BEDFORD REGIONAL WATER AUTHORITY

HELM STREET TANK REPLACEMENT

TOWN OF BEDFORD, VA

BRWA JOB# 2021-111

GENERAL INFORMATION

OWNER/DEVELOPER: BEDFORD REGIONAL WATER AUTHORITY
CONTACT: RHONDA B. ENGLISH, PE
1723 FALLING CREEK ROAD
BEDFORD, VA 24523
PHONE: (540) 586-7679

ENGINEER: WHITMAN REQUARDT, & ASSOCIATES, LLP
CONTACT: PAULA MOORE, PE
1700 KRAFT DRIVE, SUITE 1200
BLACKSBURG, VA 24060
PHONE: (540) 328-1114
FAX: (540) 951-3741

SOURCE OF SURVEY: LUMSDEN ASSOCIATES, P.C. ENGINEERS-SURVEYORS-PLANNERS
CONTACT: LARRY THOMAS OGLE, JR. LS#2459
4664 BRAMBLETON AVENUE P.O. BOX 20669
ROANOKE, VA 24018
PHONE: (540) 774-4411
FAX: (540) 772-9445

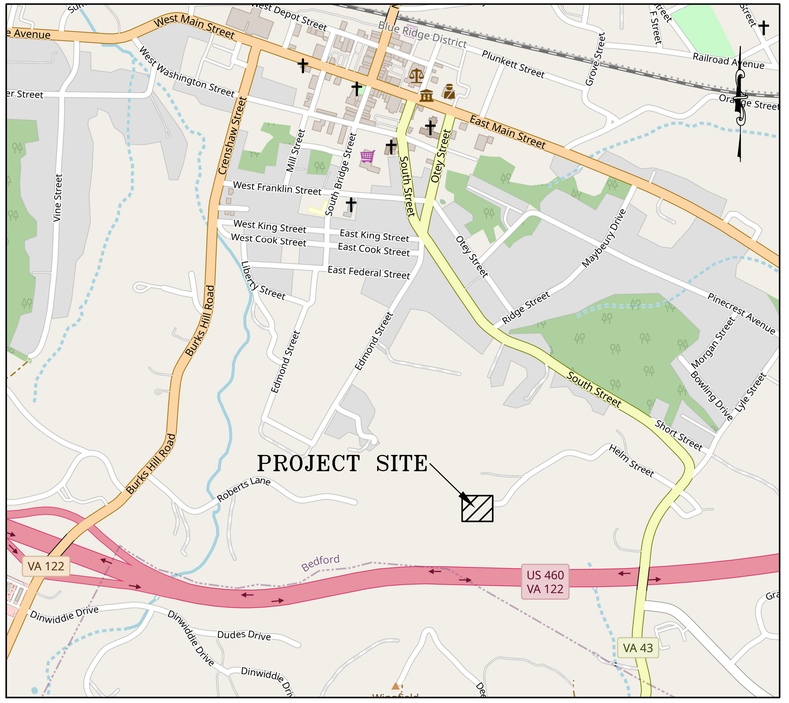
SOURCE OF TOPOGRAPHY: FIELD SURVEY BETWEEN 04/27/2022 – 05/11/2022

USGS DATUM: HORIZONTAL DATUM – VA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE NAD 83
VERTICAL CONTROL – NAVD 88

PARCEL ADDRESS: 900-902 HELM STREET, BEDFORD VA, 24523

PARCEL TAX NUMBER: 234 A 8 T

PARCEL INSTRUMENT NUMBER: 130007555 PLAT BOOK 56, PAGE 283



VICINITY MAP

SCALE - 1:12000

JANUARY 12, 2024

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NO.	DATE	BY	REVISIONS

N:\46626-003\CADD\46626030G-01.DWG

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
1/12/2024
PROFESSIONAL ENGINEER

SCALE:
HORIZ: AS SHOWN
VERT.: N/A
DATE: JANUARY 12, 2024
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
TITLE SHEET AND VICINITY MAP

SHEET 1 OF 30

DRAWING G-1

GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST EDITION OF THE BEDFORD REGIONAL WATER AUTHORITY (BRWA) MASTER SPECIFICATIONS, THE VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE STANDARDS, THE VIRGINIA DEPARTMENT OF HEALTH WATERWORKS REGULATIONS AND THE PROJECT MANUAL. IN CASE OF CONFLICT, THE MOST STRINGENT REQUIREMENT SHALL APPLY.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE BRWA CONSTRUCTION MANAGER AND INSPECTOR TO SCHEDULE A PRE-CONSTRUCTION MEETING AT LEAST 72 HOURS PRIOR TO STARTING ANY WORK ON THIS PROJECT. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS.

3. EXISTING UTILITIES ARE SHOWN ONLY IN APPROXIMATE LOCATIONS ON THE PLANS BASED ON AVAILABLE RECORDS AND FIELD SURVEYS. CONTRACTOR SHALL, ON HIS OWN INITIATIVE AND AT NO ADDITIONAL COST TO THE OWNER, LOCATE ALL UNDERGROUND LINES AND STRUCTURES, BY MEANS OF TEST HOLES OR OTHER APPROPRIATE METHODS, AS NECESSARY. CONTRACTOR SHALL CALL "MISS UTILITY" @ 811 PRIOR TO CONSTRUCTION. CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE AND REPAIR TO ANY UTILITY LINES OR STRUCTURES AS A RESULT OF NOT COMPLYING WITH THE VIRGINIA UNDERGROUND UTILITY DAMAGE PREVENTION ACT.

4. FINAL ACCEPTANCE BY THE BRWA SHALL NOT BE MADE UNTIL ALL WORK SHOWN ON CONTRACT DRAWINGS AND INCLUDED IN THE SPECIFICATIONS IS COMPLETED INCLUDING PAVING, GRADING, TESTING AND ALL REQUIRED ADJUSTMENTS.

5. THE OWNER WILL INSPECT ALL PIPELINES, AND APPURTENANCES THERETO, AS SHOWN ON THE APPROVED UTILITY PLANS, LOCATED WITHIN THE BWRA OWNED PARCEL.

6. CONTRACTOR SHALL RESTORE LIMITS OF WORK AND REINSTALL FENCING, LANDSCAPING, LIGHT AND POWER POLES, DITCHES, ETC. DISTURBED OR TEMPORARILY RELOCATED DURING THE WORK.

7. ALL FITTINGS AND APPURTENANCES SHALL BE RESTRAINED WITH CONCRETE THRUST BLOCKS OR MECHANICAL JOINT RESTRAINT AS INDICATED.

8. INGRESS AND EGRESS OF ACCESS ROADS SHALL BE MAINTAINED AT ALL TIMES.

9. DISTURBED DITCHES SHALL BE RESTORED TO EXISTING GRADES AND LINING EXCEPT WHERE EXISTING GRADES RESULT IN NEGATIVE GRADES. NEGATIVE GRADES SHALL BE CORRECTED TO PROVIDE POSITIVE GRADES BETWEEN CULVERTS.

10. ALL WATER MAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF 3.0 FEET, 3.0 FEET BELOW EDGE OF PAVEMENT OR 3.0 FEET BELOW BOTTOM OF DITCH, WHICH EVER IS GREATER.

11. STAKE OUT OF PIPELINES AND TANK SHALL BE BY A LICENSED LAND SURVEYOR.

12. DO NOT DISCARD/DISCHARGE CHLORINATED WATER. ALL WATER SHALL BE DE-CHLORINATED PRIOR TO DISCHARGE.

13. AT TIE-INS TO EXISTING UTILITIES, CONTRACTOR SHALL FIELD VERIFY VERTICAL AND HORIZONTAL LOCATION OF EXISTING UTILITIES.

14. CONTRACTOR SHALL COORDINATE ALL SHUTDOWNS, TIE-INS AND SEQUENCING WITH THE BRWA. CONTRACTOR SHALL NOT OPERATE BRWA VALVES AT ANY TIME AND SHALL PROVIDE THREE BUSINESS DAYS ADVANCE NOTICE PRIOR TO NEEDING VALVE OPERATION BY THE BRWA.

15. LAND DISTURBANCE SHALL BE KEPT WITHIN THE LIMITS OF THE LOD INDICATED ON THE TANK SITE PLAN. THE CONTRACTOR SHALL NOT HAVE EQUIPMENT AND MATERIALS OUTSIDE OF THE LIMITS OF DISTURBANCE. LAYDOWN AND STOCKPILING AREAS SHALL BE KEPT WITHIN THE AREA OF DISTURBANCE AS SHOWN ON THE PLANS.

16. ALL SPOIL AREAS SHALL BE RETURNED TO NATURAL GROUND AT THE COMPLETION OF THE PROJECT.

17. ALL BOUNDARY OR PROPERTY LINE MARKERS DISTURBED SHALL BE REPLACED AT THEIR ORIGINAL LOCATION AT NO ADDITIONAL COST BY A LICENSED LAND SURVEYOR.

18. MAINTAIN ADEQUATE CLEARANCE FROM OVERHEAD LINES AND POLES IN ORDER TO PROTECT EQUIPMENT AND WORKERS. COORDINATE WITH LOCAL UTILITY COMPANY TO TEMPORARILY LIFT, SUPPORT, PULL ASIDE, OR DEACTIVATE ANY OVERHEAD LINES WHICH MAY PRESENT DANGER TO THE CONTRACTOR, HIS WORKERS OR EQUIPMENT.CONTRACTOR SHALL PROTECT ALL UTILITY POLES ADJACENT TO THE WORK. ALL TEMPORARY BRACING TO BE PERFORMED BY OVERHEAD UTILITY COMPANY OR TO THEIR SATISFACTION. ALL COSTS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.

19. COORDINATE THE REMOVAL, REPLACEMENT, OR REINSTALLATION OF ALL GUY WIRES (IF ANY) AND TEMPORARY SUPPORT OF POLES WITH OVERHEAD UTILITY COMPANY. ALL COSTS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.

20. MAINTAIN DETAILED RED LINE DRAWING ON THE JOB SITE DURING CONSTRUCTION TO DOCUMENT CONSTRUCTION CHANGES AND INFORMATION AS DELINEATED IN THE SPECIFICATION. RED LINE RECORD DRAWINGS SHALL BE MADE AVAILABLE FOR PERIODIC REVIEW DURING PROGRESS MEETINGS AND TURNED OVER TO ENGINEER AT END OF PROJECT.

21. MINIMUM CLEARANCE OF WATER AND STORM DRAINS SHALL BE 18" EDGE TO EDGE.

22. WATER MAINS SHALL BE TESTED AT A PRESSURE OF 200 PSI.

23. VALVE EXTENSIONS SHALL BE USED WHEN THE DEPTH TO TOP OF VALVE NUT IS GREATER THAN 4 FEET.

24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A BUILDING PERMIT FROM THE TOWN OF BEDFORD AND PAYING THE APPLICATION FEE PRIOR TO STARTING CONSTRUCTION. THE CONTRACTOR SHALL COMPLETE AND SUBMIT THE BUILDING PERMIT APPLICATION AND STATEMENT OF SPECIAL INSPECTIONS INCLUDED THE APPENDICES OF THE PROJECT MANUAL. THE CONTRACTOR SHALL SUBMIT THE FORMS TO THE TOWN OF BEDFORD OFFICE OF BUILDING INSPECTIONS. THE CONTRACTOR (TANK MANUFACTURER) SHALL BE THE REGISTERED DESIGN PROFESSIONAL IN CHARGE. THE SPECIAL INSPECTIONS ENGINEER IN CHARGE SHALL BE A THIRD PARTY HIRED BY THE CONTRACTOR. COPIES OF ALL TESTING REPORTS AND SUMMARIES SHALL BE SUBMITTED TO THE TOWN AND THE BRWA.

    24.A. CONCRETE SPECIAL INSPECTIONS ARE REQUIRED.
    24.B. STEEL SPECIAL INSPECTIONS ARE NOT REQUIRED. STEEL INSPECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH AWWA D100 AND THE CONTRACT DOCUMENTS. ANY SUBMITTALS REQUIRED BY THE CONTRACT DOCUMENTS SHALL ALSO BE SUBMITTED TO THE TOWN OF BEDFORD BUILDING OFFICIAL IN ACCORDANCE WITH THE BUILDING PERMIT SUBMITTAL REQUIREMENTS.
    24.C. MASONRY SPECIAL INSPECTIONS ARE NOT REQUIRED.

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
1/12/2024
PROFESSIONAL ENGINEER

SCALE:
HORIZ: N/A
VERT.: N/A
DATE: JANUARY 12, 2024
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
GENERAL NOTES AND SURVEY CONTROL POINTS

SHEET 2 OF 30

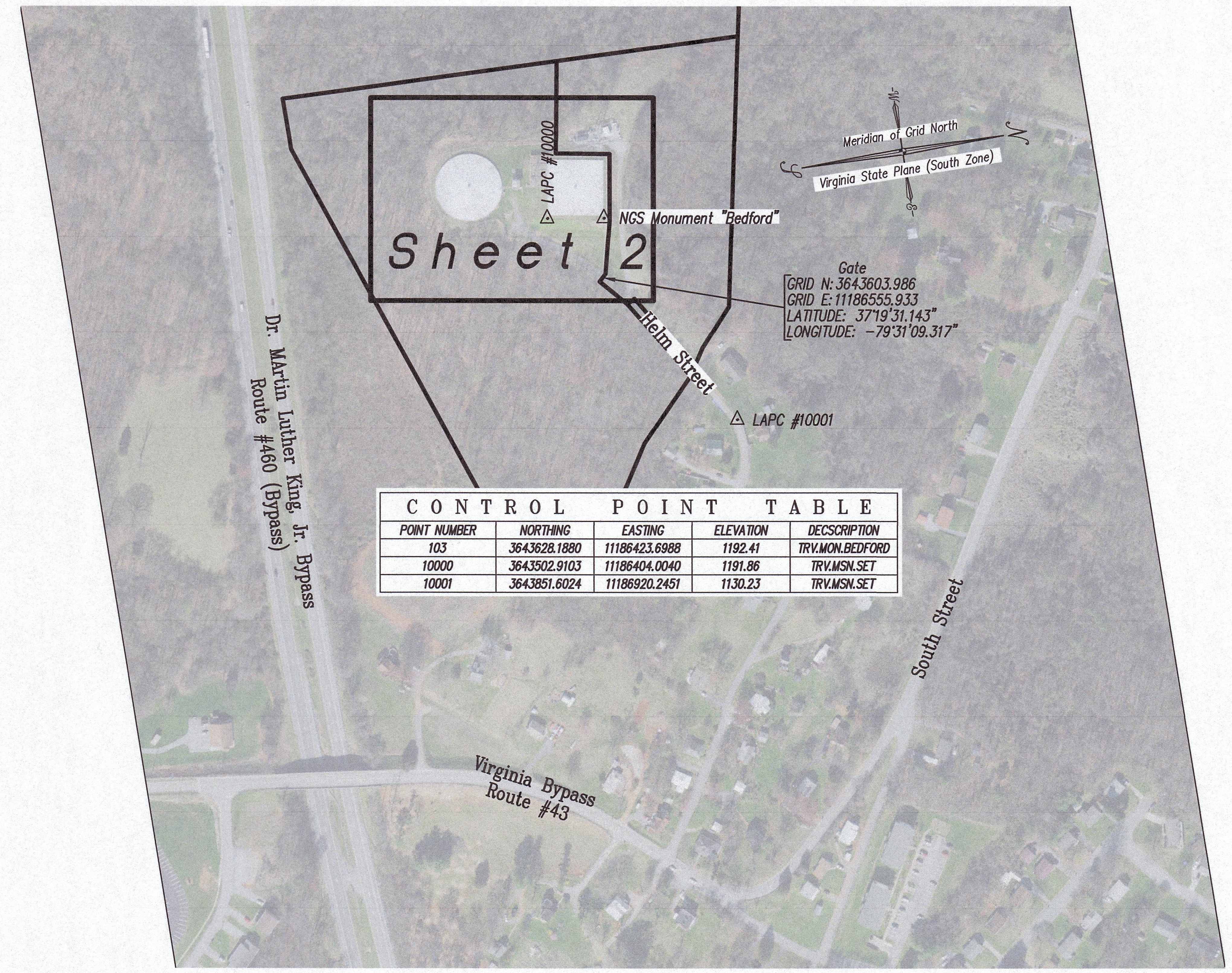
DRAWING G-2

N:\46626-003\CADD\466260360-02.DWG

22111 20230817 client-sheet 1.plt

SYMBOL LEGEND
Property Line
Property Monument
Property Corner
Sign
Water Manhole
Gate Valve
Water Spigot
Water Meter
Air Release Valve
Transformer
Utility Pole
Guy Wire
Electric Box
Electric Meter
Telephone Pedestal
Borehole
Flow Arrow

ABBREVIATIO	DESCRIPTION
BT	Bottom of Tank
CLF	Chainlink Fence
C.S.	Concrete Slab
C.W.	Concrete Walk
D	Drain Pipe
Ex.IP	Existing Iron Pin
G.Dr.	Gravel Drive
GW	Guy Wire
OE	Overhead Electric
OF	Over Flow Pipe
OU	Overhead Utilities
TC	Top of Concrete
TR	Top of Roof
UE	Underground Electric
W	Waterline
W.St.	Wooden Steps
x	Approximate



CONTROL POINT TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DECSCRIPTION
103	3643628.1880	11186423.6988	1192.41	TRV.MON.BEDFORD
10000	3643502.9103	11186404.0040	1191.86	TRV.MSN.SET
10001	3643851.6024	11186920.2451	1130.23	TRV.MSN.SET

Pattern Legend
Concrete
Metal Tank Roof
Building
Gravel

Linetype Legend	
Linetype	Description
	Chainlink Fence
	Ditch

This Partial Topographic Survey was completed under the direct and responsible charge of, Larry Thomas Ogle, Jr., LS #2459 from an actual Ground survey made under my supervision; that the original data was obtained April 27th, 2022 through May 11th, 2022; and that this plat, including metadata meets minimum accuracy standards unless otherwise noted.

NOTES:

1. THIS PLAT IS BASED ON A CURRENT FIELD SURVEY.
2. THIS PLAT DOES NOT CONSTITUTE A BOUNDARY SURVEY.
3. THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND ENCUMBRANCES MAY EXIST THAT AFFECT THE SUBJECT PROPERTY THAT ARE NOT SHOWN HEREON.
4. THIS PROPERTY DOES NOT LIE WITHIN THE LIMITS OF A SPECIAL FLOOD HAZARD AREA AS DESIGNATED BY F.E.M.A. THIS OPINION IS BASED ON AN INSPECTION OF THE FLOOD INSURANCE RATE MAPS AND HAS BEEN VERIFIED BY ACTUAL FIELD ELEVATIONS., SEE MAP NUMBER 51019C309D, DATED SEPTEMBER 29, 2010. ZONE "X" (unSHADED).
5. THE HORIZONTAL (NAD 83) & VERTICAL CONTROL (NAVD 88) FOR THIS PROJECT WAS BASED TRIMBLE'S KEYNET VRS GPS NETWORK.
6. COORDINATE VALUES AS SHOWN HEREON ARE SURFACE COORDINATES ESTABLISHED BY SCALING THE GRID COORDINATES AT POINT #10000 (N:3643502.9103, E:11186404.0040, ELEV.:1191.86') BY A COMBINED SCALE FACTOR OF 1.00010628.
7. CONTOURS AS SHOWN ARE AT A 2-FOOT INTERVAL.
8. THIS PLAT DOES NOT GUARANTEE THE EXISTENCE OR LOCATION OF ANY UNDERGROUND UTILITIES. ALL SURFACE UTILITIES WERE FIELD LOCATED. ALL UNDERGROUND UTILITIES SHOWN WERE ESTABLISHED USING ABOVE GROUND STRUCTURES, MARKINGS, AVAILABLE UTILITY MAPS AND MARKINGS ESTABLISHED BY MISS UTILITY OF VIRGINIA, SEE MISS UTILITY TICKET #A211700135. ALL UNDERGROUND UTILITY LINES ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO THE START OF ANY CONSTRUCTION.
9. THERE MAY BE A ABANDONED OR PRIVATE UNDERGROUND TELEPHONE AND/OR CABLE LOCATED NEAR ELECTRIC POLE #64345. NO MISS UTILITY MARKINGS WERE FOUND AND ALL SUCH RESPONDING UTILITY COMPANY'S STATE "NO CONFLICT".
10. TAX PARCELS #234 A 8 T & 8A T ARE THE PROPERTY OF THE TOWN OF BEDFORD PER DEED BOOK 161, PAGE 463, DEED BOOK 161, PAGE 64, DEED BOOK 151, PAGE 454, AND DEED BOOK 64, PAGE 138 AND INSTRUMENT #130007555..

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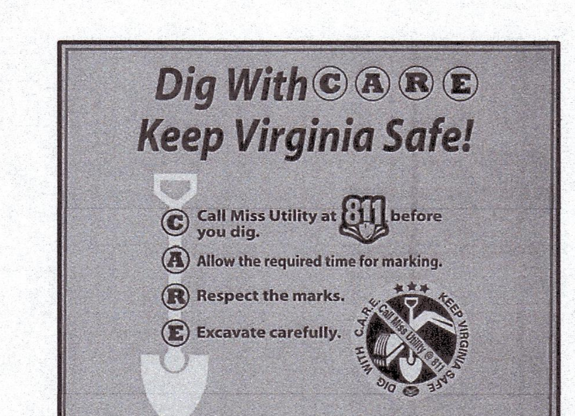
Utilities per Miss Utility Tickets #A211700135

COMPANY	CONTACT	PHONE NUMBER	DAMAGE CONTACT PHONE NUMBER	STATUS
Town of Bedford–Electric (BDF240)	Rick Dellinger	(540)587–6071	(540)587–6071	Marked
Bedford Regional Water (BRA176)	Howard DeMarsh	(540)871–6455	(540)586–7679	Marked
Bedford Regional Sewer (BRA177)	Howard DeMarsh	(540)871–6455	(540)586–7679	No Conflict
Comcast (CMC503)	Cable Protection Services	(804)562–3861	(877)359–1821 Ext OPT 1	No Conflict
Fiberlight (FBL411)	Stake Center Office	(801)381–5064	(800)672–0181	No Conflict
Lumos DBA Segra (LMS546)	Stake Center Locating	(801)364–1063	(877)411–6930	No Conflict
Shentel Cable (STC555)	Cable Protection Services	(804)562–3861	(540)984–5531	No Conflict
Verizon (VZN804)	Utiliquest	(804)286–1721	(888)483–1233	No Conflict



SHEET 3A DRAWING C-1A

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COMMONWEALTH OF VIRGINIA
LARRY THOMAS OGLE, JR.
05/20/2022
Lic. No. 002459
LAND SURVEYOR

Graphic Scale
0' 100' 200' 400'
1" inch = 200' Feet

Partial Topographic Survey for
Water Tank Replacement
situated at the terminus of Helm Street
Town of Bedford, Bedford County, Virginia
prepared for the
WRA &
Bedford Regional Water Authority

REVISIONS		
NO.	DATE	DESCRIPTION
1	6/27/2022	Added Headwall and 15" RCP
2	8/17/2023	Added Tank Note & Approximate Fence
3		
4		
5		

DATE: May 20, 2022
SCALE: 1" = 200'
COMMISSION NO: 2022-063
SHEET 1 OF 2

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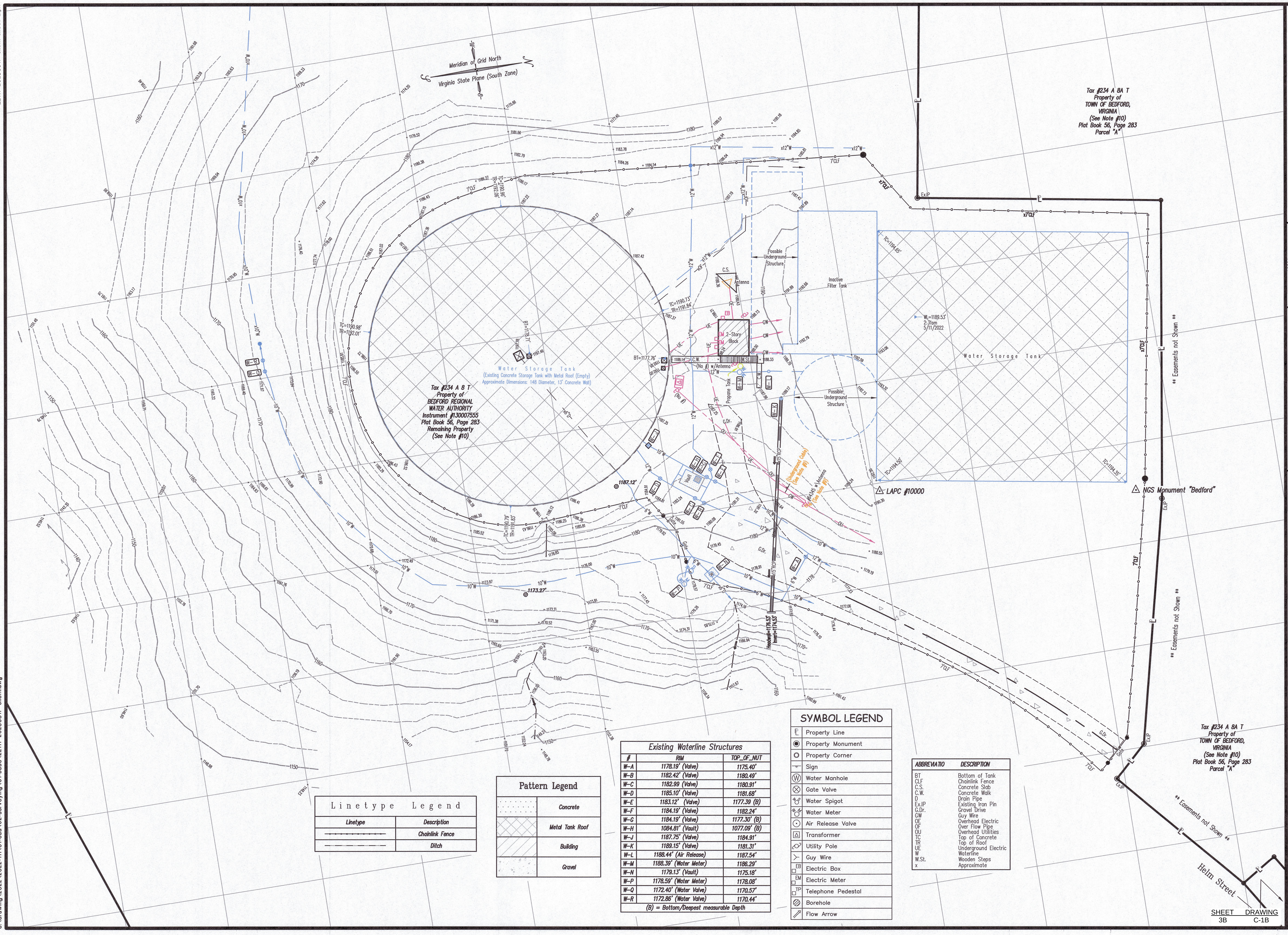

Existing Waterline Structures

#	RIM	TOP_OF_NUT
W-A	1178.19' (Valve)	1175.40'
W-B	1182.42' (Valve)	1180.49'
W-C	1182.99 (Valve)	1180.91'
W-D	1185.10' (Valve)	1181.68'
W-E	1183.12' (Valve)	1177.39 (B)
W-F	1184.19' (Valve)	1182.24'
W-G	1184.19' (Valve)	1177.30' (B)
W-H	1084.81' (Vault)	1077.09' (B)
W-J	1187.75' (Valve)	1184.91'
W-K	1189.15' (Valve)	1181.31'
W-L	1188.44' (Air Release)	1187.54'
W-M	1188.39' (Water Meter)	1186.29'
W-N	1179.13' (Vault)	1175.18'
W-P	1178.59' (Water Meter)	1178.08'
W-Q	1172.40' (Water Valve)	1170.57'
W-R	1172.86' (Water Valve)	1170.44'

(B) = Bottom/Deepest measurable Depth

Linetype Legend

Linetype	Description
	Chainlink Fence
	Ditch

Pattern Legend

	Concrete
	Metal Tank Roof
	Building
	Gravel

SYMBOL LEGEND

	Property Line
	Property Monument
	Property Corner
	Sign
	Water Manhole
	Gate Valve
	Water Spigot
	Water Meter
	Air Release Valve
	Transformer
	Utility Pole
	Guy Wire
EB	Electric Box
EM	Electric Meter
TP	Telephone Pedestal
	Borehole
	Flow Arrow

ABBREVIATIO	DESCRIPTION
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CLF	Chainlink Fence
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OE	Overhead Electric
OF	Over Flow Pipe
OU	Overhead Utilities
TC	Top of Concrete
TR	Top of Roof
UE	Underground Electric
W	Waterline
W.St.	Wooden Steps
x	Approximate

LUMSDEN ASSOCIATES, P.C.
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COMMONWEALTH OF VIRGINIA
LARRY THOMAS OGLE, JR.
05/20/2022
Lic. No. 002459
LAND SURVEYOR

Graphic Scale
0' 10' 20' 40'
1" inch = 20' Feet

Partial Topographic Survey for
Water Tank Replacement
situated at the terminus of Helm Street
Town of Bedford, Bedford County, Virginia
prepared for the
WRA &
Bedford Regional Water Authority

REVISIONS

NO.	DATE	DESCRIPTION
1	6/27/2022	Added Headwall and 15" RCP
2	8/17/2023	Added Tank Note & Approximate Fence
3		
4		
5		

DATE: May 20, 2022
SCALE: 1" = 20'
COMMISSION NO: 2022-063

SHEET	DRAWING
3B	C-1B

SHEET 2 OF 2

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NOTES:
1. CONTRACTOR TO INSTALL BULKHEAD ANCHOR PRIOR TO CUTTING AND CAPPING WATER MAINS. SEE DETAIL ON SHEET C-16 FOR CONCRETE ANCHOR SIZING FOR 10" AND 12" PIPE DIAMETERS.

