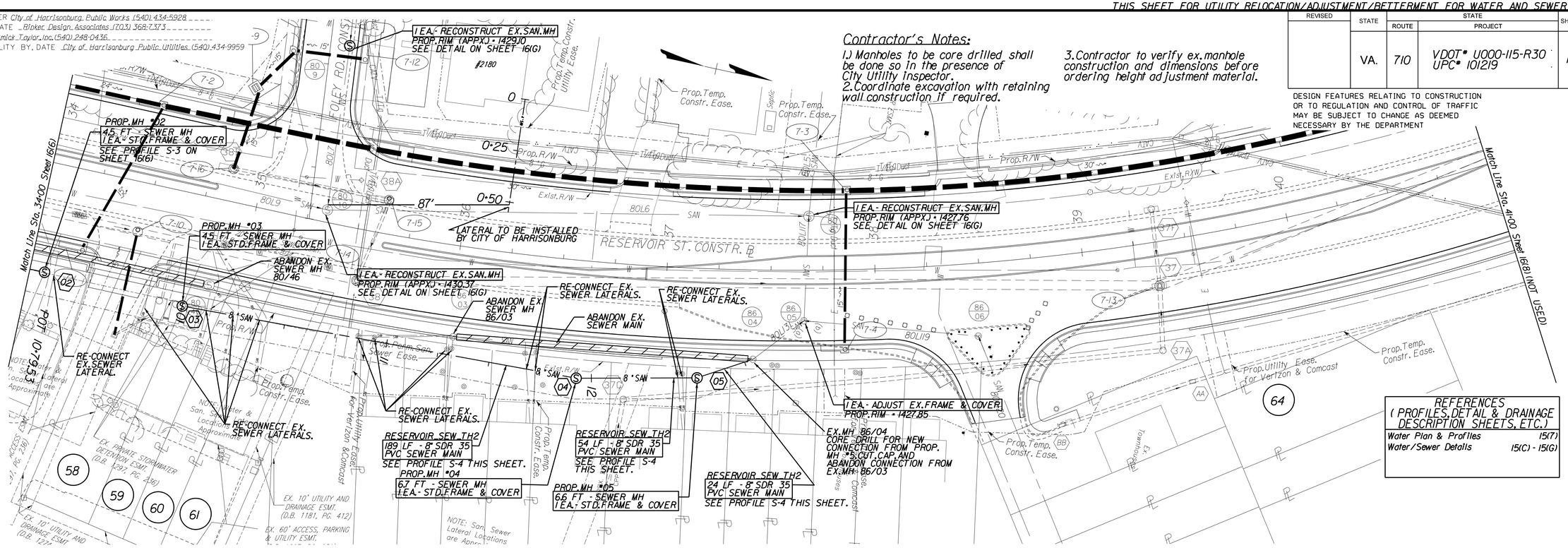
REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	16(7)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Contractor's Notes:

1.) Manholes to be core drilled shall be done so in the presence of City Utility Inspector.
2. Coordinate excavation with retaining wall construction if required.
3. Contractor to verify ex. manhole construction and dimensions before ordering height adjustment material.



REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)

Water Plan & Profiles	15(7)
Water/Sewer Details	15(C) - 15(G)

PROFILE S-4
RESERVOIR_SEW_TH2
267 LF - 8" WATER MAIN
RESERVOIR STREET
STA.10+00.00 - STA.12+79.22

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC# 101219	16(7)