EXISTING OVER FLOW PIPE TO BE ABANDONED

EXISTING 12" WATER MAIN TO BE ABANDONED

PLUG OR CAP EXISTING WATER MAINS

EXISTING TANK INCLUDING FOUNDATION TO BE DEMOLISHED DOWN TO THE ACCEPTABLE SUBGRADE. RUBBLIZED CONCRETE FROM EXISTING TANK MAY BE USED ON-SITE FOR NON-STRUCTURAL SUB-BASE MATERIAL. REMOVE ALL OTHER DEMOLITION MATERIALS, INCLUDING ALL REINFORCING STEEL TO AN APPROVED OFF-SITE LOCATION.

EXISTING UNDERGROUND ELECTRIC TO BE ABANDONED

Tax #234 A B 1
Property of
TOWN OF BEDFORD,
VIRGINIA
(See Note #10)
Plat Book 56, Page 283
Parcel "A"

Tax #234 A B 1
Property of
BEDFORD REGIONAL
WATER AUTHORITY
Instrument #130007555
Plat Book 56, Page 283
Remaining Property
(See Note #10)

Water Storage Tank
(Existing Concrete Storage Tank with Metal Roof (Empty)
Approximate Dimensions: 148 Diameter, 13' Concrete Wall)

BEDFORD COUNTY SCHOOLS TO RELOCATE COMMUNICATION POLE AND EQUIPMENT. CONTRACTOR TO COORDINATE TANK GRADING/CONSTRUCTION WITH BEDFORD COUNTY SCHOOLS.

EXISTING 10" WATER MAIN TO BE ABANDONED OR REMOVED SEE NOTE 1, THIS SHEET

EXISTING ALTITUDE VALVE VAULT TO BE DEMOLISHED APPROXIMATE DIMENSIONS: 10.5'L X 7.5'W X 8'H

PLUG OR CAP EXISTING 10" WATER MAIN SEE NOTE 1, THIS SHEET

1 EA. – WATERLINE BULKHEAD ANCHOR SEE NOTE 1, THIS SHEET

PLUG OR CAP EXISTING WATER MAIN SEE NOTE 1, THIS SHEET

PLUG OR CAP EXISTING 12" WATER MAIN SEE NOTE 1, THIS SHEET

WATER MAIN TIE-IN LOCATION SEE SHEET C-4 FOR PROP. WATER MAIN

EXISTING 12" WATER MAIN TO BE ABANDONED OR REMOVED SEE NOTE 1, THIS SHEET.

EXISTING 6" DRAIN LINE TO BE REMOVED

WATER MAIN TIE-IN LOCATION SEE SHEET C-4 FOR PROP. WATER MAIN

CAP, CAP AND ABANDON EXISTING 10" WATER MAIN AS NECESSARY

EXISTING FENCE TO BE REMOVED

REMOVE 10" WATER MAIN FOR INSTALLATION OF NEW 15" AND 16" DRAIN PIPES SEE SHEET C-4

YARD HYDRANT TO BE REMOVED

EXISTING VAULT TO BE REMOVED APPROXIMATE DIMENSIONS: 5.5'L X 4.5'W X 4'H

CAP, CAP AND ABANDON (OR REMOVE) EXISTING 6" WATER MAIN AS NECESSARY FOR CONSTRUCTION OF NEW DRAINAGE PIPES. SEE SHEET C-4.

PLUG OR CAP EXISTING 6" WATER MAIN

LAPC #10000

NGS Monument "Bedf

** Easements not Shown **

0 10' 20' 40'
SCALE: 1" = 20'

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
11/01/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 1"=20'
VERT.: N/A
DATE: NOVEMBER 1, 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DEMOLITION PLAN

SHEET 4 OF 30

DRAWING C-2

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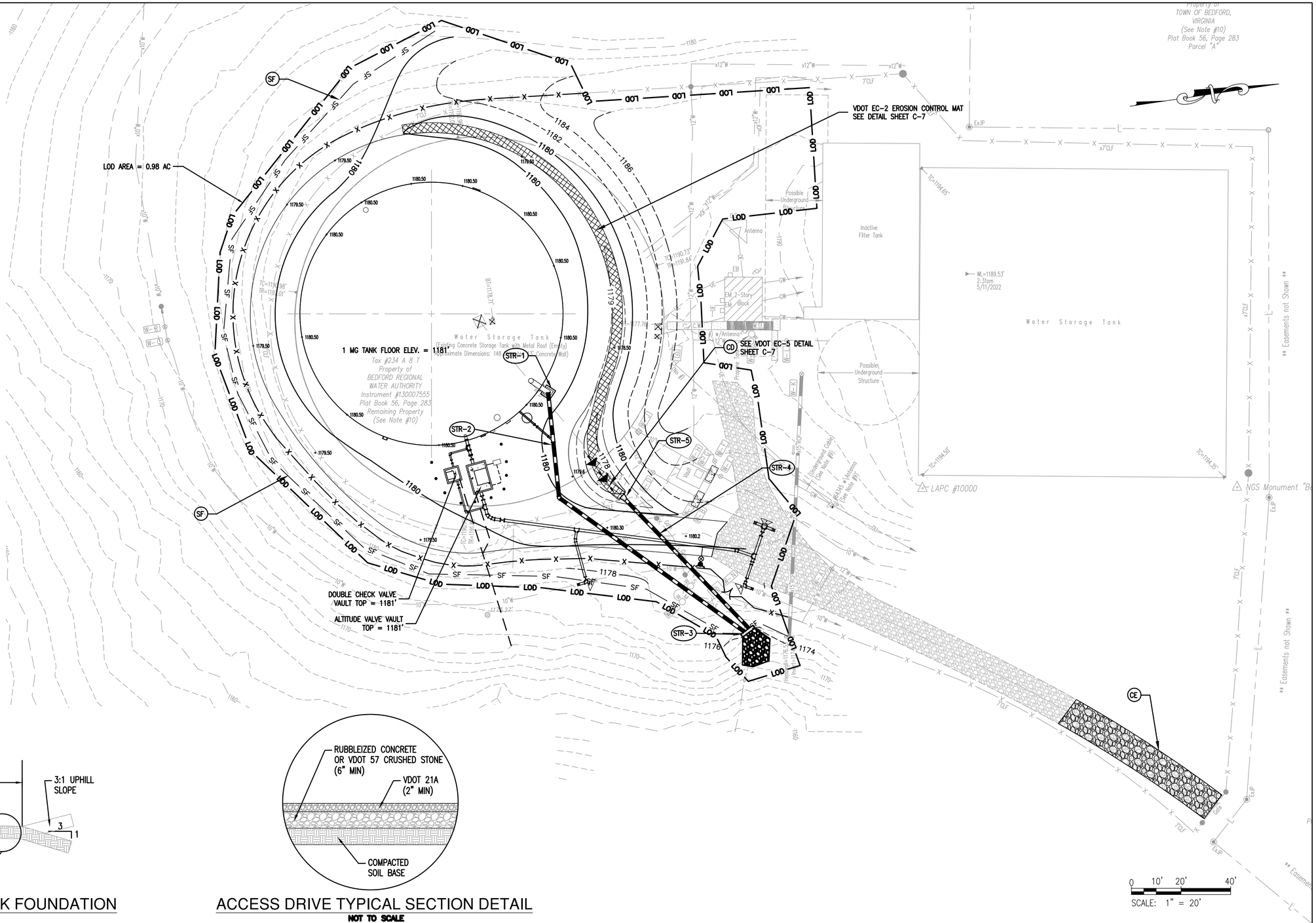
STRUCTURE SCHEDULE

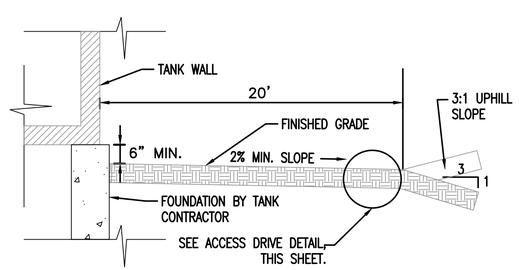
STR-1	DI-7, TOP=1181.5, H=5.66' SEE DETAIL, SHEET C-16
STR-2	136 L.F. 16" D.I. PIPE AT 1.35% SLOPE INV. IN = 1175.84 INV. OUT= 1174.0
STR-3	VDOT EW-6 WITH OUTLET PROTECTION EC-1, TYPE A, CLASS 1. SEE DETAIL, SHEET C-15.
STR-4	76 L.F. 15" RCP AT 5.3% SLOPE INV. IN = 1178.0 INV. OUT= 1174.0
STR-5	VDOT ES-1 END SECTION SEE DETAIL, SHEET C-15.

E&S SYMBOL LEGEND

(SOME SYMBOLS SHOWN MAY NOT BE USED)

- LIMITS OF DISTURBANCE — LOD —
- TEMPORARY STONE CONSTRUCTION ENTRANCE (CE)
- SEDIMENT BASIN (SD)
- SILT FENCE (SF) —SF—
- SUPER SILT FENCE (SSF) —SSF—
- DIVERSION DIKE (DD)
- TREE PROTECTION (TP) —TP—
- STORM DRAIN INLET PROTECTION (IP)
- CULVERT INLET PROTECTION (CIP)
- ROCK CHECK DAM (CD)





ACCESS DRIVE AROUND TANK FOUNDATION

NOT TO SCALE

ACCESS DRIVE TYPICAL SECTION DETAIL

NOT TO SCALE

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
11/01/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 1"=20'
VERT.: N/A
DATE: NOVEMBER 1, 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
GRADING AND EROSION AND SEDIMENT CONTROL PLAN

SHEET 5 OF 30

DRAWING C-3

N:\46626-003\CADD\46626003C1-03.DWG

UTILITY TEST HOLES (TH) ⊕ – DEPTH TO TOP OF UTILITY		
TH NO.	EXISTING UTILITY	DEPTH
1	12" WATER MAIN	4'-5"
2	10" WATER MAIN	3'-9"
3	10" WATER MAIN	2'-8"

7' PERMANENT FENCE – TIE-IN TO EXISTING
PROPOSED GRAVEL ACCESS ROAD
PROPOSED 1 MG WATER STORAGE TANK DIAMETER = 106' FF ELEV. = 1181'
PRESSURE TRANSDUCER AND VAULT SEE DETAIL, SHEET C-15
6" D.I. PIPE FOR TANK DRAIN LINE 1 EA. – 6" GATE VALVE AND BOX SEE DETAIL, SHEET M-2
6" BOLLARD (TYP. OF 10) SEE DETAIL, SHEET C-15
TANK OVERFLOW STRUCTURE (STR-1, VDOT DI-7) SEE DETAIL, SHEET M-1.
1 EA.-16"x6" WYE N 3643359.02 E 11186360.39
SEE INSET THIS SHEET
1 EA.-16" BEND (45°) N 3643357.71 E 11186384.47
16" D.I. TANK OVERFLOW DRAIN PIPE SEE PROFILE SHEET C-5
15" DRAINAGE PIPE SEE PLAN SHEET C-3 SEE PROFILE SHEET C-5
1 EA.-12" BEND (11.25°) N 3643425.00 E 11186416.81
1 EA.-12" TEE (12"X12") 1 EA.-12" GATE VALVE & BOX 2 EA.-12" SOLID SLEEVE 1 EA.- CONCRETE ANCHOR SEE DETAIL SHEET C-16, (12" DEAD END) N 3643437.36 E 11186409.16
16 LF – 12" D.I. WATER MAIN WATERLINE W-2 SEE PROFILE SHEET C-5
1 EA.-12" TEE (12"X12") 1 EA.-12"X10" REDUCER N 3643431.53 E 11186420.23
10 LF – 10" D.I. WATER MAIN WATERLINE W-2 SEE PROFILE SHEET C-5
1 EA.-10" BEND (90°) 1 EA.-10" GATE VALVE & BOX 1 EA.-10" SOLID SLEEVE 1 EA.- CONCRETE ANCHOR SEE DETAIL SHEET C-16, (10" DEAD END) N 3643425.60 E 11186431.45
RELOCATE EXIST. 10' DOUBLE GATE. REPLACE ANY DAMAGED COMPONENTS WITH NEW.
VDOT EW-6 SEE PLAN SHEET C-3 SEE DETAIL, SHEET C-15
1 EA. – YARD HYDRANT 1 EA. – 5/8" WATER METER & BOX 7 LF. – 3/4" WATER SERVICE LINE
128 LF – 12" D.I. WATER MAIN WATERLINE W-1 SEE PROFILE SHEET C-5
1 EA.-12" TEE (12"X10") N 3643362.64 E 11186398.32
1 EA.-10" BEND (22.5°) N 3643361.41 E 11186402.47
1 EA.-10" BEND (90°) 1 EA.-10" GATE VALVE & BOX 1 EA.-10" SOLID SLEEVE 1 EA.- CONCRETE ANCHOR SEE DETAIL SHEET C-16, (10" DEAD END) LOCATE & CONNECT TO EXIST. 10" WATER MAIN N 3643363.22 E 11186419.80
22 LF – 10" D.I. WATER MAIN
4" SCH. 40 PVC DRAIN PIPE FROM BACKFLOW VAULT AND ALTITUDE VAULT. BOTH DRAIN PIPES COMBINE AT 4" WYE DOWNSTREAM AND DAYLIGHT. INSTALL 2.0% MIN. SLOPE AND TERMINATE WITH FLAP VALVE.
1 EA. – 4" PVC BEND (45°) N 3643327.56 E 11186396.75
1 EA. – 4"X4" PVC WYE N 3643323.72 E 11186401.75
1 EA.-12" BEND (22.5°) 1 EA.-12" GATE VALVE & BOX N 3643330.10 E 11186388.67
1 EA.-12" BEND (45°) N 3643328.07 E 11186387.05
ALTITUDE VALVE VAULT SEE DETAIL, SHEET C-12
DOUBLE CHECK VALVE VAULT SEE DETAIL, SHEET C-13
TH-1
TH-2
TH-3
Tax #234 A 8A Property of TOWN OF BEDFORD, VIRGINIA (See Note #10) Plat Book 56, Page 283 Parcel "A"
BEDFORD REGIONAL WATER AUTHORITY Instrument #130007555 Plat Book 56, Page 283 Remaining Property (See Note #10)
Water Storage Tank
NGS Monument "Bedford"
LAPC #10000
** Easements not Shown **
0 10' 20' 40'
SCALE: 1" = 20'
1 EA.-12" TEE (12"X6") 1 EA.-12" GATE VALVE AND BOX N 3643324.94 E 11186359.04
12" D.I. WATER MAIN N 3643322.67 E 11186365.73
1 EA.-6" BEND (90°) N 3643316.99 E 11186359.96
CHLORINE SAMPLING LINE
CHLORINE ANALYZER IN HOTBOX ENCLOSURE WITH 36"X22" CONCRETE PAD SEE DETAIL, SHEET I-6
1 EA. – 6" GATE VALVE
N 3643313.60 E 11186365.84
2" PVC DRAIN PIPE
N 3643320.23 E 11186371.14
N 3643331.95 E 11186376.77
1 EA. – 6" GATE VALVE
1 EA.-12" TEE (12"X6") 1 EA.-12" GATE VALVE AND BOX N 3643327.67 E 11186383.45
34 LF – 6" D.I. WATER MAIN
1 EA.-6" BEND (90°) N 3643319.71 E 11186384.32
12" D.I. WATER MAIN

VAULT DETAIL INSET
SCALE = 1"=10'

N:\46626-003\CADD\46626003C1-04.DWG

NO.	DATE	BY	REVISIONS

WRA Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA — PAULA J. MOORE Lic. No. 035821 — 11/01/2023 — PROFESSIONAL ENGINEER

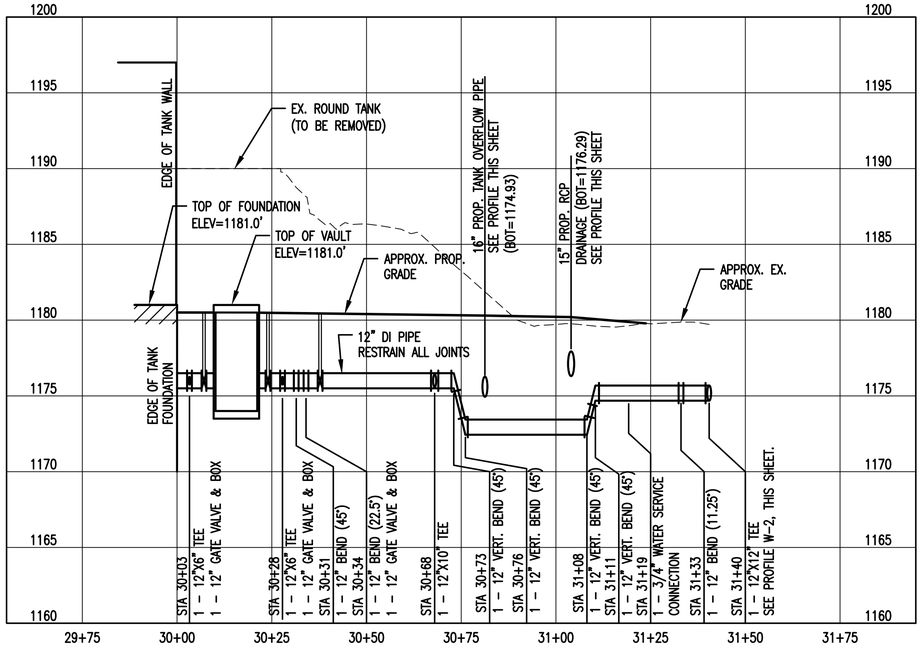
SCALE: HORIZ: 1"=20' VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

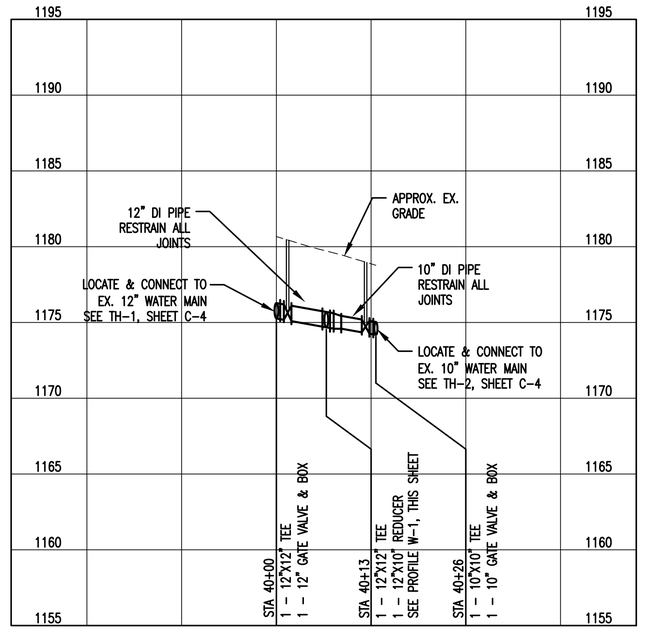
HELM STREET TANK REPLACEMENT
SITE LAYOUT AND UTILITY PLAN

SHEET 6 OF 30

DRAWING C-4



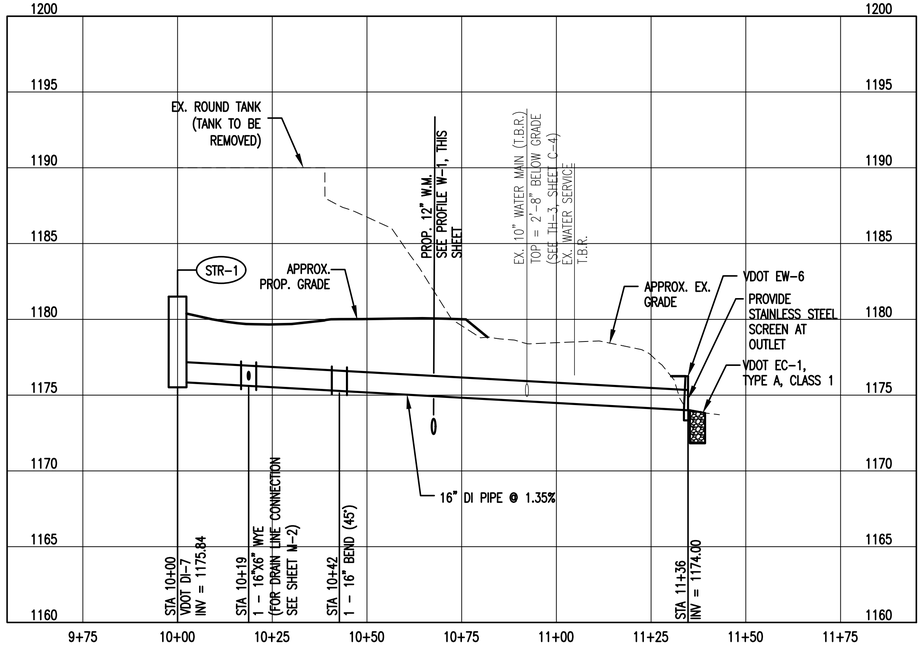
W-1 - 12-INCH WATER MAIN



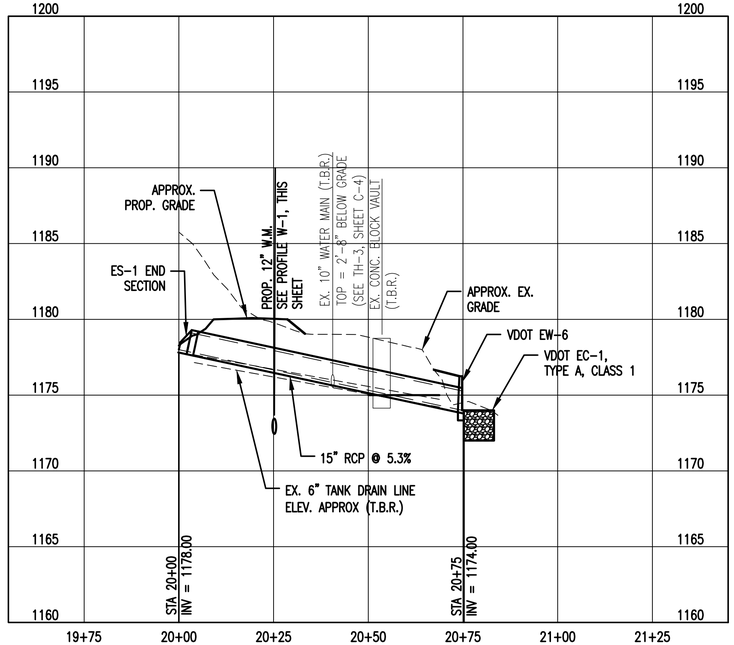
W-2 - 12-INCH AND 10-INCH WATER MAIN

NOTES:

1. ELECTRONIC MARKERS SHALL BE INSTALLED ON NEW WATER MAIN AND DRAIN LINES WITH A MAXIMUM SPACING OF 60 FEET AND AT EVERY TEE AND BEND. SEE BRWA MASTER SPECIFICATION 31 23 33.
2. TRACER WIRE SHALL BE INSTALLED ON ALL WATER MAINS AND BROUGHT TO THE SURFACE IN A TRACER WIRE ACCESS BOX. TRACER WIRE SHALL BE BROUGHT UP THROUGH A TRACER WIRE ACCESS BOX AT ALL VALVE BOXES, METER BOXES, AND AT THE END OF A WATER LINE AT THE TIE-IN LOCATION TO AN EXISTING LINE OR PLUG (EVEN IF NO VALVE IS INSTALLED) AS SPECIFIED IN BRWA MASTER SPECIFICATION 31 23 33 AND PER STANDARD DETAIL TW-1 ON SHEET C-14.



16-INCH TANK OVERFLOW DRAIN PIPE



15-INCH DRAINAGE PIPE

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 1"=20'
VERT.: 1"=5'
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
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PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
WATER MAIN, OVERFLOW AND DRAINAGE PROFILES

SHEET 7 OF 30

DRAWING C-5

N:\46626-003\CADD\46626003C1-05.DWG

EROSION AND SEDIMENT CONTROL NARRATIVE:

A. PROJECT DESCRIPTION
THE HELM STREET TANK REPLACEMENT PROJECT IS LOCATED AT THE END OF HELM STREET IN THE TOWN OF BEDFORD, PARCEL ADDRESS 900-902 HELM STREET. THIS FACILITY WILL BE OWNED AND OPERATED BY THE BEDFORD REGIONAL WATER AUTHORITY (BRWA). THE PROJECT CONSISTS THE DEMOLITION OF THE EXISTING CONCRETE ROUND TANK, CONSTRUCTION OF THE NEW STEEL TANK, WATER MAINS, VAULTS, VALVES, DRAINAGE PIPES AND APPURTENANCES. THE SITE WILL BE COMPLETELY FENCED FOR SECURITY. THE TOTAL DISTURBED AREA FOR THIS PROJECT IS 0.99 ACRES.

B. EXISTING SITE CONDITIONS
THE PARCEL IS OWNED BY THE BEDFORD REGIONAL WATER AUTHORITY. THE PROPERTY IS ZONED LOCAL GOVERMENT. THE SITE CAN BE ACCESSED VIA A GRAVEL ACCESS ROAD AT THE END OF HELM STREET. THE EXISTING PARCEL HAS TWO CONCRETE POTABLE WATER TANKS AND A TWO STORY BLOCK STRUCTURE. THE PROJECT SITE IS LOCATED ON A HIGH POINT AND HAS MODERATE SLOPES. THE PROJECT SITE GENERALLY DRAINS VIA SHEET FLOW TOWARD THE WEST, SOUTH AND EAST. THE SITE IS NOT WITHIN A 100-YR FLOODPLAIN. THERE ARE NO WETLANDS WITHIN THE SITE.

C. ADJACENT AREAS
THE PROJECT SITE IS IMMEDIATELY ADJACENT TO A HEAVILY WOODED AREA WITH DENSE VEGETATION TO THE WEST, SOUTH AND EAST. TO THE NORTH IS THE EXISTING SQUARE TANK AND TWO STORY BUILDING OWNED BY THE BRWA. TO THE NORTH EAST ARE SINGLE FAMILY HOMES FURTHER ALONG HELM STREET.

D. OFF-SITE AREAS
THERE ARE NO OFF-SITE AREAS INCLUDED IN THIS PROJECT.

E. SOILS
THE SOILS ON THE SITE ARE CHARACTERIZED AS FOLLOWS: MAP UNIT 51B – CLIFFORD-URBAN LAND COMPLEX, 2%-7% SLOPE

SOIL EROSION FACTORS					
SOIL	K-FACTOR		T-FACTOR (TONS PER ACRE/YEAR)	WIND ERODIBILITY GROUP	WIND ERODIBILITY INDEX (TONS/ACRES/YEAR)
	ROCK FREE	WHOLE SOIL			
51B	0.28	0.28	5	3	86

F. CRITICAL AREAS
THERE ARE NO CRITICAL AREAS.

G. EROSION AND SEDIMENT (E&S) CONTROL MEASURES
ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH, LATEST EDITION) PRIOR TO GRADING. THE FOLLOWING IS A DESCRIPTION AND PURPOSE OF THE E&S MEASURES DEPICTED ON DRAWING C-3. PLEASE REFER TO DRAWING C-3 FOR LOCATION OF THESE MEASURES.

TEMPORARY STONE CONSTRUCTION ENTRANCE (CE) – THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED ALONG THE EASTERN PORTION OF THE NEW TANK SITE. ALL VEHICLES ENTERING AND LEAVING THE SITE SHALL USE THE CONSTRUCTION ENTRANCE TO REDUCE THE AMOUNT OF MUD TRANSPORTED ONTO PAVED PUBLIC ROADS.

SILT FENCE (SF) – SILT FENCE IS LOCATED ALONG THE WEST, SOUTH AND EAST OF THE NEW TANK SITE. THIS IS TO BE USED TO INTERCEPT AND DETAIN SMALL AMOUNTS OF SEDIMENT FROM DISTURBED AREAS DURING CONSTRUCTION OPERATIONS IN ORDER TO PREVENT SEDIMENT FROM LEAVING THE SITE, AND TO DECREASE THE VELOCITY OF SHEET FLOWS AND LOW-TO-MODERATE LEVEL CHANNEL FLOWS.

ROCK CHECK DAM (RCD) – TO PREVENT SEDIMENT FROM ENTERING THE PROPOSED 15" DRAINAGE PIPE ADJACENT TO THE TANK. THE ROCK CHECK DAM SHALL BE PLACED AT THE UPSTREAM END OF THE PIPE.

H. TEMPORARY AND PERMANENT SEEDING PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN 7 DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN 7 DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT THAT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEARS. SUCH AREAS INCLUDE DENUDED AREAS, SOIL STOCKPILES, DIKES, DAMS, SIDES OF SEDIMENT BASINS, TEMPORARY ROAD BANKS, ETC. TEMPORARY SEEDING SHALL COMPLY WITH BEDFORD COUNTY REQUIREMENTS. SEE DETAIL ON THIS SHEET.

I. PERMANENT STABILIZATION PERMANENT SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE PROJECT ALIGNMENT. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN A YEAR. METHODS OF PERMANENT SOIL STABILIZATION SHALL COMPLY WITH THE VESCH (LATEST EDITION) AND SHALL BE IN ACCORDANCE WITH THE BEDFORD COUNTY EROSION AND SEDIMENT CONTROL ORDINANCE.

J. MAINTENANCE
1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED, INSPECTED (PERIODICALLY) AND REPAIRED AS NEEDED TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION BY THE CONTRACTOR.
2. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (LATEST EDITION).
3. CONTRACTOR SHALL SECURE SITES FOR STORAGE AND STOCKPILING OF MATERIALS. SITES ARE TO BE PROTECTED FROM EROSION AS PER SEDIMENT CONTROL NOTES.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE ENVIRONMENTAL INSPECTOR.
5. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES AFTER EACH RUN-OFF PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
6. SEE ADDITIONAL MAINTENANCE REQUIREMENTS FOR BEDFORD COUNTY, THIS SHEET.

K. STORMWATER RUNOFF CONSIDERATIONS
VEGETATED AREAS IN FOREST AND OPEN SPACE AREAS SHALL BE MOWED NO GREATER THAN 4 TIMES A YEAR IN ACCORDANCE WITH THE VRRM MANUAL.

L. CALCULATIONS
CALCULATIONS ARE SHOWN ON SHEETS C-9 AND C-10.

M. CONSTRUCTION SEQUENCE
PERIMETER CONTROLS (SILT FENCE) TO BE INSTALLED BEFORE CLEARING AND GRUBBING OCCUR. EC LINING AND ROCK CHECK DAMS TO BE INSTALLED AFTER DTICH IS GRADED. E&S CONTROLS TO BE REMOVED ONCE SITE IS STABILIZED.

BEDFORD COUNTY – MAINTENANCE REQUIREMENTS

3.02 CONSTRUCTION ENTRANCE
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE WASHING AND REWORKING OF EXISTING STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY STRUCTURES USED TO TRAP SEDIMENT.
2. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
3. THE USE OF WATER TRUCKS TO REMOVE MATERIALS DROPPED, WASHED, OR TRACKED ONTO ROADWAYS WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES.

3.05 SILT FENCE
1. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED SILT FENCE RESULTING FROM END RUNS AND UNDERCUTTING.
3. SHOULD THE FABRIC ON A SILT FENCE DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
4. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
5. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.

3.20 ROCK CHECK DAMS
1. CHECK DAMS SHOULD BE CHECKED FOR SEDIMENT ACCUMULATION AFTER EACH RUNOFF-PRODUCING STORM EVENT. SEDIMENT SHOULD BE REMOVED WHEN IT REACHES ONE HALF OF THE ORIGINAL HEIGHT OF THE MEASURE.
2. REGULAR INSPECTIONS SHOULD BE MADE TO INSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES. EROSION CAUSED BY HIGH FLOWS AROUND THE EDGES OF THE DAM SHOULD BE CORRECTED IMMEDIATELY.

E&S NOTES
1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN, DORMANT (UNDISTURBED) FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
2. EXCESS EXCAVATION DISPOSED OF OFF THE SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
3. EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED IN ACCORDANCE WITH VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK PRIOR TO GRADING AND SHALL BE PLACED PRIOR TO OR AS THE FIRST STEP OF THE LAND DISTURBING ACTIVITY.
4. EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED SO THAT THE SEDIMENT CARRYING RUNOFF FROM THE SITE WILL NOT ENTER STORM DRAINAGE FACILITIES.
5. EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED UNTIL THE DISTURBED AREA IS STABILIZED.
6. PROPERTIES ADJOINING THE SITE SHALL BE KEPT CLEAN OF MUD OR SILT CARRIED FROM THE SITE BY VEHICULAR TRAFFIC OR RUNOFF.
7. THE DISPOSAL OF WASTE MATERIALS REMOVED FROM EROSION AND SEDIMENT CONTROL FACILITIES AND THE DISPOSAL OF THESE FACILITIES SHALL BE IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
8. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
9. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
10. CONTRACTOR SHALL CONFORM TO THE MINIMUM STANDARDS OF THE VIRGINIA AND EROSION AND SEDIMENT CONTROL REGULATIONS.
11. NO DEBRIS SHALL BE BURIED ON SITE.
12. THE LAND DISTURBING PERMIT SHALL BE POSTED ON-SITE IN CLEAR VIEW FROM THE ROAD FROM ALL TIMES.
13. AN ON-SITE PRE-CONSTRUCTION CONFERENCE WITH THE BEDFORD COUNTY DEPARTMENT OF NATURAL RESOURCES SHALL BE REQUIRED PRIOR TO THE ISSUANCE OF THE LAND DISTURBANCE PERMIT.
14. PER SECTION 10.1-563 AND 10.1-566 OF THE CODE OF VIRGINIA, THE LAND DISTURBANCE PERMIT SHALL NOT BE ISSUED UNTIL THE CONTRACTOR HAS PROVIDED PROOF OF CERTIFICATE OF COMPETENCE FOR THE PARTY RESPONSIBLE FOR CARRYING OUT THE LAND-DISTURBING ACTIVITY.

TABLE 6-1 (VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK)

GENERAL EROSION AND SEDIMENT CONTROL NOTES

ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND THE VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS 9VAC25-840.

ES-2: THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.

ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.

ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.

ES-7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.

ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.

ES-9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

9VAC25-840-40. MINIMUM STANDARDS. (EFFECTIVE 11/17/16)

A VESCP MUST BE CONSISTENT WITH THE FOLLOWING CRITERIA, TECHNIQUES AND METHODS:

1. PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN SEVEN DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 14 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.
2. DURING CONSTRUCTION OF THE PROJECT, SOIL STOCK PILES AND BORROW AREAS SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. THE APPLICANT IS RESPONSIBLE FOR THE TEMPORARY PROTECTION AND PERMANENT STABILIZATION OF ALL SOIL STOCKPILES ON SITE AS WELL AS BORROW AREAS AND SOIL INTENTIONALLY TRANSPORTED FROM THE PROJECT SITE.
3. A PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED ON DENUDED AREAS NOT OTHERWISE PERMANENTLY STABILIZED. PERMANENT VEGETATION SHALL NOT BE CONSIDERED ESTABLISHED UNTIL A GROUND COVER IS ACHIEVED THAT IS UNIFORM, MATURE ENOUGH TO SURVIVE AND WILL INHIBIT EROSION.
4. SEDIMENT BASINS AND TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS AND OTHER MEASURES INTENDED TO TRAP SEDIMENT SHALL BE CONSTRUCTED AS A FIRST STEP IN ANY LAND-DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
5. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
6. SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.
   a. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT TRAP SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA AND THE TRAP SHALL ONLY CONTROL DRAINAGE AREAS LESS THAN THREE ACRES.
   b. SURFACE RUNOFF FROM DISTURBED AREAS THAT IS COMPRISED OF FLOW FROM DRAINAGE AREAS GREATER THAN OR EQUAL TO THREE ACRES SHALL BE CONTROLLED BY A SEDIMENT BASIN. THE MINIMUM STORAGE CAPACITY OF A SEDIMENT BASIN SHALL BE 134 CUBIC YARDS PER ACRE OF DRAINAGE AREA. THE OUTFALL SYSTEM SHALL, AT A MINIMUM, MAINTAIN THE STRUCTURAL INTEGRITY OF THE BASIN DURING A 25-YEAR STORM OF 24-HOUR DURATION. RUNOFF COEFFICIENTS USED IN RUNOFF CALCULATIONS SHALL CORRESPOND TO A BARE EARTH CONDITION OR THOSE CONDITIONS EXPECTED TO EXIST WHILE THE SEDIMENT BASIN IS UTILIZED.
7. CUT AND FILL SLOPES SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION. SLOPES THAT ARE FOUND TO BE ERODING EXCESSIVELY WITHIN ONE YEAR OF PERMANENT STABILIZATION SHALL BE PROVIDED WITH ADDITIONAL SLOPE STABILIZING MEASURES UNTIL THE PROBLEM IS CORRECTED.
8. CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.
9. WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
10. ALL STORM SEWER INLETS THAT ARE MADE OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT SEDIMENT-LADEN WATER CANNOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR OTHERWISE TREATED TO REMOVE SEDIMENT.
11. BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE CHANNEL AND RECEIVING CHANNEL.
12. WHEN WORK IN A LIVE WATERCOURSE IS PERFORMED, PRECAUTIONS SHALL BE TAKEN TO MINIMIZE ENCROACHMENT, CONTROL SEDIMENT TRANSPORT AND STABILIZE THE WORK AREA TO THE GREATEST EXTENT POSSIBLE DURING CONSTRUCTION. NONERODIBLE MATERIAL SHALL BE USED FOR THE CONSTRUCTION OF CAUSEWAYS AND COFFERDAMS. EARTHEN FILL MAY BE USED FOR THESE STRUCTURES IF ARMORED BY NONERODIBLE COVER MATERIALS.
13. WHEN A LIVE WATERCOURSE MUST BE CROSSED BY CONSTRUCTION VEHICLES MORE THAN TWICE IN ANY SIX-MONTH PERIOD, A TEMPORARY VEHICULAR STREAM CROSSING CONSTRUCTED OF NONERODIBLE MATERIAL SHALL BE PROVIDED.
14. ALL APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.
15. THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.
10. UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
   a. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
   b. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
   c. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
   d. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
   e. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THIS CHAPTER.
   f. APPLICABLE SAFETY REQUIREMENTS SHALL BE COMPLIED WITH.
17. WHERE CONSTRUCTION VEHICLE ACCESS ROUTES INTERSECT PAVED OR PUBLIC ROADS, PROVISIONS SHALL BE MADE TO MINIMIZE THE TRANSPORT OF SEDIMENT BY VEHICULAR TRACKING ONTO THE PAVED SURFACE. WHERE SEDIMENT IS TRANSPORTED ONTO A PAVED OR PUBLIC ROAD SURFACE, THE ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM THE ROADS BY SHOVELING OR SWEEPING AND TRANSPORTED TO A SEDIMENT CONTROL DISPOSAL AREA. STREET WASHING SHALL BE ALLOWED ONLY AFTER SEDIMENT IS REMOVED IN THIS MANNER. THIS PROVISION SHALL APPLY TO INDIVIDUAL DEVELOPMENT LOTS AS WELL AS TO LARGER LAND-DISTURBING ACTIVITIES.
18. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE VESCP AUTHORITY. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREAS RESULTING FROM THE DISPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.
19. PROPERTIES AND WATERWAYS DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUME, VELOCITY AND PEAK FLOW RATE OF STORMWATER RUNOFF FOR THE STATED FREQUENCY STORM OF 24-HOUR DURATION IN ACCORDANCE WITH THE FOLLOWING STANDARDS AND CRITERIA. STREAM RESTORATION AND RELOCATION PROJECTS THAT INCORPORATE NATURAL CHANNEL DESIGN CONCEPTS ARE NOT MAN-MADE CHANNELS AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS:
   a. CONCENTRATED STORMWATER RUNOFF LEAVING A DEVELOPMENT SITE SHALL BE DISCHARGED DIRECTLY INTO AN ADEQUATE NATURAL OR MAN-MADE RECEIVING CHANNEL, PIPE OR STORM SEWER SYSTEM. FOR THOSE SITES WHERE RUNOFF IS DISCHARGED INTO A PIPE OR PIPE SYSTEM, DOWNSTREAM STABILITY ANALYSES AT THE OUTFALL OF THE PIPE OR PIPE SYSTEM SHALL BE PERFORMED.
   b. ADEQUACY OF ALL CHANNELS AND PIPES SHALL BE VERIFIED IN THE FOLLOWING MANNER:
      (1) THE APPLICANT SHALL DEMONSTRATE THAT THE TOTAL DRAINAGE AREA TO THE POINT OF ANALYSIS WITHIN THE CHANNEL IS 100 TIMES GREATER THAN THE CONTRIBUTING DRAINAGE AREA OF THE PROJECT IN QUESTION; OR
      (2) (A) NATURAL CHANNELS SHALL BE ANALYZED BY THE USE OF A TWO-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED OR BANKS.
      (b) ALL PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS SHALL BE ANALYZED BY THE USE OF A 10-YEAR STORM TO VERIFY THAT STORMWATER WILL NOT OVERTOP ITS BANKS AND BY THE USE OF A TWO-YEAR STORM TO DEMONSTRATE THAT STORMWATER WILL NOT CAUSE EROSION OF CHANNEL BED OR BANKS; AND
      (c) PIPES AND STORM SEWER SYSTEMS SHALL BE ANALYZED BY THE USE OF A 10-YEAR STORM TO VERIFY THAT STORMWATER WILL BE CONTAINED WITHIN THE PIPE OR SYSTEM.
   c. IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:
      (1) IMPROVE THE CHANNELS TO A CONDITION WHERE A 10-YEAR STORM WILL NOT OVERTOP THE BANKS AND A TWO-YEAR STORM WILL NOT CAUSE EROSION TO THE CHANNEL, THE BED, OR THE BANKS; OR
      (2) IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE 10-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;
      (3) DEVELOP A SITE DESIGN THAT WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A TWO-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A NATURAL CHANNEL OR WILL NOT CAUSE THE PRE-DEVELOPMENT PEAK RUNOFF RATE FROM A 10-YEAR STORM TO INCREASE WHEN RUNOFF OUTFALLS INTO A MAN-MADE CHANNEL; OR
      (4) PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.
   d. THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.
   e. ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.
   f. IF THE APPLICANT CHOOSES AN OPTION THAT INCLUDES STORMWATER DETENTION, HE SHALL OBTAIN APPROVAL FROM THE VESCP OF A PLAN FOR MAINTENANCE OF THE DETENTION FACILITIES. THE PLAN SHALL SET FORTH THE MAINTENANCE REQUIREMENTS OF THE FACILITY AND THE PERSON RESPONSIBLE FOR PERFORMING THE MAINTENANCE.
   g. OUTFALL FROM A DETENTION FACILITY SHALL BE DISCHARGED TO A RECEIVING CHANNEL, AND ENERGY DISSIPATORS SHALL BE PLACED AT THE OUTFALL OF ALL DETENTION FACILITIES AS NECESSARY TO PROVIDE A STABILIZED TRANSITION FROM THE FACILITY TO THE RECEIVING CHANNEL.
   h. ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.
   i. INCREASED VOLUMES OF SHEET FLOWS THAT MAY CAUSE EROSION OR SEDIMENTATION ON ADJACENT PROPERTY SHALL BE DIVERTED TO A STABLE OUTLET, ADEQUATE CHANNEL, PIPE OR PIPE SYSTEM, OR TO A DETENTION FACILITY.
   j. IN APPLYING THESE STORMWATER MANAGEMENT CRITERIA, INDIVIDUAL LOTS OR PARCELS IN A RESIDENTIAL, COMMERCIAL OR INDUSTRIAL DEVELOPMENT SHALL NOT BE CONSIDERED TO BE SEPARATE DEVELOPMENT PROJECTS. INSTEAD, THE DEVELOPMENT, AS A WHOLE, SHALL BE CONSIDERED TO BE A SINGLE DEVELOPMENT PROJECT. HYDROLOGIC PARAMETERS THAT REFLECT THE ULTIMATE DEVELOPMENT CONDITION SHALL BE USED IN ALL ENGINEERING CALCULATIONS.
   k. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.
   l. ANY PLAN APPROVED PRIOR TO JULY 1, 2014, THAT PROVIDES FOR STORMWATER MANAGEMENT THAT ADDRESSES ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS SHALL SATISFY THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS IF THE PRACTICES ARE DESIGNED TO (I) DETAIN THE WATER QUALITY VOLUME AND TO RELEASE IT OVER 48 HOURS; (II) DETAIN AND RELEASE OVER A 24-HOUR PERIOD THE EXPECTED RAINFALL RESULTING FROM THE ONE YEAR, 24-HOUR STORM; AND (III) REDUCE THE ALLOWABLE PEAK FLOW RATE RESULTING FROM THE 1.5, 2, AND 10-YEAR, 24-HOUR STORMS TO A LEVEL THAT IS LESS THAN OR EQUAL TO THE PEAK FLOW RATE FROM THE SITE ASSUMING IT WAS IN A GOOD FORESTED CONDITION, ACHIEVED THROUGH MULTIPLICATION OF THE FORESTED PEAK FLOW RATE BY A REDUCTION FACTOR THAT IS EQUAL TO THE RUNOFF VOLUME FROM THE SITE WHEN IT WAS IN A GOOD FORESTED CONDITION DIVIDED BY THE RUNOFF VOLUME FROM THE SITE IN ITS PROPOSED CONDITION, AND SHALL BE EXEMPT FROM ANY FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS FOR NATURAL OR MAN-MADE CHANNELS AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO § 62.1-44.15:54 OR 62.1-44.15:65 OF THE ACT.
   m. FOR PLANS APPROVED ON AND AFTER JULY 1, 2014, THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT AND THIS SUBSECTION SHALL BE SATISFIED BY COMPLIANCE WITH WATER QUANTITY REQUIREMENTS IN THE STORMWATER MANAGEMENT ACT (§ 62.1-44.15:24 ET SEQ. OF THE CODE OF VIRGINIA) AND ATTENDANT REGULATIONS, UNLESS SUCH LAND-DISTURBING ACTIVITIES (I) ARE IN ACCORDANCE WITH PROVISIONS FOR TIME LIMITS ON APPLICABILITY OF APPROVED DESIGN CRITERIA IN 9VAC25-870-47 OR GRANDFATHERING IN 9VAC25-870-48 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION, IN WHICH CASE THE FLOW RATE CAPACITY AND VELOCITY REQUIREMENTS OF § 62.1-44.15:52 A OF THE ACT SHALL APPLY, OR (II) ARE EXEMPT PURSUANT TO § 62.1-44.15:34 C 7 OF THE ACT.
   n. COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN 9VAC25-870-66 OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) REGULATION SHALL BE DEEMED TO SATISFY THE REQUIREMENTS OF THIS SUBDIVISION 19.

STATUTORY AUTHORITY

§ 62.1-44.15:52 OF THE CODE OF VIRGINIA.

HISTORICAL NOTES

FORMER 4VAC50-30-40, DERIVED FROM VR625-02-00 § 4; EFF. SEPTEMBER 13, 1990; AMENDED, VIRGINIA REGISTER VOLUME 11, ISSUE 11, EFF. MARCH 22, 1995; VOLUME 29, ISSUE 4, EFF. NOVEMBER 21, 2012; AMENDED AND RENUMBERED, VIRGINIA REGISTER VOLUME 30, ISSUE 2, EFF. OCTOBER 23, 2013; AMENDED, VIRGINIA REGISTER VOLUME 31, ISSUE 24, EFF. AUGUST 26, 2015; VOLUME 33, ISSUE 4, EFF. NOVEMBER 17, 2016.

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
11/01/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: N/A
VERT.: N/A

DATE: NOVEMBER 1, 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

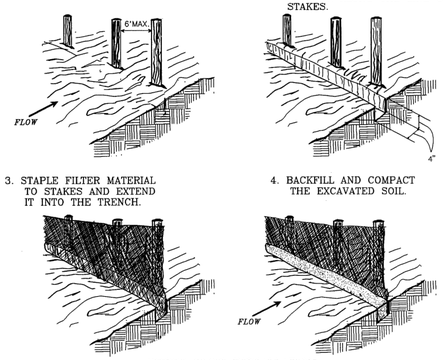
SHEET 8 OF 30

DRAWING C-6

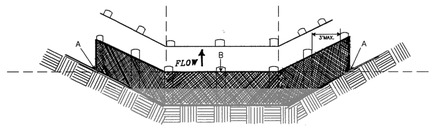
N:\46626-003\CADD\46626003C1-06.DWG

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)

1. SET THE STAKES.
2. EXCAVATE A 4"X 4" TRENCH UPSLOPE ALONG THE LINE OF STAKES.
3. STAPLE FILTER MATERIAL TO STAKES AND EXTEND IT INTO THE TRENCH.
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



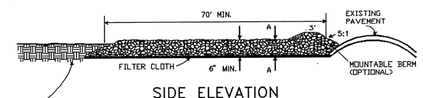
SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)



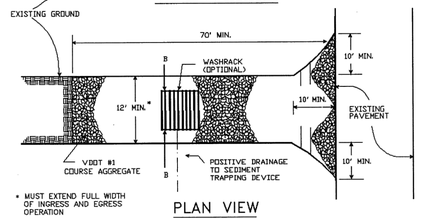
POINTS A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)

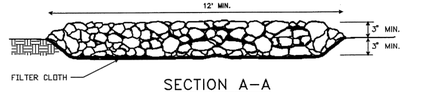
STONE CONSTRUCTION ENTRANCE



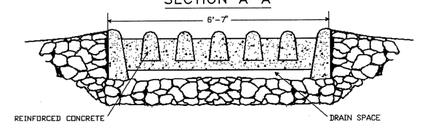
SIDE ELEVATION



PLAN VIEW



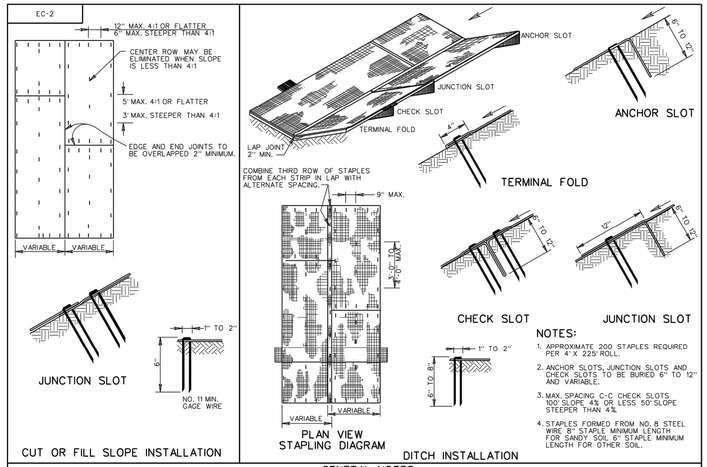
SECTION A–A



SECTION B–B

2016 ROAD & BRIDGE STANDARDS

EC-2



NOTES:

1. APPROXIMATE 200 STAPLES REQUIRED PER 4'X 225' ROLL.
2. ANCHOR SLOTS, JUNCTION SLOTS AND CHECK SLOTS TO BE BURIED 6" TO 12" AND VARIABLE.
3. MAX. SPACING C-C CHECK SLOTS 100' SLOPE 4% OR LESS 50' SLOPE STEEPER THAN 4%.
4. STAPLES FORMED FROM NO. 8 STEEL WIRE 8" STAPLE MINIMUM LENGTH FOR SANDY SOIL 6" STAPLE MINIMUM LENGTH FOR OTHER SOIL.