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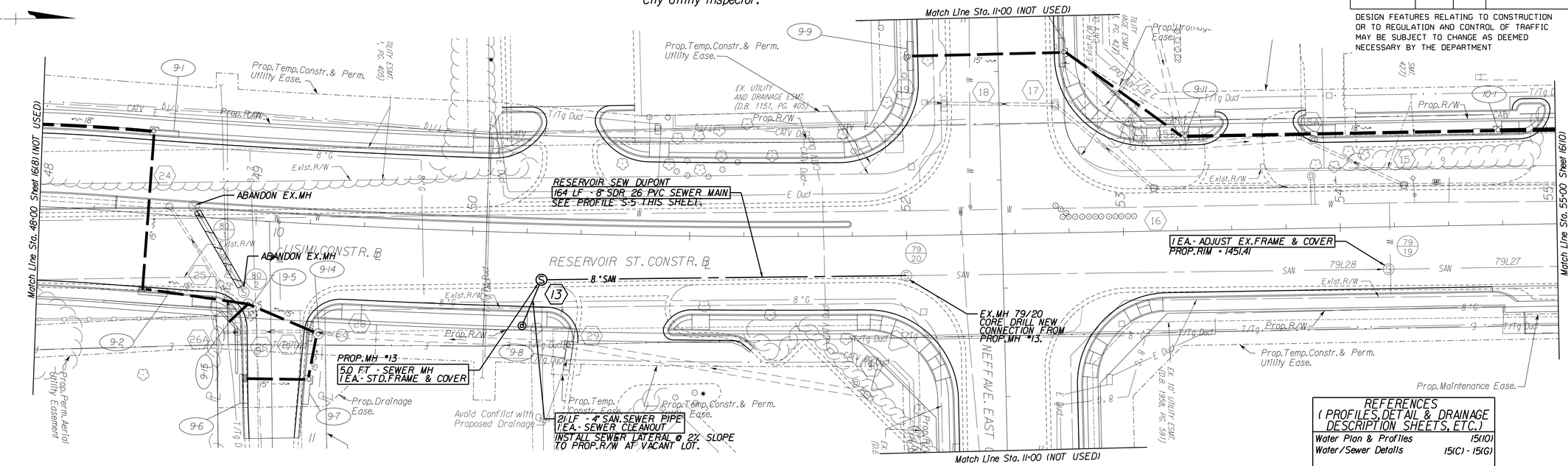
REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT# U000-115-R30 UPC# 101219	16(9)

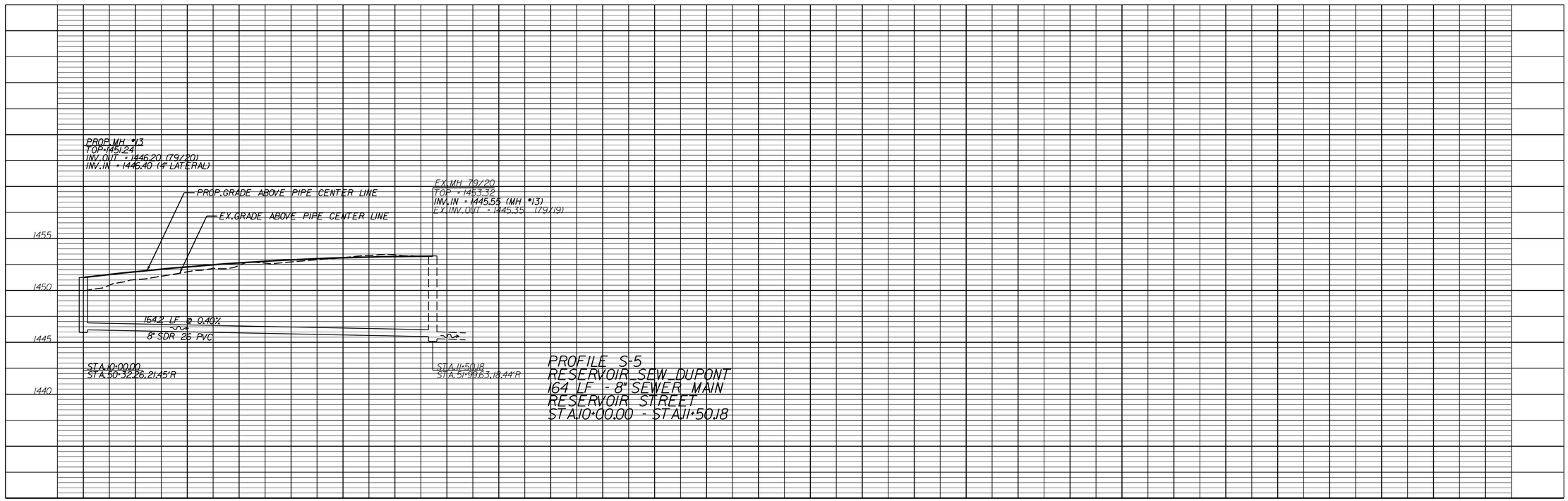
DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

Contractor's Notes:

1.) Manholes to be core drilled shall be done so in the presence of City Utility Inspector.