GENERAL NOTES:

1. ROLLED EROSION CONTROL PRODUCT IS TO BE LOCATED AS INDICATED ON THE PLANS IN ACCORDANCE WITH THE DIMENSIONS SPECIFIED ON TYPICAL SECTION.
2. "T-TOP" STAPLES OR OTHER MANUFACTURER'S DESIGN APPROVED BY THE ENGINEER MAY BE SUBSTITUTED FOR THE STAPLES SHOWN.
3. WIDTH OF MATERIAL MAY VARY FROM MINIMUM DIMENSION BY INCREMENTS OF 4 OR 5 FEET.
4. FOR SOURCES OF APPROVED MATERIAL SEE VDOT'S APPROVED PRODUCTS LIST FOR EC-2 MATERIALS TYPES 1, 2, 3, OR 4.

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

VDOT ROAD AND BRIDGE STANDARDS	ROLLED EROSION CONTROL PRODUCT PROTECTIVE COVERING INSTALLATION CRITERIA (TEMPORARY USE) VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 1 OF 1	REVISION DATE 07/16	244 606
113.02		

2016 ROAD & BRIDGE STANDARDS

SEEDING REQUIREMENTS

Virginia Erosion and Sediment Control Regulation Minimum Standard #1

Permanent or temporary soil stabilization shall be applied to denuded areas within 7 days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within 7 days to denuded areas that may not be at final grade but that will remain dormant (undisturbed) for longer than 30 days. Permanent stabilization shall be applied to areas that are to be left dormant for more that one year.

PERMANENT SEEDING (rates per acre):

For lawn stabilization

February 1 to May 15	100 lbs. tall fescue 15 lbs. annual rye 2 lbs. red clover
May 16 to July 31	120 lbs. tall fescue 10 lbs. foxtail millet 2 lbs. red clover
August 1 to September 15	100 lbs. tall fescue 15 lbs. annual rye 2 lbs. red clover
September 16 to January 31	120 lbs. tall fescue 10 lbs. cereale rye 2 lbs. red clover

For wildlife plantings or natural areas

Year-round broadcast rate	5 lbs. orchard grass 5 lbs. ladino clover OR 3 lbs. crown vetch OR 8 lbs. hairy vetch
For steeply-sloped areas	40 lbs. tall fescue 10 lbs. ladino clover

TEMPORARY SEEDING (rates per acre)

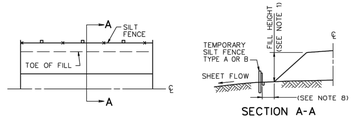
Winter	40 lbs. annual rye
Summer	40 lbs. cereale rye 40 lbs. annual rye 40 lbs. foxtail millet

FERTILIZER AND LIME (required for both temporary and permanent seeding and all seasons)
Fertilizer – 1500 lbs. of 10-18-10 per acre
Lime – 2 tons per acre

MULCHING
Straw at 80 bales per acre or an approved manufactured mulch/stabilization fabric or material

2016 ROAD & BRIDGE STANDARDS

EC-5

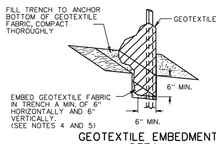


SECTION A-A

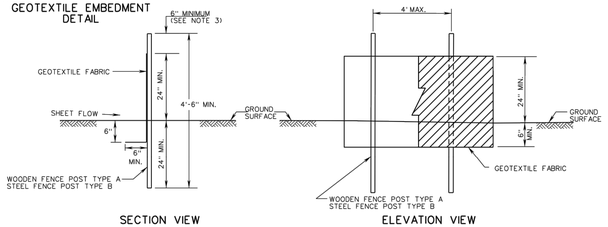
TYPICAL DETAIL FOR TEMPORARY SILT FENCE AT TOE OF FILL

NOTES

1. TYPE A SILT FENCE WILL HAVE WOODEN POSTS AND IS LIMITED TO FILL HEIGHTS OF 20 FEET OR LESS. TYPE B SILT FENCE WILL HAVE STEEL POSTS AND MUST BE USED WHERE THE FILL HEIGHT EXCEEDS 20 FEET.
2. WOODEN POSTS SHALL BE OAK AND HAVE NOMINAL DIMENSIONS OF 2" BY 2". STEEL POSTS SHALL HAVE A MINIMUM WEIGHT OF 1.25 POUNDS PER LINEAR FOOT.
3. ALL POSTS SHALL BE DRIVEN 24" MIN. INTO THE GROUND AND SHALL EXTEND 6" ABOVE THE FILTER FABRIC.
4. GEOTEXTILE FABRIC SHALL BE EMBEDDED 12" INTO THE GROUND (6" VERTICALLY AND 6" HORIZONTALLY ALONG THE BOTTOM OF TRENCH) AS SHOWN IN DETAILS.
5. SLICING IS AN APPROVED ALTERNATIVE TO TRENCHING FOR ANCHORING THE GEOTEXTILE FABRIC INTO THE GROUND. SLICING SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SECTION 303 OF THE ROAD AND BRIDGE SPECIFICATIONS.
6. WHEN TWO SEPARATE SECTIONS OF GEOTEXTILE FABRIC ADJOIN EACH OTHER, THEY SHALL OVERLAP BY 6" AND BE DOUBLE FOLDED.
7. GEOTEXTILE FABRIC SHALL BE FASTENED SECURELY TO THE POSTS AT BOTH THE TOP AND VERTICAL MIDPOINT OF THE GEOTEXTILE FABRIC.
8. WHEN THE DISTANCE FROM THE TOE OF THE FILL TO THE SILT FENCE IS NOT PROVIDED IN THE PLANS A MINIMUM OF 5 FEET WILL BE USED.
9. MATERIALS FOR ALL SILT FENCE SHALL CONFORM TO THE REQUIREMENTS OF SECTION 242 OF THE VDOT ROAD & BRIDGE SPECIFICATIONS.
10. THE GEOTEXTILE FABRIC FOR SILT FENCE SHALL BE FROM THE VDOT MATERIALS APPROVED LIST 63.



GEOTEXTILE EMBEDMENT DETAIL



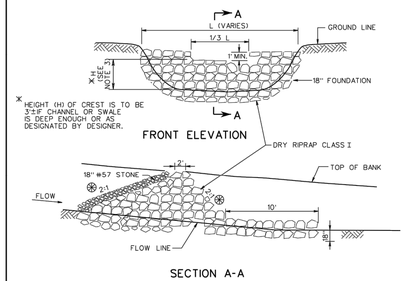
SECTION VIEW ELEVATION VIEW

SPECIFICATION REFERENCE	TEMPORARY SILT BARRIERS SILT FENCE (TYPE A & B) VIRGINIA DEPARTMENT OF TRANSPORTATION	VDOT ROAD AND BRIDGE STANDARDS
107 242 245 303		REVISION DATE 04/20 — SHEET 1 OF 2 113.07

2016 ROAD & BRIDGE STANDARDS

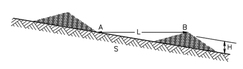
EC-4

TYPICAL DETAIL FOR ROCK CHECK DAM TYPE I



SECTION A-A

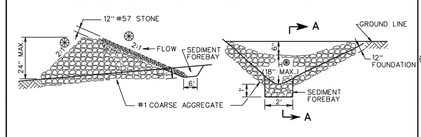
SUGGESTED ROCK CHECK DAM SPACING



L = H/S WHERE:
H = HEIGHT OF DAM CREST IN FEET
S = CHANNEL SLOPE IN FT/FT
L = CHECK DAM SPACING IN FEET; THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

CHECK DAM SPACING, L TO BE DETERMINED FROM THE EQUATION. IN STEEP SLOPE AREAS THE CHECK DAM SPACING IS NOT TO BE LESS THAN 25'.

TYPICAL DETAIL FOR ROCK CHECK DAM TYPE II



SECTION A-A FRONT ELEVATION

NOTES:

1. ROCK CHECK DAMS THAT ARE DESIGNATED ON THE PLANS AS A STORMWATER MANAGEMENT (SWM) ITEM ARE TO BE LEFT IN PLACE AS A PERMANENT INSTALLATION.
2. WHERE DRAINAGE AREAS EXCEED 1 ACRE OR DITCH GRADE EXCEEDS 3%, A TEMPORARY SEDIMENT FOREBAY SHALL BE INSTALLED WITH MINIMUM DIMENSIONS OF 12" DEPTH, 2' WIDTH AND 6' LENGTH.
3. IF A CHECK DAM IS LOCATED INSIDE CLEAR ZONE AND ADJACENT TO A TRAVELWAY, SLOPE FACING ON COMING TRAFFIC IS TO BE 6:1 AND MAXIMUM H IS TO BE 12".
4. CHECK DAM SHALL NOT BE USED FOR LOCATIONS IN LIVE STREAM.

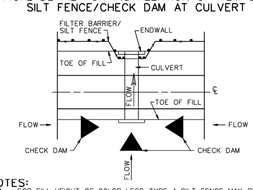
CHECK DAM (ROCK) TY. I, ITEM CODE 27410 EACH
CHECK DAM (ROCK) TY. II, ITEM CODE 27415 EACH

VDOT ROAD AND BRIDGE STANDARDS	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. ROCK CHECK DAMS TYPE I & II VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 1 OF 1 — REVISION DATE 04/19		107 303
113.06		

2016 ROAD & BRIDGE STANDARDS

EC-6

TYPICAL DETAIL FOR INSTALLATION OF TEMPORARY SILT FENCE/CHECK DAM AT CULVERT



NOTES:

1. FOR FILL HEIGHT OF 20' OR LESS, TYPE A SILT FENCE MAY BE USED. FOR FILL HEIGHT GREATER THAN 20', TYPE B SILT FENCE IS REQUIRED.
2. ROCK CHECK DAM IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-4 OR EC-16 AS DETERMINED BY THE ENGINEER.
3. SILT FENCE IS TO BE INSTALLED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS, AND STANDARD EC-5.

* INSTALLATION DETAIL ONLY -- ROCK CHECK DAMS AND SILT FENCE TO BE PAID FOR IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS.

VDOT ROAD AND BRIDGE STANDARDS	A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. INLET PROTECTION (TYPE C) VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 3 OF 3 — REVISION DATE 04/19		107 242 303
113.10A		

2016 ROAD & BRIDGE STANDARDS

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: N/A
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

SHEET 9 OF 30

DRAWING C-7

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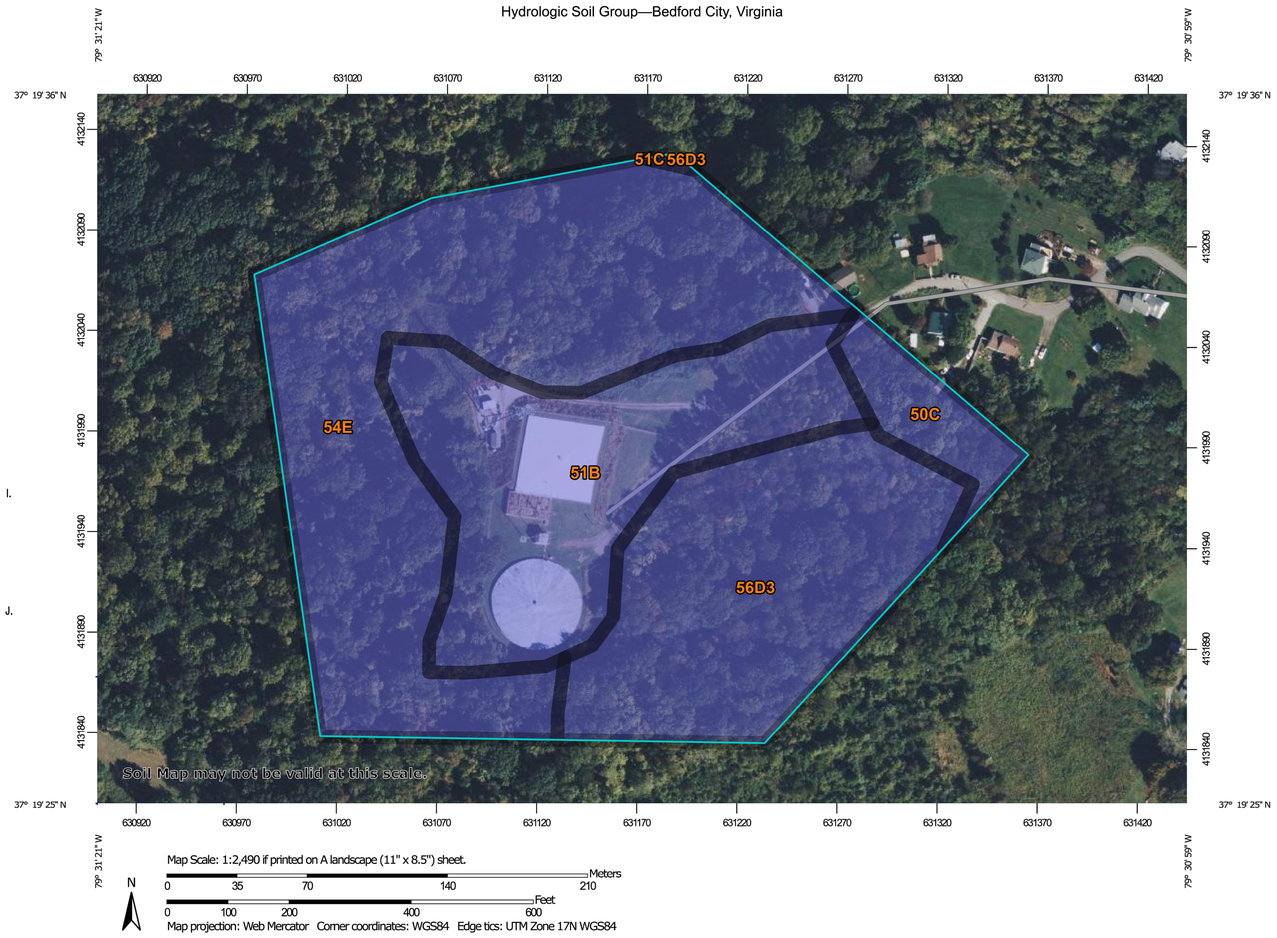

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
50C	Clifford fine sandy loam, 7 to 15 percent slopes	B	0.9	4.7%
51B	Clifford-Urban land complex, 2 to 7 percent slopes	B	5.2	25.7%
51C	Clifford-Urban land complex, 7 to 20 percent slopes	B	0.0	0.0%
54E	Rhodhiss loam, 25 to 60 percent slopes	B	9.0	44.5%
56D3	Fairview sandy clay loam, 15 to 25 percent slopes, severely eroded	B	5.1	25.2%
Totals for Area of Interest			**20.2**	**100.0%**

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
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BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

SHEET 10 OF 30

DRAWING C-8

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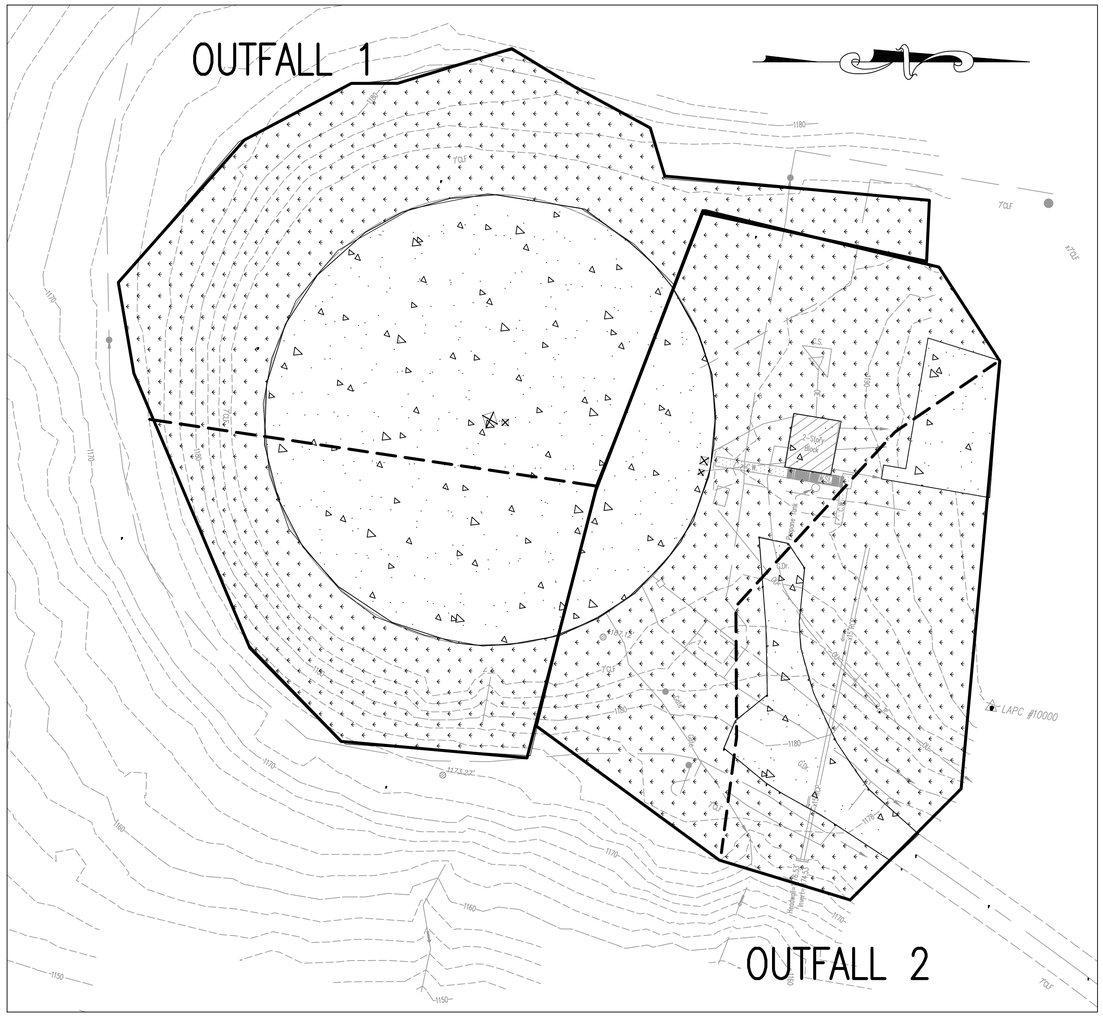
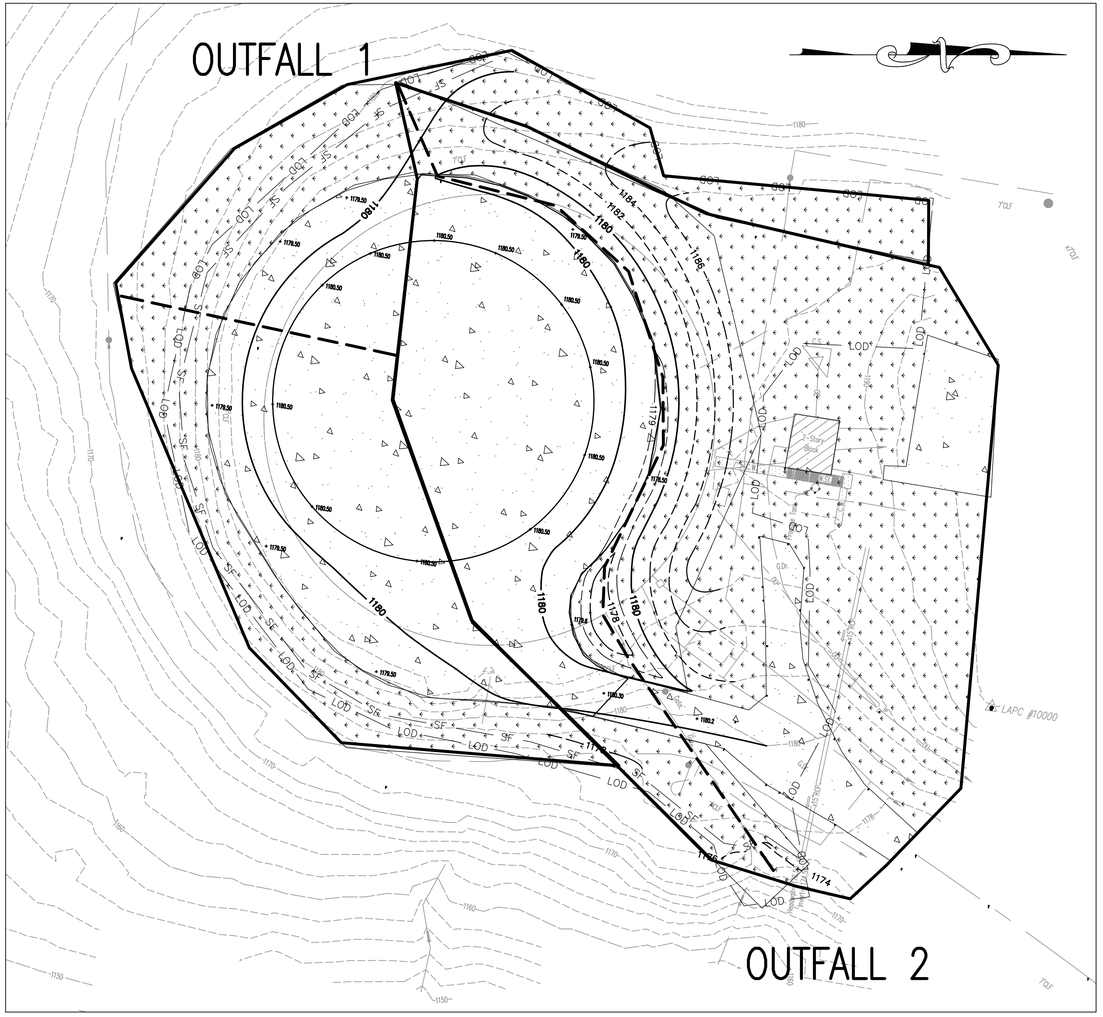


PRE-DEVELOPMENT DRAINAGE AREAS



POST-DEVELOPMENT DRAINAGE AREAS

LEGEND

TIME OF CONCENTRATION PATH

TURF

IMPERVIOUS

0 25' 50'

SCALE: 1" = 25'

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 1" = 25'
VERT.: N/A

DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
EXISTING AND PROPOSED DRAINAGE AREA PLAN

SHEET 11 OF 30

DRAWING C-9

N:\46626-003\CADD\46626003C1-09.DWG

WHITMAN, REQUARDT AND ASSOCIATES, LLP
Helm Street Tank (DECEMBER-2022)

OUTFALL 1
RATIONAL METHOD HYDROLOGY

PRE-DEVELOPMENT **VS.** **POST-DEVELOPMENT**

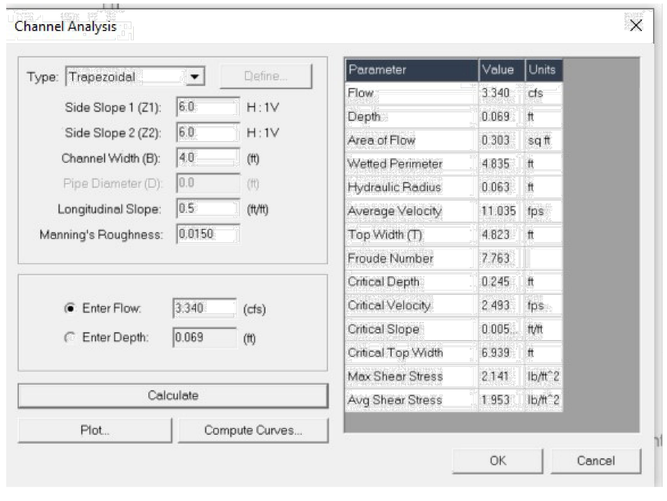
LANDUSE	*PRE-DEVELOPMENT*				*POST-DEVELOPMENT*		
	AREA(AC.)	C	CA		AREA(AC.)	C	CA
GRASSED	0.42	0.50	0.21		0.18	0.50	0.09
IMPERVIOUS	0.32	0.90	0.29		0.30	0.90	0.27
TOTAL	0.74 AC	*0.67AVG*	0.50		0.48 AC	*0.75AVG*	0.36

TIME OF CONC. (Tc)	LENGTH	SLOPE	HEIGHT	AVG. VEL	TRAVEL TIME	C	PIPE DIA.
TRAVEL PATH	FT.	FT/FT	FT.	FPS	MIN.		IN.
PRE-DEVELOPMENT							
OVERLAND (SEELYE) A - B	148.0	0.020	3.0	0.3	7.70	0.50	
TOT. LENGTH =	148	*2.03%*	*3.0*	TOT Tc=	7.70 MIN.	*AVG. V=0.3*	

TIME OF CONC. (Tc)	LENGTH	SLOPE	HEIGHT	AVG. VEL	TRAVEL TIME	C	PIPE DIA.
TRAVEL PATH	FT.	FT/FT	FT.	FPS	MIN.		IN.
POST-DEVELOPMENT							
OVERLAND (SEELYE) A - B	93.0	0.032	3.0	0.3	5.80	0.50	
TOT. LENGTH =	93	*3.23%*	*3.0*	TOT Tc=	5.80 MIN.	*AVG. V=0.3*	