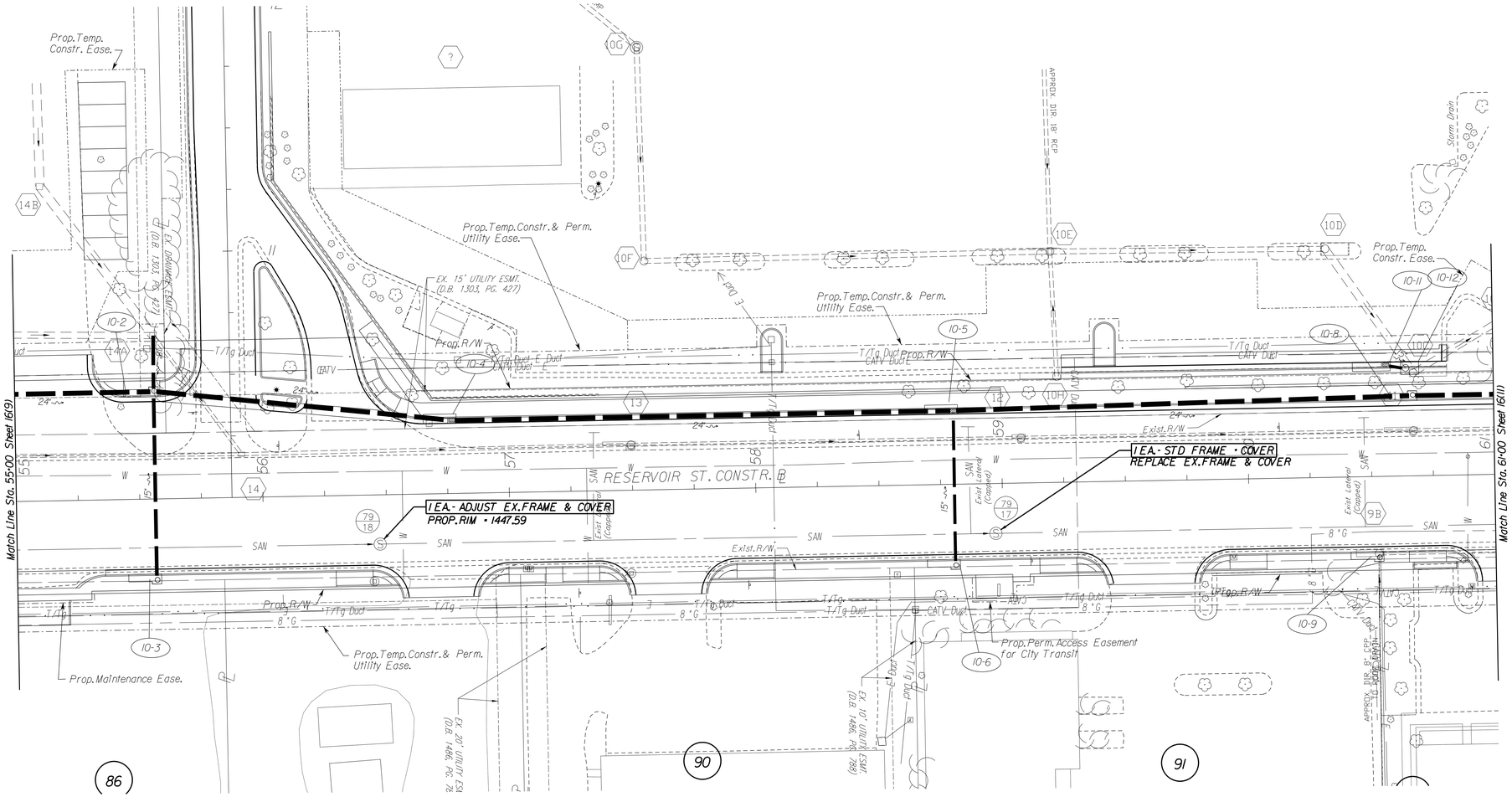
REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(10)
Water/Sewer Details	15(C) - 15(G)