RAINFALL INTENSITY	COUNTY / CITY =	Bedford			PRE-DEVELOPMENT		POST-DEVELOPMENT	
FREQUENCY	B	D	E	Cf	Tc	I (IN/HR)	Tc	I (IN/HR)
2-YR	45.85	10.94	0.82	1.00	7.70	**4.16**	5.80	**4.55**
5-YR	50.40	10.91	0.79	1.00	7.70	**5.00**	5.80	**5.45**
10-YR	51.89	10.64	0.77	1.00	7.70	**5.52**	5.80	**6.01**
25-YR	51.58	10.03	0.73	1.10	7.70	**6.96**	5.80	**7.56**
50-YR	50.54	9.57	0.70	1.20	7.70	**8.26**	5.80	**8.96**
100-YR	48.91	8.99	0.68	1.25	7.70	**9.02**	5.80	**9.79**
	Nearest Precipitation Gage				I =Cf*B/(Tc+D)^E			

DISCHARGES (CFS)			
FREQUENCY	PRE-DEVELOPMENT		POST-DEVELOPMENT
2-YR	2.09		1.65
5-YR	2.51		1.98
10-YR	2.77		2.18
25-YR	3.49		2.74
50-YR	4.14		3.25
100-YR	4.52		3.55



WHITMAN, REQUARDT AND ASSOCIATES, LLP
Helm Street Tank (DECEMBER-2022)

OUTFALL 2
RATIONAL METHOD HYDROLOGY

PRE-DEVELOPMENT **VS.** **POST-DEVELOPMENT**

LANDUSE	*PRE-DEVELOPMENT*				*POST-DEVELOPMENT*		
	AREA(AC.)	C	CA		AREA(AC.)	C	CA
GRASSED	0.42	0.50	0.21		0.49	0.50	0.25
IMPERVIOUS	0.15	0.90	0.13		0.34	0.90	0.30
TOTAL	0.57 AC	*0.60AVG*	0.35		0.83 AC	*0.66AVG*	0.55

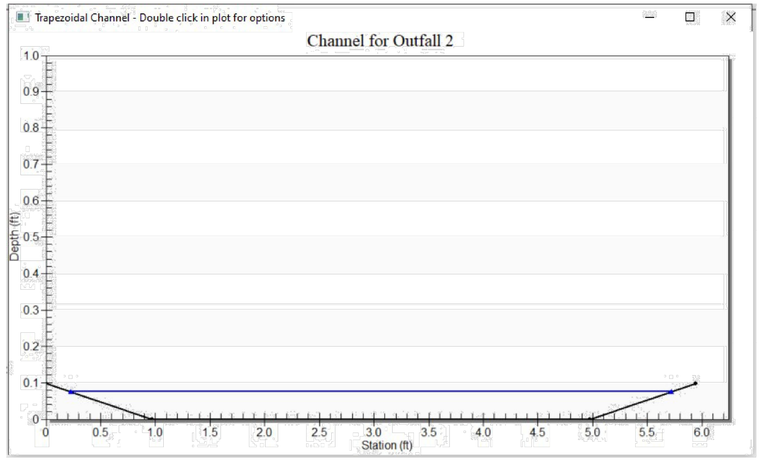
TIME OF CONC. (Tc)	LENGTH	SLOPE	HEIGHT	AVG. VEL	TRAVEL TIME	C	PIPE DIA.
TRAVEL PATH	FT.	FT/FT	FT.	FPS	MIN.		IN.
PRE-DEVELOPMENT							
OVERLAND (SEELYE) A - B	150.0	0.040	6.0	0.4	6.80	0.50	
SWALE (KIRPICH)	49.0	0.061	3.0	1.6	0.51		
TOT. LENGTH =	199	*4.52%*	*9.0*	TOT Tc=	7.31 MIN.	*AVG. V=0.5*	

TIME OF CONC. (Tc)	LENGTH	SLOPE	HEIGHT	AVG. VEL	TRAVEL TIME	C	PIPE DIA.
TRAVEL PATH	FT.	FT/FT	FT.	FPS	MIN.		IN.
POST-DEVELOPMENT							
OVERLAND (SEELYE) A - B	34.0	0.029	1.0	0.1	3.87	0.50	
DITCH (MANNING) B - C	201.0	0.015	3.0	2.2	1.51		
CULVERT (MANNING) C - D	92.0	0.043	4.0	11.0	0.14		15
TOT. LENGTH =	327	*2.45%*	*8.0*	TOT Tc=	5.52 MIN.	*AVG. V=1.0*	

RAINFALL INTENSITY	COUNTY / CITY =	Bedford			PRE-DEVELOPMENT		POST-DEVELOPMENT	
FREQUENCY	B	D	E	Cf	Tc	I (IN/HR)	Tc	I (IN/HR)
2-YR	45.85	10.94	0.82	1.00	7.31	**4.24**	5.52	**4.61**
5-YR	50.40	10.91	0.79	1.00	7.31	**5.09**	5.52	**5.52**
10-YR	51.89	10.64	0.77	1.00	7.31	**5.62**	5.52	**6.09**
25-YR	51.58	10.03	0.73	1.10	7.31	**7.07**	5.52	**7.65**
50-YR	50.54	9.57	0.70	1.20	7.31	**8.39**	5.52	**9.07**
100-YR	48.91	8.99	0.68	1.25	7.31	**9.16**	5.52	**9.92**
	Nearest Precipitation Gage				I =Cf*B/(Tc+D)^E			

cc

DISCHARGES (CFS)			
FREQUENCY	PRE-DEVELOPMENT		POST-DEVELOPMENT
2-YR	1.46		2.53
5-YR	1.76		3.03
10-YR	1.94		3.34
25-YR	2.44		4.20
50-YR	2.90		4.98
100-YR	3.16		5.44



CHANNEL COMPS SHOW OUTFALL 2 CHANNEL IS NON-EROSIVE BASED ON SHEAR STRESS AND CONTAINS THE 10-YEAR FLOW. NO DOWNSTREAM FLOODING OCCURING.

OUTFALL 1 IS SHEET FLOW. 10-YR POST IS LESS THAN 10-YR PRE.

N:\46626-003\CADD\46626003C1-10.DWG

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE: HORIZ.: N/A VERT.: N/A
DATE: AUGUST 2023
DESIGNED: JBD
DRAWN: JBD
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DRAINAGE CALCULATIONS

SHEET 12 OF 30

DRAWING C-10

Project Name:	Helm Street Tank Site Plan
Date:	12/20/2022
	Linear Development Project? No

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area *(acres)* → 0.99

Maximum reduction required:	*10%*
The site's net increase in impervious cover (acres) is:	*0.077203857*
Post-Development TP Load Reduction for Site (lb/yr):	*0.07*

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space					0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed		0.57			0.57
Impervious Cover (acres)		0.42			0.42
					0.99

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land		0.47			0.47
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed		0.03			0.03
Impervious Cover (acres)		0.49			0.49
Area Check	OK.	OK.	OK.	OK.	0.99

** Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method*

Whitman, Requardt & Associates, LLP

12/20/2022

VDOT STD. FORM LD-268 - DITCH COMPUTATIONS
SITE: HELM STREET TANK

DITCH TYPE	BW	SS
TYP-1	0	2 AND 2

PROJECT: HELM STREET TANK
COUNTY: BEDFORD
BY: WHITMAN, REQUARDT AND ASSOCIATES, LLP

DESIGNED BY: JBD
CHECKED BY: DSG

STA. TO STA.		FLOW DIR.	HYDROLOGY-RATIONAL "C" VALUE 0.9 =PVT WIDTH OF STRIP (FT)	CxA (AC.)	0.5 =ROW WIDTH OF STRIP (FT)	CxA (AC.)	0.3 =OFFSITE WIDTH OF STRIP (FT)	CxA (AC.)	CxA INCR. (AC.)	CxA ACCUM. (AC.)	Tc (MIN.)	I-2 (IN/HR)	Q-2 (CFS)	DITCH TYPE	SLOPE (FT/FT)	ALLOW. SHEAR STRESS (LBS/FT^2)	EARTH n=0.030 SHEAR STRESS (LBS/FT^2)	PROTECTIVE LINING (2-YR DESIGN) n = 0.05 SHEAR STRESS (LBS/FT^2)	DEP. (FT)	n = 0.015 SHEAR STRESS (LBS/FT^2)	DEP. (FT)	I-10 (IN/HR)	Q-10 (CFS)	DEP. (FT)	REQ'D DITCH LINING	PROPOSED DITCH LINING
Helm Street Tank--Left																										
10+00	10+25	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.037	5.0	3.99	0.15	TYP-1	0.0100	0.05	0.07	0.08	0.30	NOT REQ'D	NOT REQ'D	6.24	0.23	0.36	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
10+25	10+50	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.074	5.4	3.92	0.29	TYP-1	0.0100	0.05	0.09	0.11	0.39	NOT REQ'D	NOT REQ'D	6.14	0.45	0.46	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
10+50	10+75	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.111	5.6	3.86	0.43	TYP-1	0.0100	0.05	0.10	0.13	0.45	NOT REQ'D	NOT REQ'D	6.05	0.67	0.53	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
10+75	11+00	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.148	5.9	3.81	0.56	TYP-1	0.0100	0.05	0.11	0.14	0.50	NOT REQ'D	NOT REQ'D	5.98	0.88	0.59	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
11+00	11+25	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.185	6.2	3.76	0.70	TYP-1	0.0100	0.05	0.13	0.15	0.54	NOT REQ'D	NOT REQ'D	5.91	1.09	0.64	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
11+25	11+50	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.222	6.4	3.71	0.82	TYP-1	0.0100	0.05	0.13	0.16	0.58	NOT REQ'D	NOT REQ'D	5.84	1.30	0.69	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
11+50	11+75	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.259	6.6	3.67	0.95	TYP-1	0.0100	0.05	0.14	0.17	0.61	NOT REQ'D	NOT REQ'D	5.78	1.50	0.72	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1
11+75	12+00	▲	52.3	0.0270	34.8	0.0100	0.0	0.0000	0.0370	0.296	6.9	3.63	1.08	TYP-1	0.0100	0.05	0.15	0.18	0.64	NOT REQ'D	NOT REQ'D	5.73	1.70	0.76	EC-2, JUTE MESH TYPE-1	EC-2, JUTE MESH TYPE-1

VDOT CULVERT ANALYSIS - STD. FORM LD-269

Project: Helm Street Tank
Location: Bedford, VA

DESIGNED BY: JBD
CHECKED BY: DG

Structure No.:		15" Culvert

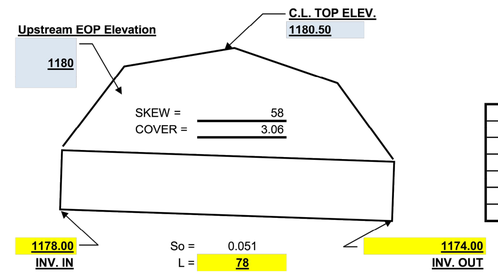
HYDROLOGICAL DATA:

DISCHARGES USED:

FREQ.	Q (CFS)	TW	
2-YR	1.4	0.25	PROPOSED CONDITIONS
10-YR	1.9	0.30	
25-YR	2.4	0.34	
50-YR	2.9	0.38	
100-YR	3.3	0.41	

AHW Controls

100-yr Flood Plain Elev.----------	=	NA
Design AHW Depth (DITCH SADDLE HP)	=	1180.0
Structures Elev.----------	=	NA
L.P. Overtop Elev.----------	=	1180.50
L.P. Shoulder Elev.----------	=	1180
Invert In----------	=	1178
Invert Out----------	=	1174
So----------	=	0.051
Length----------	=	78
n' Value----------	=	0.013
Overflow Weir Length----------	=	15



FREEBOARD CHART	
STORM EVENT	FREEBOARD (FT)
2-YR	1.38
10-YR	1.26
25-YR	1.14
50-YR	1.03
100-YR	0.94

CULVERT TYPE & SIZE									HEADWATER COMPUTATIONS										CONTR. HW ELEV. (FT)	OUTLET VELOCITY (FPS)	END TREATMENT REQ'D	COMMENTS	ADJ. OVER-TOP HW EL.	FINAL HW/D RATIO
TYPE	I.C. CHART NO.	I.C. CHART SCALE	PIPE DIA. (IN.)	BOX WIDTH (FT.)	BOX/PIPE HEIGHT (FT.)	NO. OF BRL's	Q (CFS)	Q/B	INLET CONTROL HW/D	INLET CONTROL HW (FT.)	OUTLET CONTROL Ke	dc (FT.)	(dc+D)/2 (FT.)	ho (FT.)	H (FT.)	Lso (FT.)	HW (FT.)							
PROPOSED CONDITIONS	1	2	15	0	1.25	1	1.4	N.A.	0.49	0.62	0.5	0.5	0.86	0.86	0.07	4.0	0.25		1178.62	7.4	EC-1, CLASS A1	I.C.-CHECK SHLDR.	1178.62	0.49
	1	2	15	0	1.25	1	1.9	N.A.	0.59	0.74	0.5	0.5	0.89	0.89	0.12	4.0	0.30		1178.74	8.2	EC-1, CLASS I	I.C.-CHECK SHLDR.	1178.74	0.59
	1	2	15	0	1.25	1	2.4	N.A.	0.69	0.86	0.5	0.6	0.93	0.93	0.20	4.0	0.34		1178.86	8.8	EC-1, CLASS I	I.C.-CHECK SHLDR.	1178.86	0.69
	1	2	15	0	1.25	1	2.9	N.A.	0.78	0.97	0.5	0.7	0.96	0.96	0.29	4.0	0.38		1178.97	9.3	EC-1, CLASS I	I.C.-CHECK SHLDR.	1178.97	0.78
	1	2	15	0	1.25	1	3.3	N.A.	0.85	1.06	0.5	0.7	0.99	0.99	0.38	4.0	0.40		1179.06	9.6	EC-1, CLASS I	I.C.-CHECK SHLDR.	1179.06	0.85

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: N/A
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: JBD
DRAWN: JBD
CHECKED: PJM
PROJECT NO.: 46626-003

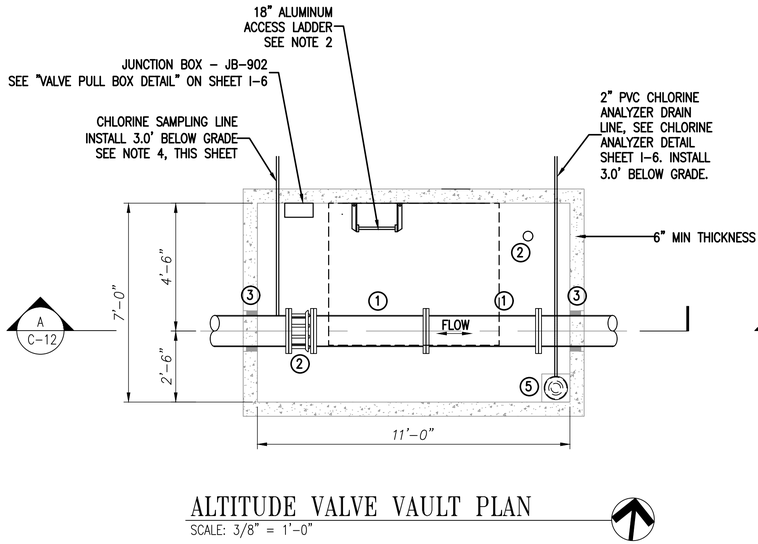
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DRAINAGE CALCULATIONS

SHEET 13 OF 30

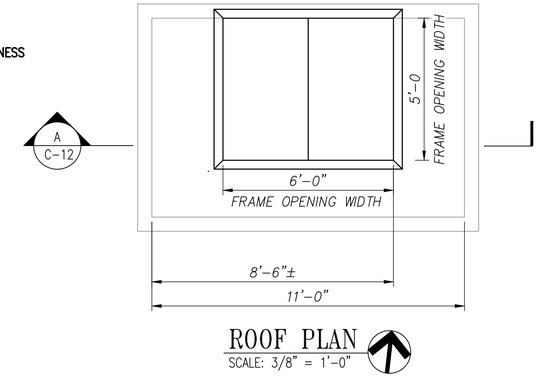
DRAWING C-11

N:\46626-003\CAD\46626003C1-11.DWG



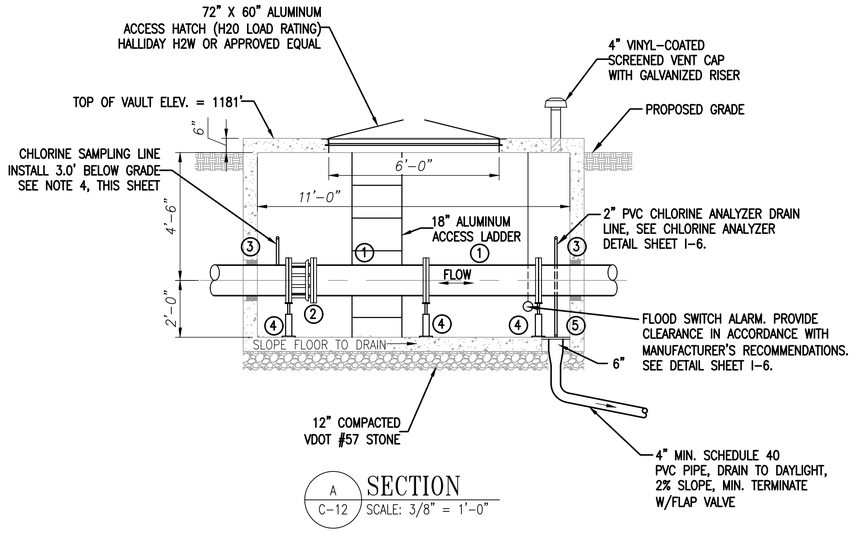
ALTITUDE VALVE VAULT PLAN

SCALE: 3/8" = 1'-0"



ROOF PLAN

SCALE: 3/8" = 1'-0"



A C-12 SECTION

SCALE: 3/8" = 1'-0"

EQUIPMENT LIST

1. 12" SPOOL PIECE, FLANGED
2. 12" DISMANTLING JOINT
3. DOUBLE LINK-SEAL
4. ADJUSTABLE PIPE STAND
5. FLOOR DRAIN WITH STAINLESS STEEL GRATE
6. FLOOD SWITCH ALARM

NOTES

1. PRECAST CONCRETE UTILITY VAULT DESIGN SHALL BE DELEGATED TO A QUALIFIED PROFESSIONAL ENGINEER, SELECTED AND HIRED BY THE CONTRACTOR.
2. ALUMINUM LADDER SHALL BE BOLTED TO VAULT. PROVIDE SAFETY EXTENSION WITH LADDER.
3. ALL VAULT PENETRATIONS SHALL BE WATER TIGHT.
4. TAP PIPE WITH CORP STOP. USE STAINLESS STEEL TUBING AND PROVIDE SHUTOFF BALL VALVE. SEE SHEET I-6 FOR CONNECTION TO CHLORINE ANALYZER.
5. SLOPE VAULT FLOOR TO DRAIN. 1% SLOPE.
6. ALTITUDE VALVE AND FLOW METER TO BE PROVIDED AND INSTALLED BY OWNER IN THE FUTURE.

0 1' 2' 3' 5'

SCALE: 3/8" = 1'-0"

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NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

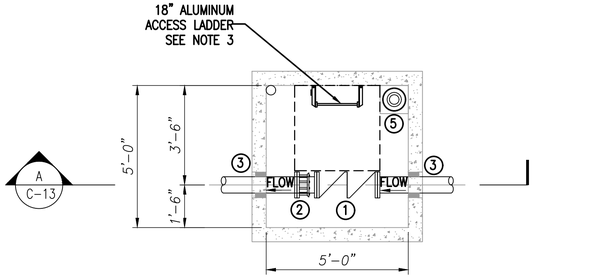
SCALE:
HORIZ: 3/8"=1'
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
FLOW METER AND ALTITUDE VALVE VAULT

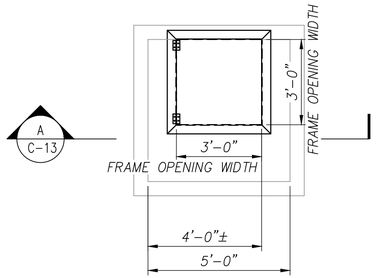
SHEET 14 OF 30

DRAWING C-12



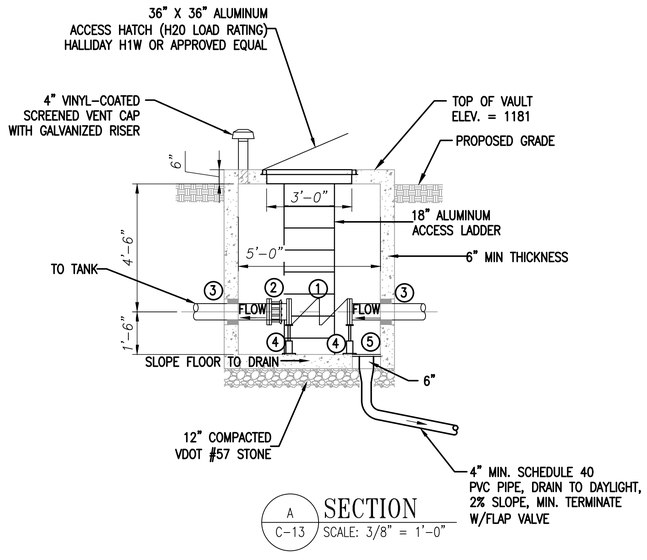
DOUBLE CHECK VALVE VAULT PLAN

SCALE: 3/8" = 1'-0"



ROOF PLAN

SCALE: 3/8" = 1'-0"



A C-13 SECTION

SCALE: 3/8" = 1'-0"

EQUIPMENT LIST

1. 6" DOUBLE CHECK VALVE
2. 6" DISMANTLING JOINT
3. DOUBLE LINK-SEAL
4. ADJUSTABLE PIPE STAND
5. FLOOR DRAIN WITH STAINLESS STEEL GRATE

NOTES

1. PRECAST CONCRETE UTILITY VAULT DESIGN SHALL BE DELEGATED TO A QUALIFIED PROFESSIONAL ENGINEER, SELECTED AND HIRED BY THE CONTRACTOR.
2. ALUMINUM LADDER SHALL BE BOLTED TO VAULT. PROVIDE SAFETY EXTENSION WITH LADDER.
3. ALL VAULT PENETRATIONS SHALL BE WATER TIGHT.
4. SLOPE VAULT FLOOR TO DRAIN. 1% SLOPE.

0 1' 2' 3' 5'

SCALE: 3/8" = 1'-0"

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
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COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 3/8"=1'
VERT.: N/A
DATE: AUGUST 2023
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DRAWN: MSS
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PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DOUBLE CHECK VALVE VAULT

SHEET 15 OF 30

DRAWING C-13

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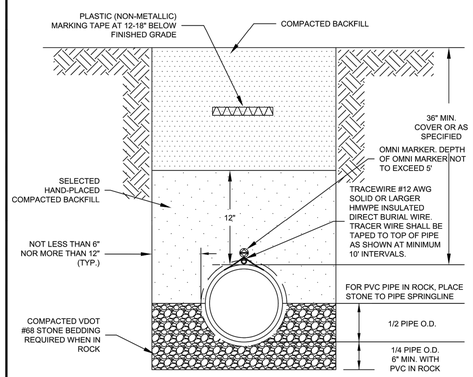
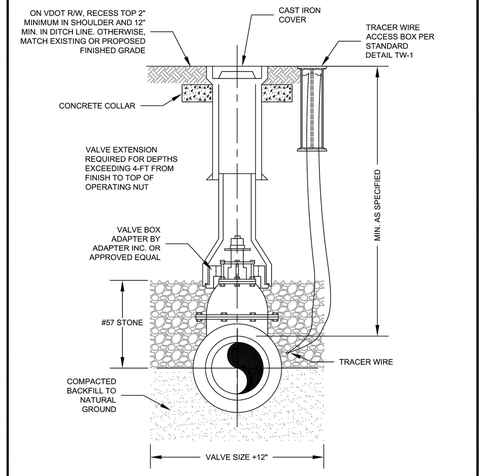


NOTE: THIS DETAIL APPLICABLE FOR DEPTHS LESS THAN 14 FEET. SEE PLANS FOR MODIFICATIONS IN DEEPER TRENCHES.

Bedford Regional Water Authority	No.	Date
	1	August 20, 2012
	2	October 6, 2017
	3	
	4	

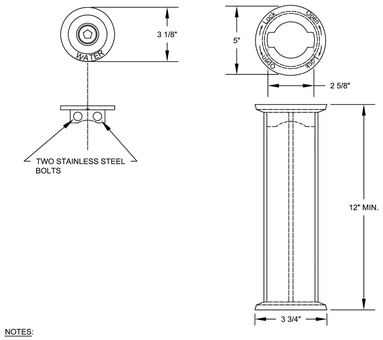
PRESSURE MAIN TRENCH BED — Detail: **TB-3**



SECTION VIEW

Bedford Regional Water Authority	No.	Date
	1	August 20, 2012
	2	October 6, 2017
	3	
	4	

2-PIECE VALVE BOX INSTALLATION — Detail: **VB-2**



NOTES:

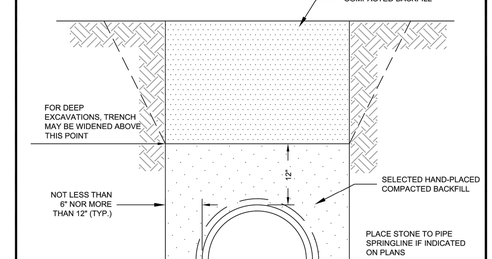
1. CAST IRON TRACER WIRE ACCESS BOX SHALL BE AS MANUFACTURED BY DRAINAGE & WATER SOLUTIONS, INC. OR APPROVED EQUAL AS FOLLOWS.:

   MODEL # LMKTWAB - WATER TRACER WIRE ACCESS BOX
   MODEL # LMKSEWAB - SEWER TRACER WIRE ACCESS BOX

2. ADJUSTABLE CAST IRON TRACER WIRE ACCESS BOXES SIMILAR TO MODELS TWABADJ18 AND SEWABADJ18 BY DRAINAGE & WATER SOLUTIONS, INC. SHALL BE USED IN NEW DEVELOPMENTS WHERE FINAL GRADE ADJUSTMENTS ARE EXPECTED.
3. TRACER WIRE ACCESS BOX SHALL BE INSTALLED AT ALL WATER & SEWER APPURTENANCES. WHERE MULTIPLE ITEMS ARE IN CLOSE PROXIMITY TO EACH OTHER, THE NUMBER AND LOCATION OF TRACER WIRE ACCESS BOXES SHALL BE AS DIRECTED BY THE AUTHORITY INSPECTOR.
4. TRACER WIRE ACCESS BOX SHALL BE INSTALLED A MAXIMUM OF 12-INCHES HORIZONTAL DISTANCE FROM APPURTENANCE.
5. TRACER WIRE SHALL BE #12 AWG SOLID OR LARGER HMWPE INSULATED DIRECT BURIAL WIRE.
6. TRACER WIRE SHALL BE ABLE TO EXTEND A MINIMUM OF 12-INCHES AND NO MORE THAN18-INCHES OUTSIDE THE TOP OF THE TRACER WIRE ACCESS BOX.

Bedford Regional Water Authority	No.	Date
	1	August 20, 2012
	2	October 6, 2017
	3	
	4	

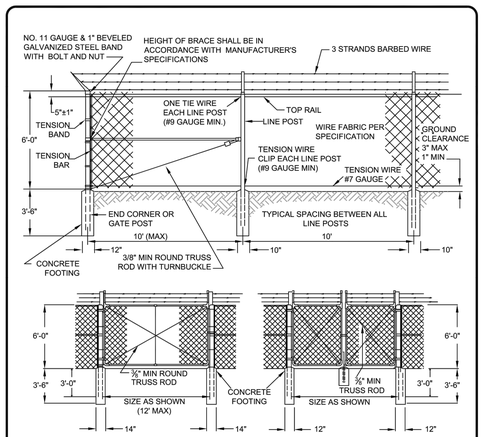
TRACER WIRE ACCESS BOX — Detail: **TW-1**



NOTE: THIS DETAIL APPLICABLE FOR DEPTHS LESS THAN 14 FEET. SEE PLANS FOR MODIFICATIONS IN DEEPER TRENCHES.

Bedford Regional Water Authority	No.	Date
	1	August 20, 2012
	2	October 6, 2017
	3	
	4	

STORM SEWER TRENCH BED — Detail: **TB-2**



SINGLE SWING GATE **DOUBLE SWING GATE**

LINE BRACE - SHALL BE USED WHEN VERTICAL ALIGNMENT CHANGES 15°. (MAX SPACING 500')
- SHALL BE USED AT FENCE END (AS SHOWN ABOVE) AND GATE LOCATIONS

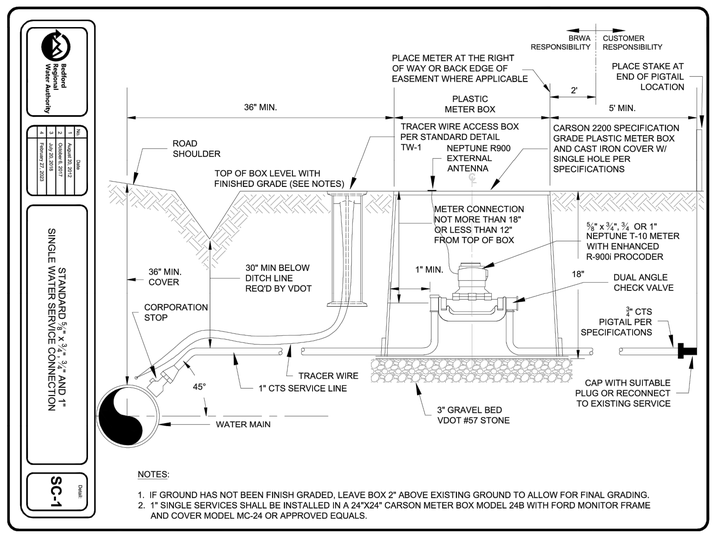
CORNER BRACE - SHALL BE USED WHEN HORIZONTAL ALIGNMENT CHANGES 15° OR MORE - SHALL BE AS DETAILED ABOVE WITH BRACING IN BOTH DIRECTIONS

NOTES:

CANTILEVERED SLIDING GATES SHALL BE OF LIGHTWEIGHT CONSTRUCTION AND DESIGN CONFORMING TO CLFMI STANDARDS, AND SHALL BE APPROVED BY THE AUTHORITY.

Bedford Regional Water Authority	No.	Date
	1	August 20, 2012
	2	October 6, 2017
	3	
	4	

CHAIN LINK FENCE INSTALLATION — Detail: **FE-1**



NOTES:

1. IF GROUND HAS NOT BEEN FINISH GRADED, LEAVE BOX 2" ABOVE EXISTING GROUND TO ALLOW FOR FINAL GRADING.
2. 1" SINGLE SERVICES SHALL BE INSTALLED IN A 24"X24" CARSON METER BOX MODEL 24B WITH FORD MONITOR FRAME AND COVER MODEL MC-24 OR APPROVED EQUALS.

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: N/A
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
NOTES AND DETAILS

SHEET 16 OF 30

DRAWING C-14

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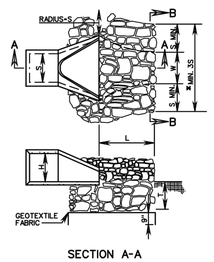
2016 ROAD & BRIDGE STANDARDS

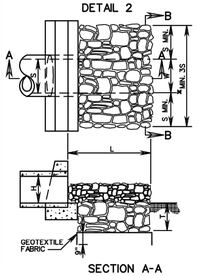
EC-1

DETAIL 1



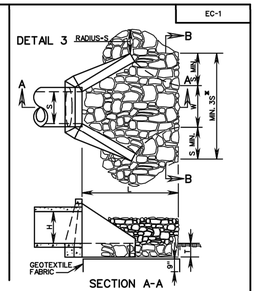
SECTION A-A

DETAIL 2

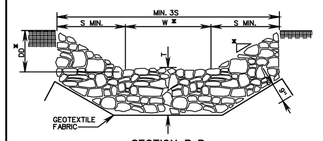


SECTION A-A

DETAIL 3



SECTION A-A



SECTION B-B

TYPE OF OUTLET PROTECTION MATERIAL		MAXIMUM OUTLET VELOCITY (FOR DESIGN STORM)	MINIMUM "T" (INCHES)
CLASS A1	CLASS A1 DRY RIPRAP	8 fps	18
CLASS I	CLASS I DRY RIPRAP	14 fps	24
CLASS II	CLASS II DRY RIPRAP	19 fps	36

NOTES:

1. FOR MULTIPLE LINE INSTALLATIONS, DIMENSION S IS TO GOVERN THE PROTECTION OUTSIDE THE CHANNEL WIDTH (W).
2. ON ANY INSTALLATION REQUIRING CULVERT OUTLET PROTECTION WHERE NO ENDWALL OR ENDSECTION IS SPECIFIED ON THE PLANS, CONSTRUCTION IS TO BE IN ACCORDANCE WITH DETAIL 2 SHOWN ABOVE.
3. GEOTEXTILE FABRIC TO BE INSTALLED UNDER CLASS A1, I, AND II MATERIALS IN ACCORDANCE WITH THE SPECIFICATIONS.
4. S = DIAMETER OF CIRCULAR CULVERT OR SPAN FOR BOX, ELLIPTICAL OR ARCH CULVERT. H = DIAMETER OF CIRCULAR CULVERT OR RISE/HEIGHT FOR BOX, ELLIPTICAL OR ARCH CULVERT.

✱ USE TYPICAL SECTION SHOWN ON PLANS FOR SIDE SLOPE, BOTTOM WIDTH AND DEPTH OF CHANNEL OR MATCH EXISTING DITCH OR NATURAL GROUND.

OUTLET PROTECTION MINIMUM LENGTH (L)	
TYPE A INSTALLATION	3H
TYPE B INSTALLATION	5H

SPECIFICATION REFERENCE
204 245 303 414

CULVERT OUTLET PROTECTION

VIRGINIA DEPARTMENT OF TRANSPORTATION

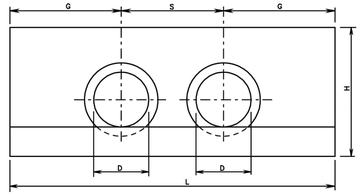
VDOT ROAD AND BRIDGE STANDARDS

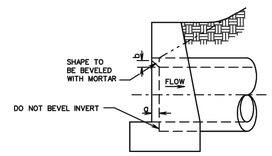
REVISION DATE	SHEET 1 OF 1
	113.01

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

EW-6





NOTES:

1. IN NO CASE SHALL TOP OF ENDWALL PROJECT ABOVE FILL SLOPE, DITCH SLOPE, DITCH SLOPE, OR SHOULDER.
2. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
3. ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR PRECAST SEE SHEET 101.02.
4. THIS STANDARD TO BE USED WITH STRAIGHT CROSSINGS AND SKEW ANGLES TO 15°.
5. HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT OR WINGWALLS OCCUR.
6. BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET END OF THE CULVERT (WHERE THE FLOW ENTERS THE CULVERT).
7. HEADWALL AT THE OUTLET END OF THE CULVERT MAY BE EITHER SQUARE EDGE OR BEVEL EDGE.
8. ON SHALLOW FILLS, WHERE ENDWALLS ARE 1'-0" LESS BELOW SHOULDER LINE, THE TOP OF THE ENDWALL SHALL BE CONSTRUCTED PARALLEL TO THE GRADE OF THE ROAD.
9. ¾" CHAMFER MAY BE PROVIDED ON ALL EDGES AT MANUFACTURER'S OPTION.
10. QUANTITIES GIVEN ARE FOR ONE ENDWALL. PLEASE REFER TO STANDARD EW-1, SHEET 101.01 FOR ALL DIMENSIONS NOT GIVEN IN TABLES.

FOR CONCRETE PIPE							
D	S	G	L	CUBIC YARDS CONCRETE ONE DOUBLE ENDWALL	INCREASE FOR EACH ADDITIONAL PIPE	a	b
12"	1'-10"	2'-0"	5'-10"	0.329	0.088	0'-7¼"	0'-1"
15"	2'-3"	2'-6"	7'-3"	0.671	0.179	0'-9¾"	0'-1½"
18"	2'-8"	3'-0"	8'-8"	0.941	0.244	0'-2"	0'-1½"
21" OR 24"	3'-6"	4'-0"	11'-6"	1.763	0.444	0'-2½"	0'-2"
27" OR 30"	4'-4"	5'-0"	14'-4"	2.730	0.663	0'-3¼"	0'-2½"
33" OR 36"	5'-2"	6'-0"	17'-2"	3.854	0.907	0'-3¾"	0'-3"

FOR CORRUGATED METAL PIPE							
D	S	G	L	CUBIC YARDS CONCRETE ONE DOUBLE ENDWALL	INCREASE FOR EACH ADDITIONAL PIPE	a	b
12"	1'-7"	2'-0"	5'-7"	0.344	0.087	0'-7¼"	0'-1"
15"	1'- 11½"	2'-6"	6'-11½"	0.696	0.175	0'-9¾"	0'-1½"
18"	2'-4"	3'-0"	8'-4"	0.980	0.241	0'-2"	0'-1½"
24"	3'-1"	4'-0"	11'-1"	1.840	0.442	0'-2½"	0'-2"
27" OR 30"	3'-10"	5'-0"	13'-10"	2.868	0.670	0'-3¼"	0'-2½"
36"	4'-7"	6'-0"	16'-7"	4.076	0.931	0'-3¾"	0'-3"

SPECIFICATION REFERENCE
105 302

STANDARD ENDWALL FOR MULTIPLE PIPE CULVERTS

12" - 36" CIRCULAR PIPES

VIRGINIA DEPARTMENT OF TRANSPORTATION

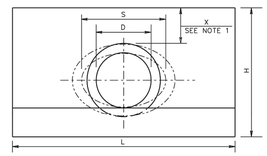
VDOT ROAD AND BRIDGE STANDARDS

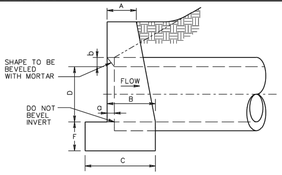
REVISION DATE	SHEET 1 OF 1
	101.11

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

EW-1,1A





NOTES:

1. "H" MAY BE REDUCED UNTIL "X" REACHES A MINIMUM OF 4" WHERE ENDWALL WOULD PROTRUDE ABOVE SHOULDER LINE. IN NO CASE SHALL TOP OF ENDWALL PROJECT ABOVE FILL SLOPE, DITCH SLOPE, OR SHOULDER.
2. THIS ITEM MAY BE PRECAST OR CAST IN PLACE.
3. ALL CAST IN PLACE CONCRETE TO BE CLASS A3. FOR PRECAST SEE SHEET 101.02.
4. THIS STANDARD TO BE USED WITH STRAIGHT CROSSINGS AND ALL SKEWS(UP TO 45°).
5. HEADWALL TO BE BEVELED IN ALL AREAS EXCEPT WHERE A CONFLICT WITH INVERT.
6. BEVEL EDGE IS REQUIRED ON THE HEADWALL AT THE INLET END OF THE CULVERT (WHERE THE FLOW ENTERS THE CULVERT).
7. HEADWALL AT THE OUTLET END OF THE CULVERT MAY BE EITHER SQUARE EDGE OR BEVEL EDGE.
8. ON SHALLOW FILLS, WHERE ENDWALLS ARE 1'-0" LESS BELOW SHOULDER LINE, THE TOP OF THE ENDWALL SHALL BE CONSTRUCTED PARALLEL TO THE GRADE OF THE ROAD.
9. ¾" CHAMFER MAY BE PROVIDED ON ALL EDGES AT MANUFACTURER'S OPTION.

EW-1

ENDWALL FOR CIRCULAR PIPE						
	DIAMETER OF PIPE CULVERT					
	12"	15"	18"	21" OR 24"	27" OR 30"	33" OR 36"
A	0'-6"	0'-8"	0'-9"	0'-11"	1'-0"	1'-0"
B	0'-11"	1'-1"	1'-3"	1'-6"	1'-9"	2'-0"
C	1'-4"	1'-7"	1'-9"	2'-2"	2'-6"	2'-9"
D	1'-0"	1'-3"	1'-6"	2'-0"	2'-6"	3'-0"
F	0'-6"	0'-8"	0'-8"	0'-9"	0'-9"	0'-9"
H	2'-3"	2'-11"	3'-2"	3'-9"	4'-3"	4'-9"
L	4'-0"	5'-0"	6'-0"	8'-0"	10'-0"	12'-0"
a	0'-7¼"	0'-9¾"	0'-2"	0'-2½"	0'-3¼"	0'-3¾"
b	0'-1"	0'-1½"	0'-1½"	0'-2"	0'-2½"	0'-3"
	CUBIC YARDS OF CONCRETE					
CONC. PIPE	0.241	0.492	0.697	1.319	2.067	2.947
C.M. PIPE	0.257	0.521	0.739	1.398	2.198	3.145

EW-1A

ENDWALL FOR ELLIPTICAL PIPE							
	SIZE OF ELLIPTICAL PIPE CULVERT (SPAN x RISE)						
	23"x14"	30"x19"	34"x22"	38"x24"	42"x27"	45"x29"	49"x32"	53"x34"
A	0'-8"	0'-9"	0'-10"	0'-11"	0'-11"	1'-0"	1'-0"	1'-0"
B	1'-2"	1'-5"	1'-6"	1'-8"	1'-9"	1'-10"	1'-11"	1'-11"
C	1'-8"	1'-11"	2'-1"	2'-4"	2'-5"	2'-7"	2'-8"	2'-9"
D	1'-2"	1'-7"	1'-10"	2'-0"	2'-3"	2'-5"	2'-8"	2'-10"
F	0'-8"	0'-8"	0'-9"	0'-9"	0'-9"	0'-9"	0'-9"	0'-9"
H	2'-10"	3'-3"	3'-7"	3'-9"	4'-0"	4'-2"	4'-5"	4'-7"
L	5'-5"	7'-2"	8'-6"	9'-2"	10'-2"	10'-11"	12'-1"	12'-11"
S	1'-11"	2'-6"	2'-10"	3'-2"	3'-6"	3'-9"	4'-1"	4'-5"
a	0'-2½"	0'-3½"	0'-3½"	0'-4"	0'-4½"	0'-4¾"	0'-5"	0'-5½"
b	0'-2"	0'-2½"	0'-2¾"	0'-3"	0'-3½"	0'-3¾"	0'-4"	0'-4½"
	CUBIC YARDS OF CONCRETE							
CONC.PIPE	0.502	0.855	1.236	1.500	1.811	2.101	2.512	2.801

SPECIFICATION REFERENCE
105 302

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

STANDARD ENDWALL FOR PIPE CULVERTS

12" - 36" CIRCULAR AND 23" x 14" - 53" x 34" ELLIPTICAL PIPES

VIRGINIA DEPARTMENT OF TRANSPORTATION

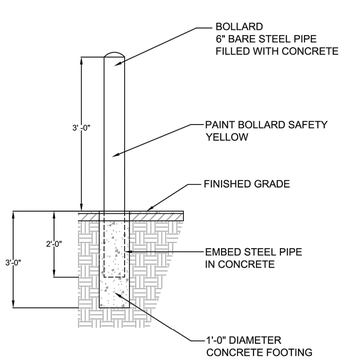
VDOT ROAD AND BRIDGE STANDARDS

REVISION DATE	SHEET 1 OF 1
04/19	101.01

2016 ROAD & BRIDGE STANDARDS

NOTES:

1. CONCRETE SHALL BE READY MIX VDOT CLASS A3, 3,000 PSI., AT 28 DAYS.



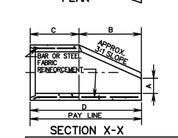
SCALE: N.T.S.

BOLLARD DETAIL
N.T.S.

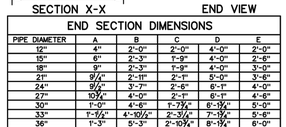
2016 ROAD & BRIDGE STANDARDS

ES-1

END-SECTION 12" - 60" PIPE



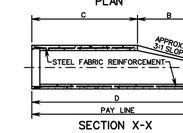
PLAN



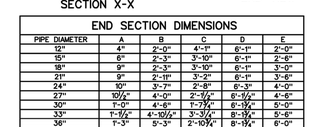
SECTION X-X END VIEW

END SECTION DIMENSIONS					
PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	2'-0"	4'-0"	2'-0"
15"	6"	2'-3"	1'-9"	4'-0"	2'-6"
18"	9"	2'-3"	1'-9"	4'-0"	3'-0"
21"	9⅛"	2'-11"	2'-1"	5'-0"	3'-6"
24"	9⅝"	3'-7"	2'-8"	6'-1"	4'-0"
27"	10¼"	4'-0"	2'-1"	6'-1"	4'-6"
30"	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"
33"	1'-1½"	4'-10½"	2'-3½"	7'-1½"	5'-6"
36"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-8"
60"	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"

ALTERNATE END-SECTION 12" - 60" PIPE

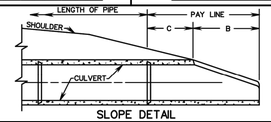


PLAN



SECTION X-X END VIEW

END SECTION DIMENSIONS					
PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	4'-1"	6'-1"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
21"	9"	2'-11"	3'-2"	6'-1"	3'-6"
24"	10"	3'-7"	2'-8"	6'-3"	4'-0"
27"	10¼"	4'-0"	2'-1¾"	6'-1¾"	4'-6"
30"	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"
33"	1'-1½"	4'-10½"	3'-3½"	8'-1½"	5'-6"
36"	1'-3"	5'-3"	2'-10¾"	8'-1¾"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-11"	8'-4"	7'-6"
60"	2'-8"	5'-0"	3'-3"	8'-3"	8'-0"



SLOPE DETAIL

NOTES:
PIPE LENGTHS SHOWN ON PLANS ARE BASED ON END-SECTION DESIGN SHOWN ON THE LEFT. IF THE CONTRACTOR ELECTS TO USE THE ALTERNATE DESIGN SHOWN ON THE RIGHT, LENGTHS WILL BE REDUCED BY THE DIFFERENCE IN DIMENSION "D".

SPECIFICATION REFERENCE
302

FLARED END SECTION

12" - 60" CONCRETE PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

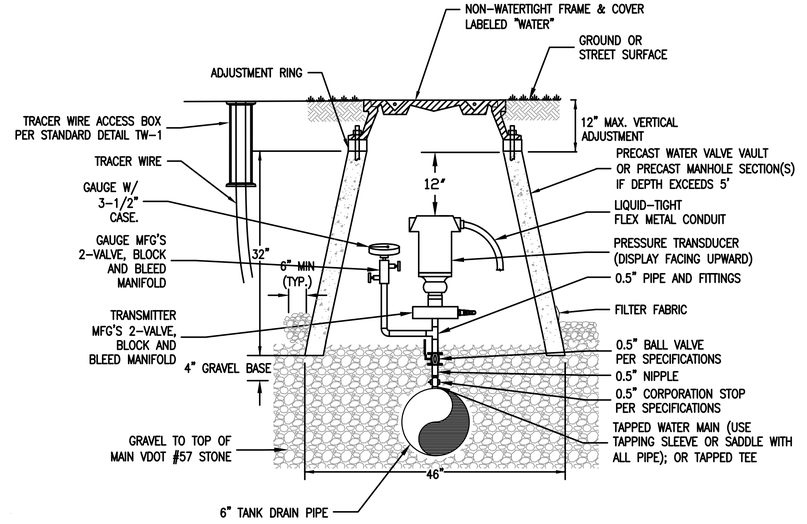
VDOT ROAD AND BRIDGE STANDARDS

REVISION DATE	SHEET 1 OF 1
	102.01

2016 ROAD & BRIDGE STANDARDS

NOTES:

1. ALL PIPE AND FITTINGS SHALL BE LEAD FREE BRASS, STAINLESS STEEL, OR EPOXY COATED DUCTILE IRON. GALVANIZED, PVC, AND BLACK IRON PIPE WILL NOT BE ALLOWED.
2. FILTER FABRIC TO BE INSTALLED BETWEEN BOTTOM OF PIPE AND STONE BEDDING. FABRIC TO EXTEND VERTICALLY A MINIMUM OF 6" FROM BOTTOM OF VAULT (FULL CIRCUMFERENCE).



PRESSURE TRANSDUCER AND VAULT
N.T.S.

N:\46626-003\CADD\466260303C1-15.DWG

NO.	DATE	BY	REVISIONS

WRA
Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

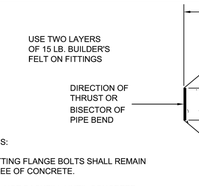
SCALE:
HORIZ: N/A
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
NOTES AND DETAILS

SHEET 17 OF 30

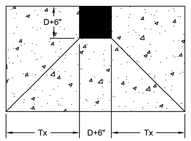
DRAWING C-15



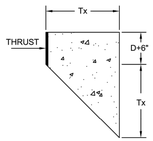
NOTES:

1. FITTING FLANGE BOLTS SHALL REMAIN FREE OF CONCRETE.
2. DO NOT BACKFILL UNTIL CONCRETE HAS SET FOR A MINIMUM OF 4 HOURS.

PLAN



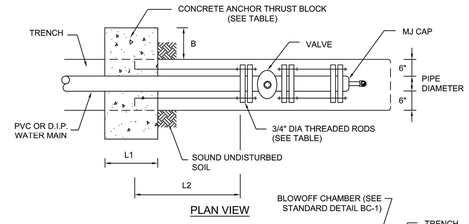
FRONT



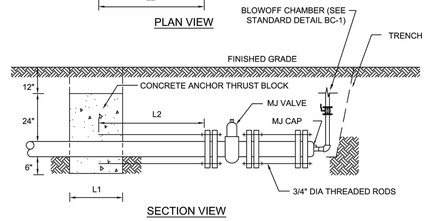
SIDE

PIPE DIA. (Inches)	DEAD END	90° BEND	45° BEND	22 ½° BEND	11 ¼° BEND	THRUST (lbs.)
6	7479 9348 0.75',1.00'	10,576 13,220 1.00',1.25'	5724 7155 0.50',0.75'	2918 3647 0.25',0.25'	1466 1833 0.25',0.25'	200psi 250psi Tx@200,Tx@250
8	12,865 16,082 1.00',1.25'	18,194 22,743 1.50',1.75'	9847 12,308 0.75',1.00'	5020 6275 0.50',0.50'	2522 3153 0.25',0.25'	200psi 250psi Tx@200,Tx@250
10	19,354 24,192 1.25',1.50'	27,370 34,213 1.75',2.00'	14,813 18,516 1.00',1.25'	7551 9439 0.50',0.75'	3794 4743 0.25',0.25'	200psi 250psi Tx@200,Tx@250
12	27,370 34,212 1.75',2.00'	38,706 48,383 2.25',2.50'	20,948 26,185 1.25',1.50'	10,679 13,349 0.75',0.75'	5365 6707 0.25',0.25'	200psi 250psi Tx@200,Tx@250

Bedford Regional Water Authority	No. 1 2 3 4 / Date: August 20, 2012; October 6, 2017	CONCRETE ANCHOR FOR HORIZONTAL AND SAG ANCHORS	Detail: CA-1



PLAN VIEW



SECTION VIEW

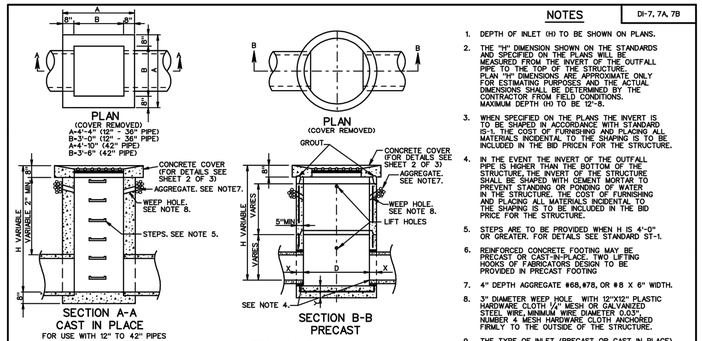
NOTES:

1. FOR USE WITH TEST OR WORKING PRESSURES 200 PSI OR LESS.
2. RETAINER GLANDS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.