PROFILE S-5
RESERVOIR SEW DUPONT
164 LF - 8" SEWER MAIN
RESERVOIR STREET
STA.10+00.00 - STA.11+50.18

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC# 101219	16(9)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(10)
Water/Sewer Details	15(C) - 15(G)

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC# 101219	16(10)

THIS SHEET FOR UTILITY RELOCATION/ADJUSTMENT/BETTERMENT FOR WATER AND SEWER ONLY

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DESIGN BY McCormick Taylor, Inc. (540) 248-0436
SUBSURFACE UTILITY BY, DATE City of Harrisonburg Public Utilities (540) 434-9959

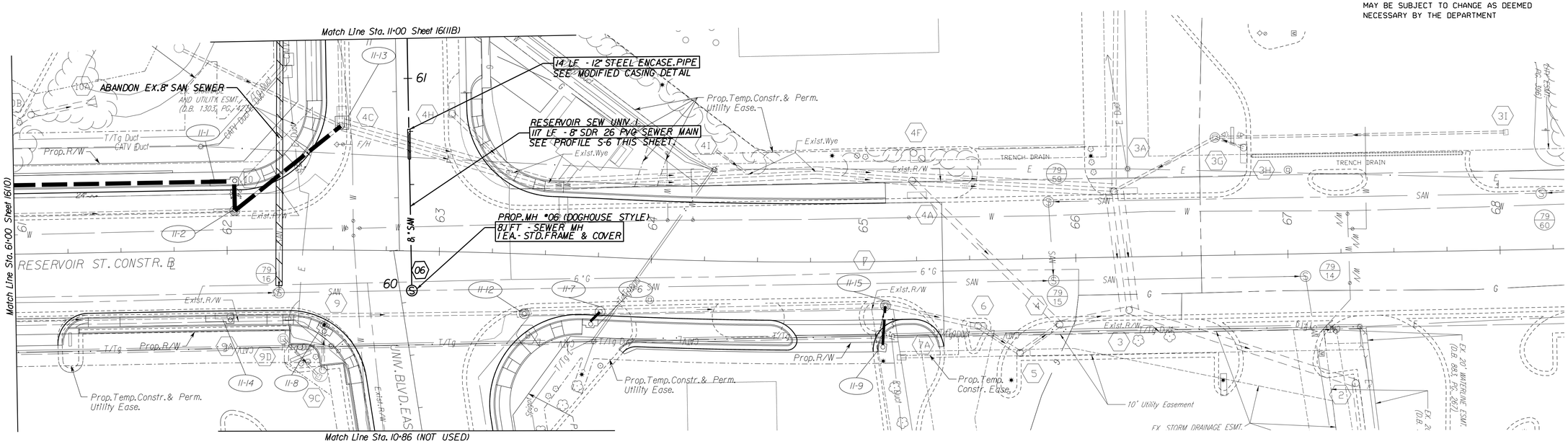
Contractor's Notes:

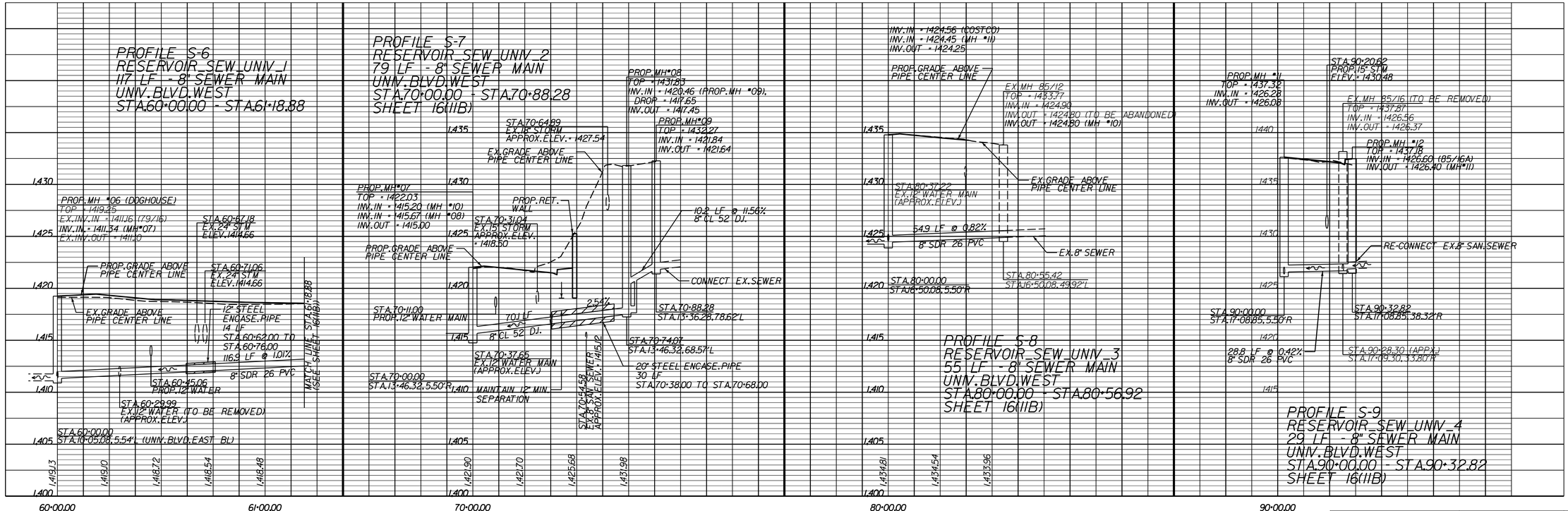
1.) Contractor shall verify physical characteristics and condition of ex. sanitary pipe and provide results to City and Engineer prior to ordering doghouse manhole materials.

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(11)
Water/Sewer Details	15(C) - 15(G)

REVISED	STATE	ROUTE	PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	16(11)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT





SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	16(11)

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REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
Water Plan & Profiles	15(IIB)
Water/Sewer Details	15(C) - 15(G)

NOTE: Costco parking spaces within Temp. Constr. Ease. to remain open and available for Costco parking and unencumbered by construction activity, to the greatest extent possible, during the following weeks:
--First Saturday before July 4th through first Saturday afterwards
--Third Thursday in November through First Monday in January

REVISED	STATE	ROUTE	STATE PROJECT	SHEET NO.
	VA.	710	VDOT* U000-115-R30 UPC* 101219	16(IIB)