PIPE DIAMETER (in)	B min (in)	L1 min (in)	NUMBER OF RODS PER RETAINER	L2 min (in)
4-8	12	18	4	27
10-12	27	33	4	50
14-16	44	50	6	75

Bedford Regional Water Authority	No. 1 2 3 4 / Date: August 20, 2012; October 6, 2017	WATERLINE BULKHEAD ANCHOR WITH GATE VALVE AND BLOW-OFF	Detail: CA-6

2016 ROAD & BRIDGE STANDARDS



RECOMMENDED MINIMUM HEIGHT CHART		
PIPE SIZE	H DIMENSION	
	CONC.	CORR. METAL
12"	2'-6"	2'-5"
15"	2'-9¼"	2'-8"
18"	3'-0½"	2'-11"
21"	3'-3¾"	3'-2"
24"	3'-7"	3'-5"
27"	3'-10¼"	3'-8"
30"	4'-1½"	3'-11"
33"	4'-4¾"	4'-2"
36"	4'-8"	4'-5"
42"	5'-2½"	4'-11"

NOTES

DI-7, 7A, 7B

1. DEPTH OF INLET (H) TO BE SHOWN ON PLANS.
2. THE "H" DIMENSION SHOWN ON THE STANDARDS AND SPECIFIED ON THE PLANS WILL BE MEASURED FROM THE INVERT OF THE OUTFALL PIPE TO THE TOP OF THE STRUCTURE. PLAN "H" DIMENSIONS ARE APPROXIMATE ONLY FOR ESTIMATING PURPOSES AND THE ACTUAL DIMENSIONS SHALL BE DETERMINED BY THE CONTRACTOR FROM FIELD CONDITIONS. MAXIMUM DEPTH (H) TO BE 12'-8.
3. WHEN SPECIFIED ON THE PLANS THE INVERT IS TO BE SHAPED IN ACCORDANCE WITH STANDARD SD-1. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICES FOR THE STRUCTURE.
4. IN THE EVENT THE INVERT OF THE OUTFALL PIPE IS HIGHER THAN THE BOTTOM OF THE STRUCTURE, THE INVERT OF THE STRUCTURE SHALL BE SHAPED WITH CEMENT MORTAR TO PREVENT STANDING OR PONDING OF WATER IN THE STRUCTURE. THE COST OF FURNISHING AND PLACING ALL MATERIALS INCIDENTAL TO THE SHAPING IS TO BE INCLUDED IN THE BID PRICE FOR THE STRUCTURE.
5. STEPS ARE TO BE PROVIDED WHEN H IS 4'-0" OR GREATER. FOR DETAILS SEE STANDARD ST-1.
6. REINFORCED CONCRETE FOOTING MAY BE PRECAST OR CAST-IN-PLACE. TWO LIFTING HOOKS OF FABRICATORS DESIGN TO BE PROVIDED IN PRECAST FOOTING
7. 4" DEPTH AGGREGATE #68,#78, OR #8 X 6" WIDTH.
8. 3" DIAMETER WEEP HOLE WITH 12"X12" PLASTIC HARDWARE CLOTH ½" MESH OR GALVANIZED STEEL WIRE, MINIMUM WIRE DIAMETER 0.03", NUMBER 4 MESH HARDWARE CLOTH ANCHORED FIRMLY TO THE OUTSIDE OF THE STRUCTURE.
9. THE TYPE OF INLET (PRECAST OR CAST IN PLACE), DETAILED HEREON, TO BE CONSTRUCTED, WILL BE AT THE OPTION OF THE CONTRACTOR.
10. FOR DETAILS OF CONCRETE COVER, COLLAR AND GRATE AND THE METHOD OF PLACING APPROACH GUTTER SEE SHEET 2 OF 3.
11. CAST-IN PLACE CONCRETE IS TO BE CLASS A3 (3000 PSI). PRECAST CONCRETE IS TO BE 4000 PSI.
12. CONCRETE QUANTITIES SHOWN ARE FOR INDICATED DEPTH (H) WITHOUT PIPES. THE AMOUNT DISPLACED BY PIPES MUST BE DEDUCTED TO OBTAIN TRUE QUANTITIES. FOR INLETS OF DIFFERENT DEPTHS ADD OR SUBTRACT THE APPROPRIATE CUBIC YARDS OF CONCRETE FOR EACH FOOT OF DEPTH.
13. PAVED DITCHES ARE TO BE TRANSITIONED TO MEET INLET GUTTER AS SHOWN IN STANDARD PG-2A.
14. PROVIDE SAFETY SLABS WHEN SPECIFIED ON THE PLANS.

NOTES (CONT.)

15. DI-7--------NO GUTTER
    DI-7A-------SINGLE GUTTER WHEN DROP INLET IS ON A GRADE.
    DI-7B------ DOUBLE GUTTER WHEN DROP INLET IS IN A SAG BETWEEN TWO GRADES.
16. FOR DETAILS OF PRECAST DI-7 NOT SHOWN HEREON SEE PRECAST UNIT ASSEMBLY DIAGRAM PAGE 103.01, FOR PRECAST GENERAL NOTES,PAGE 103.02 AND FOR APPLICABLE PRECAST BASE, RISER AND TOP DETAILS, PAGES 103.07 THRU 103.12.
17. GRATE BARS TO BE PARALLEL TO DITCH FLOW.

PIPE SIZE	12"	15"	18"	24"	30"	36"	42"
MINIMUM DEPTH H	2'-0"	2'-3¼"	2'-6½"	3'-1"	3'-7½"	4'-2"	4'-8½"
CONCRETE CUBIC YARDS	.947	1.045	1.143	1.339	1.535	1.731	1.927

INCREMENT PER FOOT OF ADDITIONAL DEPTH (H) { = 0.362 CU. YDS. (12" - 36" PIPE) / = 0.410 CU. YDS. (42" PIPE)

SPECIFICATION REFERENCE
241 503

STANDARD MEDIAN DROP INLET
12" TO 42" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT ROAD AND BRIDGE STANDARDS

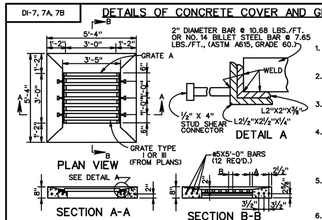
REVISION DATE	SHEET 1 OF 3
	104.22

2016 ROAD & BRIDGE STANDARDS

2016 ROAD & BRIDGE STANDARDS

DI-7, 7A, 7B

DETAILS OF CONCRETE COVER AND GRATE



GRATE A

APPROXIMATE QUANTITIES	
CONCRETE CLASS A3	REINFORCING STEEL
0.423 C.Y.	63 LBS.

BAR SPACING CHART		
GRATE TYPE	MAXIMUM DIMENSION	
	A	B
I	9/16"	3"
III	1"	1"

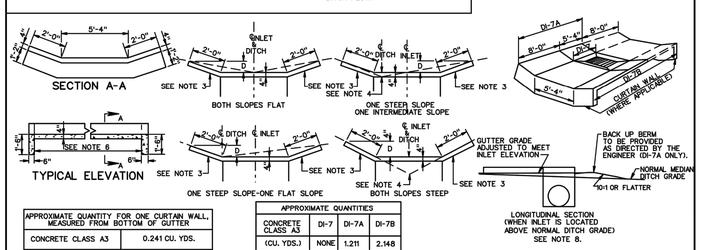
NOTES

1. GRATE A IS TO BE UTILIZED IN LOCATIONS NOT NORMALLY SUBJECT TO TRAFFIC.
2. GRATE B IS TO BE UTILIZED IN LOCATIONS NORMALLY SUBJECT TO TRAFFIC.
3. FOR DETAILS OF LOAD CARRYING GRATE (GRATE B), SEE T-DI-7, SHEET 103.08.
4. CONCRETE COVER AND GRATE ARE TO BE FURNISHED AS A SINGLE UNIT. OUTSIDE DIMENSIONS OF GRATE TO BE 3'-4" X 2'-11½" (GRATE A) OR 3'-4" X 2'-11½" (GRATE B).
5. ALTERNATE METHODS OF ANCHORING ANGLE IRON WILL BE ACCEPTABLE IF APPROVED BY THE ENGINEER.
6. GRATE AND COLLAR ARE TO BE GALVANIZED.
7. CONCRETE COVER MAY BE PRECAST OR CAST IN PLACE.
8. CONCRETE TO BE CLASS A3 IF CAST IN PLACE. 4000 PSI IF PRECAST.
9. GRATE BARS TO BE PARALLEL TO DITCH FLOW.

DETAILS OF GUTTER AND METHOD OF PLACEMENT

NOTES

1. DI-7 NO GUTTERS.
   DI-7A NO GUTTER IN ONE DIRECTION.
   DI-7B GUTTER IN BOTH DIRECTIONS.
2. JOINTS BETWEEN GUTTERS AND CONCRETE COVER ARE TO BE DOWELED WITH #4 X 8" SMOOTH RODS @ APPROX. 12" C-C TO PREVENT SETTLEMENT. IN LIEU OF DOWELS A 2" X 4" NOTCH MAY BE PROVIDED. SEE STANDARD T-DI-3, 4 ALTERNATE DESIGN.
3. VARIABLE 2:1 OR FLATTER.
4. DITCH GRADE MUST BE ADJUSTED TO MEET DIFFERENCE IN ELEVATION. SEE LONGITUDINAL SECTION.
5. IF DEPTH (D) BECOMES LESS THEN 4", LENGTH OF WINGS ARE TO BE EXTENDED AS DIRECTED BY THE ENGINEER.
6. CURTAIN WALL TO BE LOCATED AT THE END OF THE PAVED DITCH SECTIONS OF THE DI-7A & DI-7B THAT ARE NOT ABUTTED BY OTHER DRAINAGE.
7. IF NORMAL DITCH GRADE IS TOO FLAT TO ALLOW FOR ADJUSTED GRADE TO INLET, A SPECIAL GUTTER DETAIL WILL BE REQUIRED ON PLANS.



APPROXIMATE QUANTITY FOR ONE CURTAIN WALL, MEASURED FROM BOTTOM OF GUTTER	
CONCRETE CLASS A3	0.241 CU. YDS.

APPROXIMATE QUANTITIES			
CONCRETE CLASS A3	DI-7	DI-7A	DI-7B
(CU. YDS.)	NONE	1.211	2.148

VDOT ROAD AND BRIDGE STANDARDS	
SHEET 2 OF 3	REVISION DATE
104.23	

STANDARD MEDIAN DROP INLET
12" TO 42" PIPE
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
241 503

2016 ROAD & BRIDGE STANDARDS

N:\46626-003\CADD\46626003C1-16.DWG

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

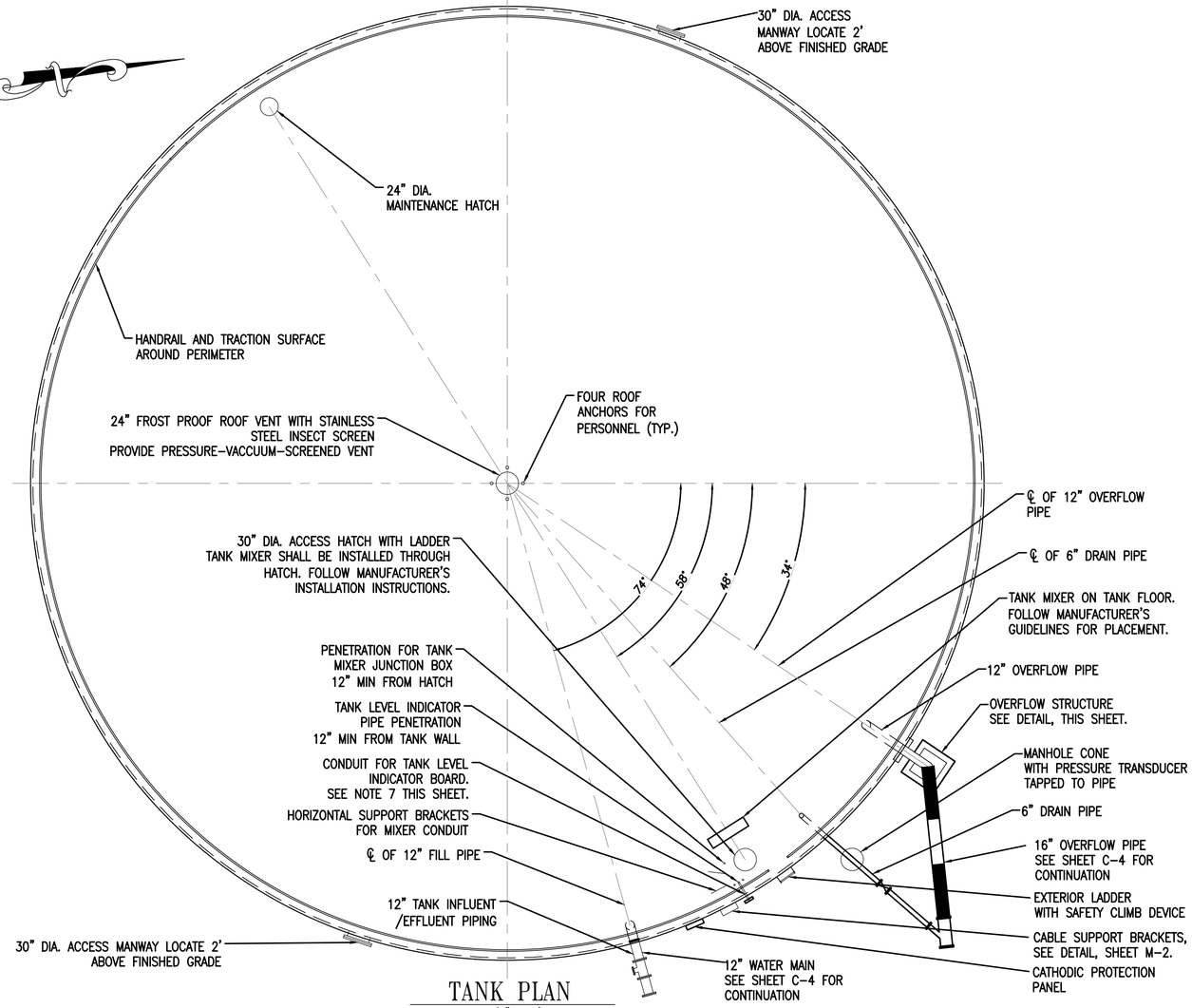
SCALE: HORIZ: N/A VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

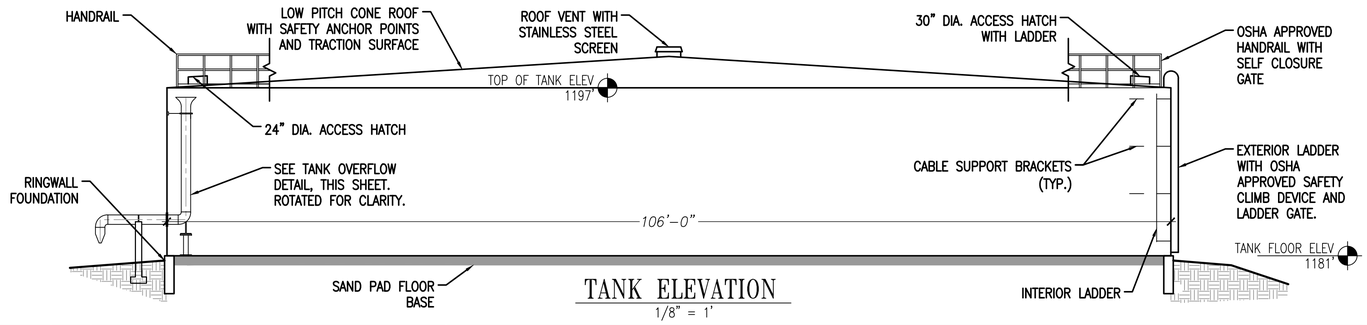
HELM STREET TANK REPLACEMENT
NOTES AND DETAILS

SHEET 18 OF 30

DRAWING C-16



TANK PLAN
1/8" = 1'



TANK ELEVATION
1/8" = 1'

1. CATHODIC PROTECTING SYSTEM

   A. CONTRACTOR SHALL COORDINATE WITH THE SYSTEM SUPPLIER TO LOCATE AND AFFIX ATTACHMENT HOOKS, TANK PENETRATION, AND CONNECTIONS WHERE REQUIRED.

   B. CATHODIC PROTECTION SYSTEM CONTROL PANEL SHALL BE MOUNTED TO EXTERIOR TANK SHELL OR INDEPENDENT SUPPORT SUCH THAT IT CAN BE REMOVED FOR FUTURE TANK MAINTENANCE.

2. TANK MIXING SYSTEM

   A. TANK SHALL BE EQUIPPED WITH IXOM WATERCARE GRIDBEE GS-12 MIXING SYSTEM OR PAX PWM400. SEE SPECIFICATION 11268 FOR MIXING SYSTEM REQUIREMENTS.
   B. SEE PENETRATION DETAIL "CABLE PENETRATION DETAIL THROUGH ROOF" ON SHEET M-2.

3. TANK FOUNDATION

   A. TANK FOUNDATION SHALL BE DESIGNED BY TANK MANUFACTURER. DESIGN AND SUPPORTING CALCULATIONS SHALL BE SUBMITTED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF VIRGINIA.

   B. SEE HELM STREET TANK REPLACEMENT GEOTECHNICAL ENGINEERING REPORT DATED SEPTEMBER 2022 FOR ADDITIONAL TANK FOUNDATION DESIGN PARAMETERS AND SUBSURFACE CONDITIONS.

4. TANK LADDER, HANDRAIL, AND PERSONNEL ROOF ANCHORS

   A. HANDRAIL, LADDER, AND ROOF ANCHORS SHALL BE DESIGNED BY TANK MANUFACTURER IN ACCORDANCE WITH PROJECT SPECIFICATIONS.

5. LIGHTNING PROTECTION SYSTEM

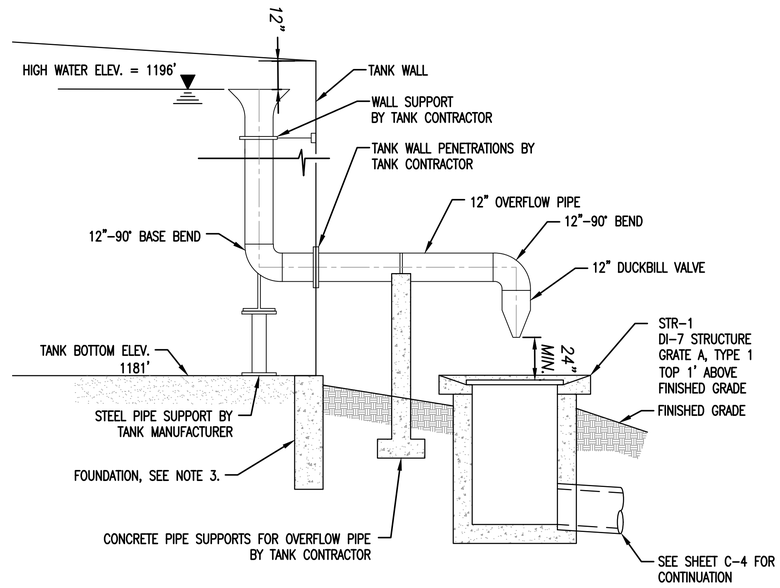
   A. LIGHTNING PROTECTION SYSTEM TO BE INSTALLED BY CONTRACTOR. THIS SHALL INCLUDE ROOF LIGHTNING PROTECTION, DOWN LEADS, AND LIGHTNING PROTECTION GROUNDS.

6. TANK COATING SYSTEM

   A. SEE SPECIFICATION 09900-TANK PAINTING FOR REQUIREMENTS.

7. TANK LEVEL INDICATOR

   A. TANK LEVEL INDICATOR SHALL BE SHAND & JURS 92302 LIQUID LEVEL INDICATOR OR APPROVED EQUAL. INSTALL INDICATOR BOARD, CONDUIT, AND FLOAT PER MANUFACTORER'S ASSEMBLY INSTRUCTIONS.
   B. SEE PENETRATION DETAIL "CABLE PENETRATION DETAIL THROUGH ROOF" ON SHEET M-2.



TANK OVERFLOW DETAIL
N.T.S.

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
8/21/2023
PROFESSIONAL ENGINEER

SCALE:
HORIZ: 1/8"=1'
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
GROUND STORAGE TANK NOTES AND DETAILS

SHEET 19 OF 30

DRAWING M-1

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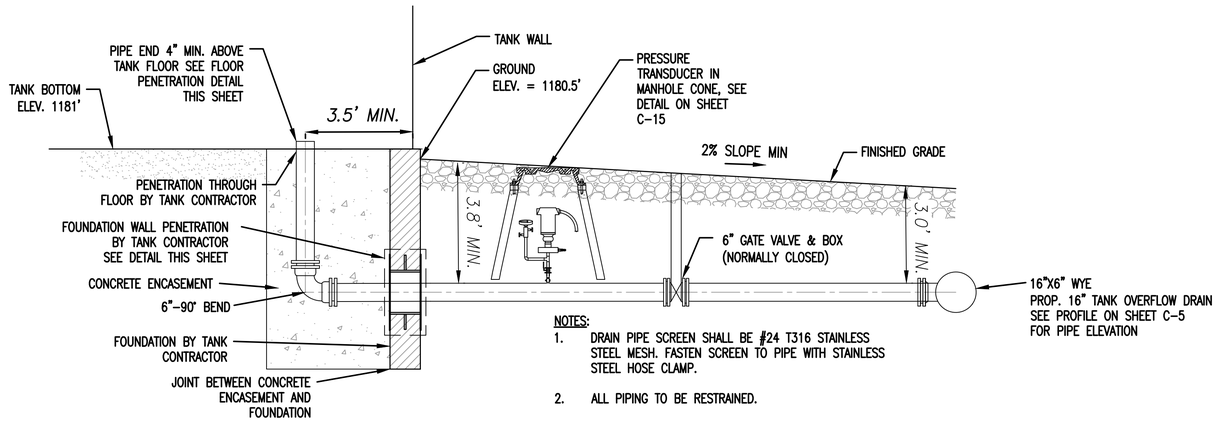
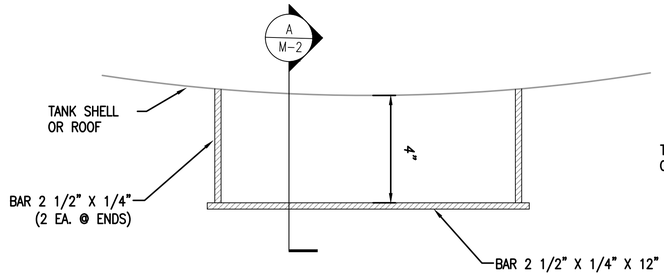


NOTES:

1. DRAIN PIPE SCREEN SHALL BE #24 T316 STAINLESS STEEL MESH. FASTEN SCREEN TO PIPE WITH STAINLESS STEEL HOSE CLAMP.
2. ALL PIPING TO BE RESTRAINED.

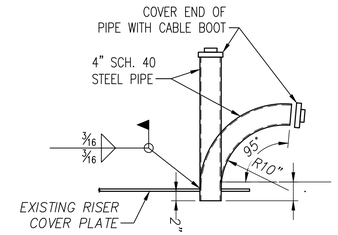
6" TANK DRAIN DETAIL
N.T.S.



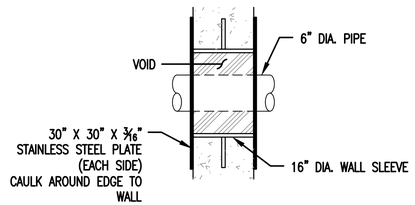
NOTES:

1. SUPPORTS TO BE SPACED AT A MAXIMUM OF 8' VERTICAL OR 3' HORIZONTAL.
2. SUPPORTS TO BE A MINIMUM OF 2' FROM THE EDGE OF THE LADDER.

SHELL/ROOF CONDUIT AND CABLE SUPPORT DETAIL
N.T.S.



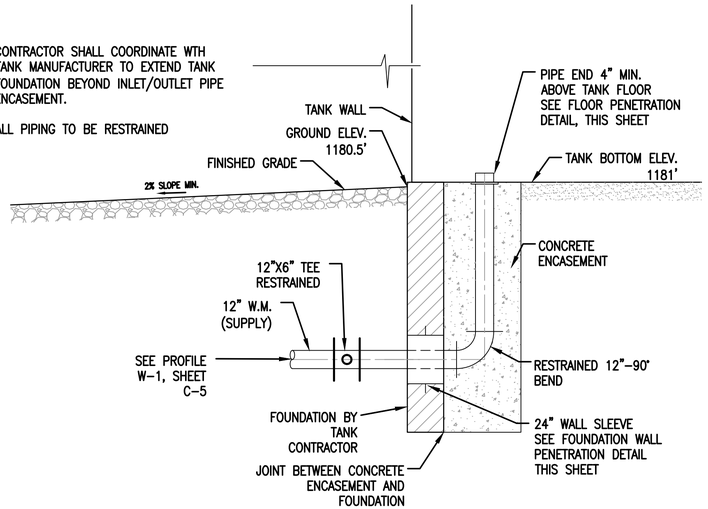
CABLE PENETRATION THROUGH ROOF
N.T.S.



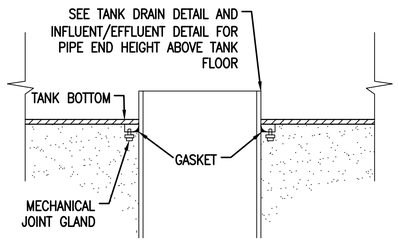
FOUNDATION WALL PENETRATION (6" DRAIN LINE)
N.T.S.

NOTES:

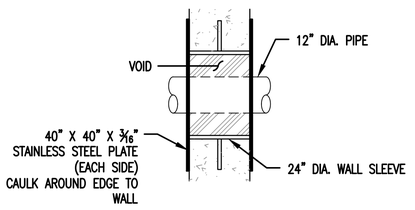
1. CONTRACTOR SHALL COORDINATE WTH TANK MANUFACTURER TO EXTEND TANK FOUNDATION BEYOND INLET/OUTLET PIPE ENCASEMENT.
2. ALL PIPING TO BE RESTRAINED



TANK INFLUENT/EFFLUENT PIPING DETAIL
N.T.S.



FLOOR PENETRATION DETAIL
N.T.S.



FOUNDATION WALL PENETRATION (12" INFLUENT/EFFLUENT LINE)
N.T.S.