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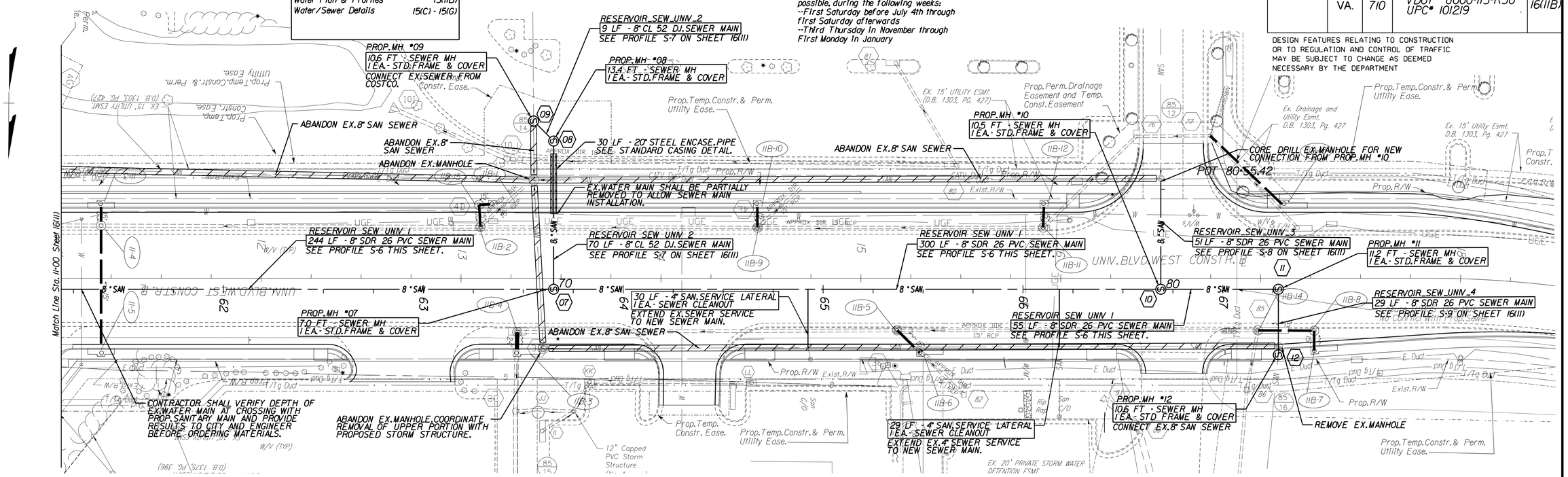

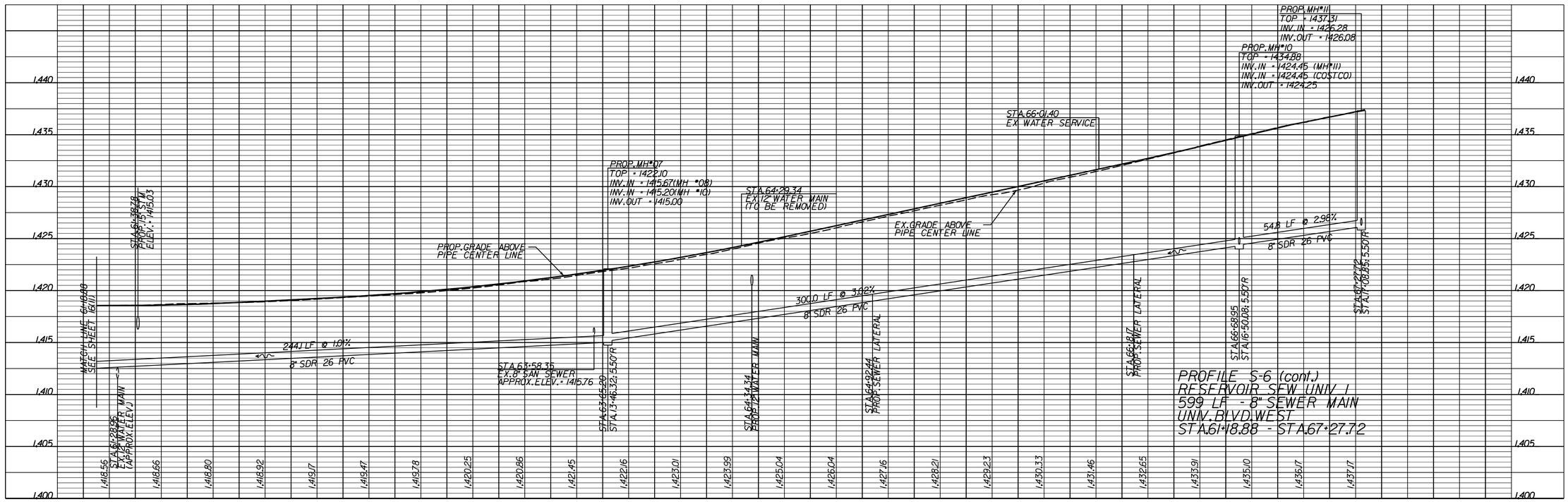

SCALE	PROJECT	SHEET NO.
0 25' 50'	UPC* 101219	16(IIB)