0 4' 8' 16'
SCALE: 1/8" = 1'-0"

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
PAULA J. MOORE
Lic. No. 035821
11/01/2023
PROFESSIONAL ENGINEER

SCALE: HORIZ: N.T.S. VERT.: N/A
DATE: NOVEMBER 1, 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
GROUND STORAGE TANK DETAILS

SHEET 20 OF 30

DRAWING M-2

N:\46626-003\CADD\46626003M1-02.DWG

GENERAL NOTES

1. INSTALLATION OF ELECTRICAL WORK MUST CONFORM TO THE AHJ'S LATEST ACCEPTED EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA 70) AND ALL APPLICABLE LOCAL CODES AND QUALITY WORKMANSHIP STANDARDS.
2. DRAWINGS ARE DIAGRAMMATIC. FINAL EQUIPMENT LOCATIONS MUST BE COORDINATED IN THE FIELD AND FIT INTO THE AVAILABLE SPACE IN ACCORDANCE WITH GIVEN WORK SPACE REQUIRED BY CODE AND MAINTENANCE REQUIRED BY THE MANUFACTURER. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE EQUIPMENT THAT MEETS THE ABOVE REQUIREMENTS AND NOTIFY THE OWNER/ENGINEER WHEN THE REQUIREMENTS ARE NOT MET.
3. PROVIDE A CONSTRUCTION SCHEDULE, SEQUENCE OF CONSTRUCTION, OUTAGE REQUESTS, AND RESTRICTED AREA ACCESS REQUESTS FOR APPROVAL BY THE OWNER. WORK IN CERTAIN AREAS IS RESTRICTED AND GOVERNED BY EXISTING SECURITY REQUIATIONS. ACCESS INTO THESE AREAS REQUIRE APPROVAL. WORK MUST ALLOW FOR DAILY OPERATION OF THE FACILITY WITHOUT INTERRUPTION. WHEN TEMPORARY POWER IS REQUIRED, THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS. CONTRACTOR MUST OBTAIN WRITTEN PERMISSION FROM THE OWNER TO DE-ENERGIZE ANY BUILDING EQUIPMENT OR DISRUPT ANY COMMUNICATION LINE.
4. THE ELECTRICAL CONTRACTOR MUST PROVIDE THE NECESSARY COORDINATION, INSTRUCTIONS AND SUPERVISION NEEDED WHEN WORKING WITH OTHER TRADES.
5. PRIOR TO STARTING DEMOLITION AND/OR NEW WORK, COORDINATE A SITE VISIT TO EXAMINE AND EVALUATE THE EXISTING CONDITIONS AFFECTING THE EXECUTION OF THIS PROJECT. REPORT ANY CONCERNS TO THE OWNER/ENGINEER AT THAT TIME.
6. THE DEMOLITION AND NEW WORK MUST BE EXECUTED IN ACCORDANCE WITH AN APPROVED WORK PLAN, SEQUENCE OF CONSTRUCTION. AND WORK SCHEDULE.
7. DEMOLITION AND NEW WORK SHOWN ON THE DRAWINGS USE DARK THICK-WEIGHTED LINES. EXISTING EQUIPMENT NOT AFFECTED BY THE CONTRACT DRAWINGS ARE SHOWN USING THIN-WEIGHTED LINES.
8. ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT ARE BASED ON EQUIPMENT SPECIFIED. COORDINATE EXACT REQUIREMENTS WITH MECHANICAL SHOP DRAWINGS PRIOR TO ORDERING AND INSTALLING EQUIPMENT.
9. ELECTRICAL EQUIPMENT INSTALLED AGAINST CONCRETE OR MASONRY WALLS MUST BE INSTALLED WITHIN A 1/4" SPACE BETWEEN THE EQUIPMENT AND THE MOUNTING SURFACE. SPACERS MUST BE STAINLESS STEEL, PVC OR NYLON.
10. PROVIDE NECESSARY COMPONENTS REQUIRED FOR MAKING FINAL CONNECTIONS OF EQUIPMENT INSTALLED AS PART OF THIS CONTRACT.
11. CIRCUIT NUMBERS ARE FOR IDENTIFICATION PURPOSE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR BALANCING LOADS AND CORRECTLY PHASING THE CIRCUITS IN PANELBOARDS.
12. MINIMUM CONDUIT AND WIRE SIZE IS 3/4" AND #12 AWG.
13. 120V CIRCUITS MUST HAVE SEPARATE NEUTRALS.
14. PROVIDE #10 AWG OR LARGER WIRES TO 120 VOLT RECEPTACLE CIRCUITS WHERE THE LAST RECEPTACLE IS LOCATED 100 FEET OR MORE FROM THE PANELBOARD .
15. PROVIDE PULL STRINGS IN EMPTY CONDUIT TO FACILITATE PULLING OF CABLES IN FUTURE.
16. OPENINGS AND PASSAGES FOR CONDUITS OR WIREWAYS THROUGH FLOOR SLABS, FIRE-RATED WALLS, OR PARTITIONS MUST BE PROVIDED WITH UL LISTED FIRE-RATED SLEEVING SYSTEMS.
17. CONDUIT ROUTING, WHEN SHOWN, IS DIAGRAMMATIC AND MUST BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. INTERIOR CONDUITS INCLUDING THOSE EXPOSED, ABOVE SUSPENDED CEILINGS, AND CONCEALED WITHIN FURRED WALLS MUST BE INSTALLED PARALLEL TO BEAMS AND WALLS. CONDUITS INSTALLED IN FINISHED AREAS MUST BE CONCEALED.
18. PROVIDE PULL BOXES AND JUNCTION BOXES, WHEN REQUIRED, IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS THOUGH THESE BOXES MAY NOT BE SHOWN ON THE DRAWINGS. JUNCTION AND PULL BOXES, ASSOCIATED WITH FEEDERS AND BRANCH CIRCUITS, MUST BE LABELED SHOWING THE PANEL AND CIRCUIT NUMBERS ROUTED THROUGH THEM.
19. PROVIDE JUNCTION BOXES WITH NUMBERED TERMINAL STRIPS AND RING TYPE COMPRESSION CONNECTORS WHEN SPLICING CONTROL AND SIGNAL WIRING.
20. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUITS ARE BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS, APPROVED BY THE ENGINEER, MAY BE MADE BY THE CONTRACTOR AT THEIR EXPENSE TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED.
21. NUMBERS ADJACENT TO EQUIPMENT AND DEVICES INDICATE THE PANEL AND CIRCUIT SERVING THAT EQUIPMENT OR DEVICE. PROVIDE COMPLETE WIRING IN CONDUIT.
22. ELECTRICAL EQUIPMENT LOCATED OUTDOORS MUST HAVE NEMA 4X ENCLOSURE UON.
23. DIRECT-BURIED UNDERGROUND CONDUITS MUST BE SCHEDULE 40 UON.
24. INTERIOR - THHN / THWN-2 , UON
25. EXTERIOR - XHHN / XHWN-2, UON
26. PROVIDE SYSTEM GROUNDING CONDUCTORS AND EQUIPMENT GROUNDING CONDUCTORS IN ACCORDANCE WITH NEC-250, UON.

DEFINITIONS

FURNISH:	SUPPLY AND DELIVER TO PROJECT SITE, READY FOR UNLOADING UNPACKING, INSTALLATION, AND SIMILAR OPERATIONS.
INSTALL:	UNLOAD, TEMPORARILY STORE, UNPACK, ASSEMBLE, ERECT, PLACE, ANCHOR, APPLY, WORK TO DIMENSION, FINISH, CURE, PROTECT, CLEAN AND SIMILAR OPERATIONS AT PROJECT SITE.
PROVIDE:	FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.
WIRING:	CONDUIT AND WIRES / CONDUCTORS.
EXISTING TO REMAIN:	LEAVE EXISTING ITEMS THAT ARE NOT TO BE REMOVED AND THAT ARE NOT OTHERWISE INDICATED TO BE SALVAGED OR REINSTALLED.
REMOVE / DEMOLISH:	DETACH ITEMS FROM EXISTING CONSTRUCTION AND DISPOSE OF THEM OFF-SITE UNLESS INDICATED TO BE SALVAGED OR REINSTALLED.
REMOVE AND SALVAGE:	DETACH ITEMS FROM EXISTING CONSTRUCTION, IN A MANNER TO PREVENT DAMAGE AND DELIVER TO OWNER FOR REUSE.
REMOVE AND REINSTALL:	DETACH ITEMS FROM EXISTING CONSTRUCTION, IN A MANNER TO PREVENT DAMAGE, PREPARE FOR REUSE, AND REINSTALL WHERE INDICATED.

ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERES INTERRUPTING CAPACITY, -SYM, RMS, AMPS-
AL	ALUMINUM
ANNUN	ANNUNCIATOR
AS	AMMETER SWITCH
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
BCSD	BARE COPPER SOFT DRAWN
BFC	BELOW FINISHED CEILING
BFI	BLOWN FUSE INDICATOR
BFG	BELOW FINISHED GRADE
BLDG	BUILDING
BKR	BREAKER
C	CONDUIT
CB	CIRCUIT BREAKER
CC1	POWER-CONTROL-INSTRUMENTATION CABLE RUN NUMBER AS INDICATED.
CKT	CIRCUIT
COMB	COMBINATION
CLG	CEILING
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
CX	CONNECT TO EXISTING
CCTV	CLOSED CIRCUIT TELEVISION
DAS	DATA ACQUISITION SYSTEM
DC	DIRECT CURRENT
O/D	OUT/DOOR
DISC	DISCNNECT
DN	DOWN
DP	DISTRIBUTED PANEL
DPC	DISTRIBUTED PROCESS CONTROLLER
DWG	DRAWING
EA	EACH
EC	EMPTY CONDUIT
ECD	ELEMENTARY CONTROL DIAGRAM
EF	EXHAUST
EH	ELECTRIC HEATER
ELEV	ELEVATION
EMERG	EMERGENCY
EMH	ELECTRIC MANHOLE
EMT	ELECTRIC METALLIC TUBING
ENCL	ENCLOSURE
E/O	ELECTRICALLY/OPERATED
EQUIP	EQUIPMENT
ETM	ELAPSED TIME METER
ETR	EXISTING TO REMAIN
EUH	ELECTRICAL UNIT HEATER
EWC	ELECTRICAL WATER COOLER
EWH	ELECTRICAL WATER HEATER
EX. EXIST	EXISTING
EXP	EXPLOSION PROOF
F	FUSE
FA	FRAM AMPS
FA	FIRE ALARM
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS UNDER SEPARATE CONTRACT
FC	FAN COIL UNIT
FDR	FEEDER
FL	FLOOR
FLEX	FLEXIBLE
FMC	FLEXIBLE METAL CONDUIT
FS	FLOW SWITCH
FSS	FUSED SAFETY SWITCH
FT	FOOT OR FEET
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
G	GROUND
GFI	GROUND FAULT INTERRUPTER
GFCI	GOVERNMENT FURNISHED CONTRACTOR INSTALLED
GFGI	GOVERNMENT FURNISHED GOVERNMENT INSTALLED
GFP	GROUND FAULT PROTECTION
HID	HIGH INTENSITY DISCHARGE
HH	HANDHOLE
HOA	HAND OFF AUTOMATIC
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HV	HIGH VOLTAGE
HZ	HERTZ
ICCB	INSULATED CASE CIRCUIT BREAKER
IDS	INTRUSION DETECTION SYSTEM
IMC	INTERMEDIATE METALLIC CONDUIT
JB	JUNCTION BOX
KAIC	THOUSAND AMPERES INTERRUPTING CAPACITY
KV	KILOVOLT
KVA	KILOVOLT AMPERE
LC	LOAD CENTER
LTG	LIGHTING
LO	LOCKOUT
LP	LIGHTING AND APPLIANCE PANEL
LT/FMC	LIQUID TIGHT/FLEXIBLE METAL CONDUIT
LS	LIMIT SWITCH
LSH	LEVEL SWITCH HIGH
MAFC	MAKE ALL FINAL CONNECTIONS
M/C	MULTI/CONDUCTOR
MCB	MAIN CIRCUIT BREAKER
MCCB	MOLDED CASE CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CONTROL PROTECTOR
MH	MOUNTING HEIGHT
MIN	MINIMUM
MILO	MAIN LUGS ONLY
MOD	MOTOR OPERATED DAMPER
MO	METAL OXIDE
MSP	MOTOR STARTER PANEL
MTD	MOUNTED
MTG	MOUNTING
N	NEUTRAL
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFSS	NON FUSED SAFETY SWITCH
NO	NORMALLY OPEN
NO	NUMBER
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NTS	NOT TO SCALE
OL	OVERLOAD
P	POLE OR POLES
PB	PUSH BUTTON
PH	PHASE
PL	PILOT LIGHT
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANELBOARD
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
RC	REMOTE CONTROL
RECEPT	RECEPTACLE
REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
RM	ROOM
RMS	ROOT MEAN SQUARE
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TERMINAL UNIT
RVAT	REDUCED VOLTAGE AUTOTRANSFORMER
RX	REMOVE EXISTING
SER.	WERVICE
SF	SUPPLY FAN
SG1-1A/P	SWGR POWER WIRE RUN NUMBER/ SWGR NUMBER AND UNIT NUMBER AS INDICATED
SIC	SYMMETRICAL INTERRUPTING CURRENT
SOPN	SPACE OR POLE NUMBER
SPPS	SOUND POWERED PHONE SYSTEM
SS	STAINLESS STEEL
SS	SAFETY SWITCH
ST	SHUNT TRIP
STA	STATION
STP	SHIELDED TWISTED PAIR
STPS	SHIELDED TWISTED PAIR OVER ALL SHIELD
STR	STARTER
STT	SHIELDED TWISTED TRIPLE
S/N	SOLID/NEUTRAL
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
SYS	SYSTEM
TA	TRIP AMPS
TC	TIME CLOCK
TDD	TIME DELAY DE-ENERGIZED -OFF-
TDE	TIME DELAY ENERGIZED -ON-
TDC	TIME DELAY CLOSED
TDO	TIME DELAY OPEN
TMH	TELEPHONE MANHOLE
TP	TWISTED PAIR
TPS	TWISTED PAIR SHIELDED
TST	THERMOSTAT SWITCH IN AUTO-TRANSFORMER STARTER
TTB/TTC	TELEPHONE TERMINAL BOARD/CABINET
TYP	TYPICAL
UH	UNIT HEATER
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTS OR VOLTAGE
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS
W	WIRE
W/	WITH/
WP	WEATHERPROOF
XFMR	TRANSFORMER
*	CENTERLINE
*	PHASE
@	AT
#	NUMBER

LEGEND

EQUIPMENT CONNECTION

- JUNCTION BOX
- EQUIPMENT CONNECTION AS NOTED

GROUNDING

- GROUND ROD, 3/4" DIAMETER X 10'-0" LONG UON
- AIR TERMINAL

UNDERGROUND/SITE WORK

- EXISTING HANDHOLE
- G — GROUND CONDUCTOR
- HANDHOLE
- UNDERGROUND DUCTBANK
- UE — UNDERGROUND DIRECT BURIED CONDUIT

WIRING

- HPA-1,3,5 — BRANCH CIRCUIT HOMERUN TO PANELBOARD. HPA DENOTES TO PANEL HPA AND NUMERALS IDENTIFY CIRCUIT NUMBERS. ARROWS DENOTE NO. OF CIRCUITS.
- CONDUIT WITH WIRES, #12 AWG IN 3/4" C. UNLESS OTHERWISE NOTED. NUMBER OF CONDUCTORS AS REQUIRED. PROVIDE SEPARATE NEUTRALS FOR ALL SINGLE PHASE CIRCUITS.

OR

- BRANCH CIRCUIT OR FEEDER WIRING IN CONDUIT. NO TICK MARKS INDICATES 2#12 CONDUCTORS AND 1#12 GROUND IN A 1/2"C (UON)
- INDICATES A CONDUIT RUN CONCEALED IN CEILING WALL, FLOOR, OR ABOVE SUSPENDED CEILING (UON)
- EXPOSED CONDUIT RUN AS INDICATED.
- CONDUIT TURNED UP
- CONDUIT TURNED DOWN
- G — GROUNDING CONDUCTOR (BCSD)
- RACEWAY WITH SEALING FITTING

PANELBOARDS

- ELECTRICAL PANELBOARD (240/120V, 1PH, 3W+G)

MISCELLANEOUS

- [1] SPECIFIC NOTE NUMBER
- (1) FEEDER SIZE

N:\46626-003\CADD\46626003ED-01.DWG

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
IL HWAN KIM
Lic. No. 036555
8-4-23
PROFESSIONAL ENGINEER

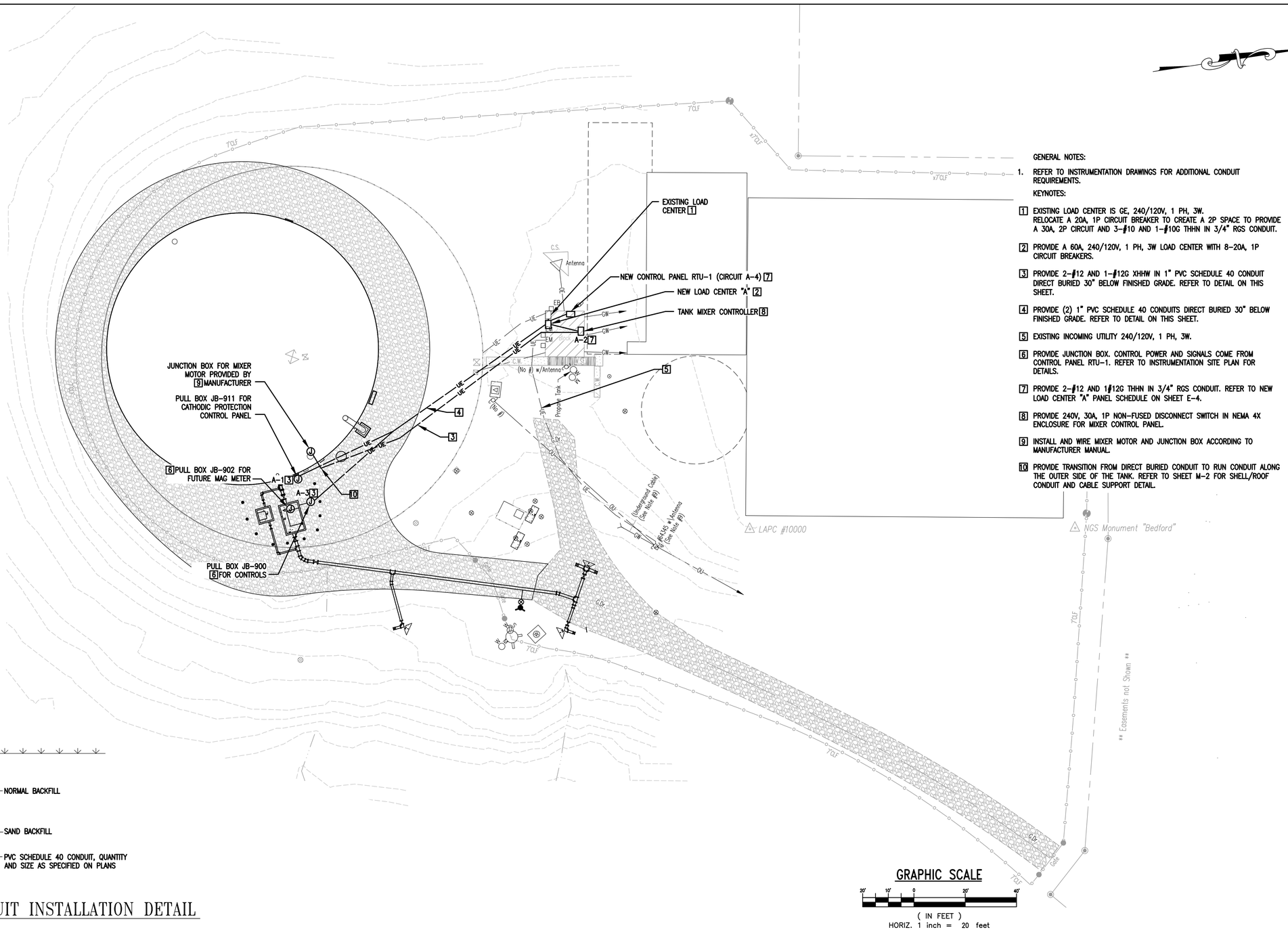
SCALE:
HORIZ: N/A
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: PD
DRAWN: PD
CHECKED: IK
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
GENERAL NOTES, DEFINITIONS, ABBREVIATIONS AND LEGEND

SHEET 21 OF 30

DRAWING E-1

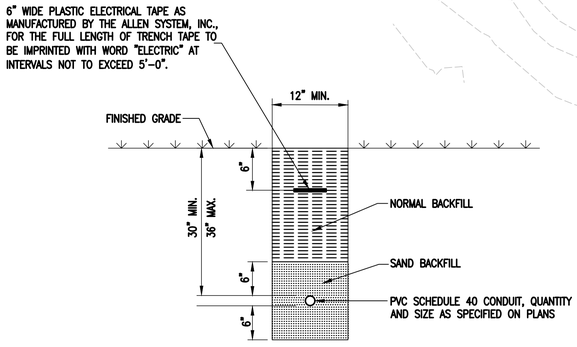


GENERAL NOTES:

1. REFER TO INSTRUMENTATION DRAWINGS FOR ADDITIONAL CONDUIT REQUIREMENTS.

KEYNOTES:

1. EXISTING LOAD CENTER IS GE, 240/120V, 1 PH, 3W. RELOCATE A 20A, 1P CIRCUIT BREAKER TO CREATE A 2P SPACE TO PROVIDE A 30A, 2P CIRCUIT AND 3-#10 AND 1-#10G THHN IN 3/4" RGS CONDUIT.
2. PROVIDE A 60A, 240/120V, 1 PH, 3W LOAD CENTER WITH 8-20A, 1P CIRCUIT BREAKERS.
3. PROVIDE 2-#12 AND 1-#12G XHHW IN 1" PVC SCHEDULE 40 CONDUIT DIRECT BURIED 30" BELOW FINISHED GRADE. REFER TO DETAIL ON THIS SHEET.
4. PROVIDE (2) 1" PVC SCHEDULE 40 CONDUITS DIRECT BURIED 30" BELOW FINISHED GRADE. REFER TO DETAIL ON THIS SHEET.
5. EXISTING INCOMING UTILITY 240/120V, 1 PH, 3W.
6. PROVIDE JUNCTION BOX. CONTROL POWER AND SIGNALS COME FROM CONTROL PANEL RTU-1. REFER TO INSTRUMENTATION SITE PLAN FOR DETAILS.
7. PROVIDE 2-#12 AND 1#12G THHN IN 3/4" RGS CONDUIT. REFER TO NEW LOAD CENTER "A" PANEL SCHEDULE ON SHEET E-4.
8. PROVIDE 240V, 30A, 1P NON-FUSED DISCONNECT SWITCH IN NEMA 4X ENCLOSURE FOR MIXER CONTROL PANEL.
9. INSTALL AND WIRE MIXER MOTOR AND JUNCTION BOX ACCORDING TO MANUFACTURER MANUAL.
10. PROVIDE TRANSITION FROM DIRECT BURIED CONDUIT TO RUN CONDUIT ALONG THE OUTER SIDE OF THE TANK. REFER TO SHEET M-2 FOR SHELL/ROOF CONDUIT AND CABLE SUPPORT DETAIL.



2 / E-2 DIRECT BURIED CONDUIT INSTALLATION DETAIL
NOT TO SCALE

NO.	DATE	BY	REVISIONS

Whitman, Requardt & Associates, LLP
1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA
IL HWAN KIM
Lic. No. 036555
PROFESSIONAL ENGINEER
8-24-23

SCALE: HORIZ: 1"=20' VERT.: N/A
DATE: AUGUST 2023
DESIGNED: PD
DRAWN: PD
CHECKED: IK
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
ELECTRICAL SITE PLAN

SHEET 22 OF 30

DRAWING E-2

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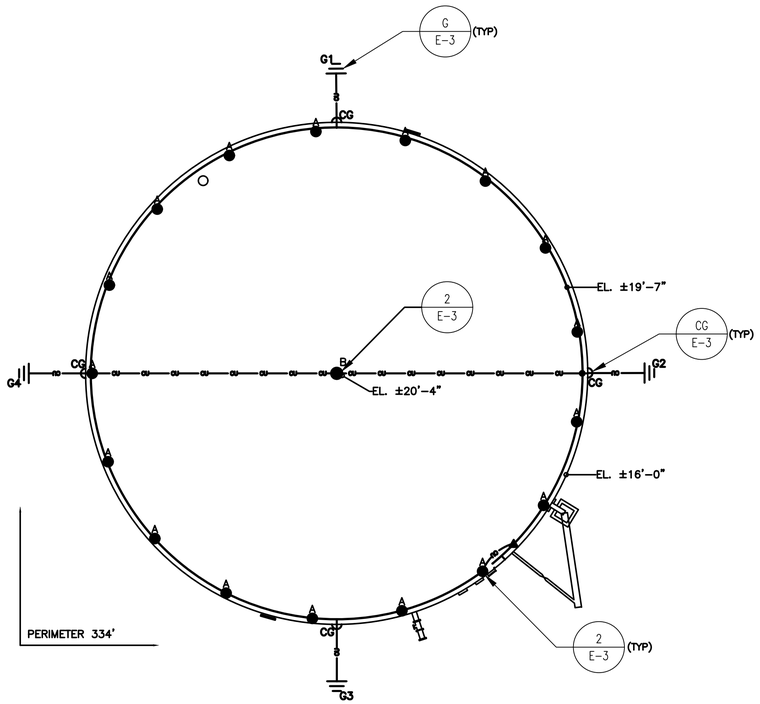
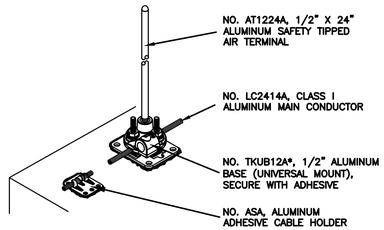


1 E-3 LIGHTNING PROTECTION PLAN
1/6" = 1'-0"



* This product may be subject to patent rights of VFC. Consult your patent attorney about your rights and responsibilities regarding patented products.

2 E-3 AIR TERMINAL A AND B DETAIL
NOT TO SCALE

GENERAL CONSTRUCTION NOTES

1. THIS DRAWING IS INTENDED FOR USE AS A CONSTRUCTION DOCUMENT. FIELD VERIFY ACTUAL CONDITIONS PRIOR TO CONSTRUCTION. CONTACT VFC, TO CLARIFY ANY DISCREPANCIES.

LEGEND

- AIR TERMINAL
- MECHANICAL CONNECTION
- MISC. BONDING
- CG — THRU-ROOF CONNECTION
- CLASS I COPPER MAIN CONDUCTOR
- G — COPPER CLAD GROUND ROD WITH EXOTHERMIC WELD CONNECTION

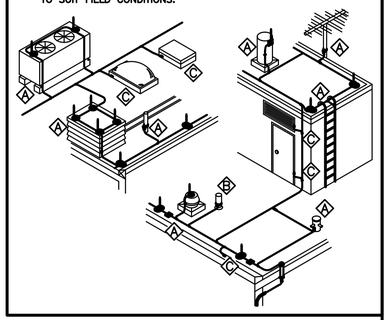
GENERAL BONDING NOTES

(A) TYPICAL BODIES OF CONDUCTANCE AS NOTED BELOW. USE FULL SIZE CONDUCTOR AND APPROPRIATE FITTING SHOWN FOR CONNECTION.

(B) (PLUMBING STACK) REQUIRES BONDING WITH MAIN SIZE CABLE ONLY IF WITHIN 6'-0" (1,828mm) OF LIGHTNING PROTECTION SYSTEM.

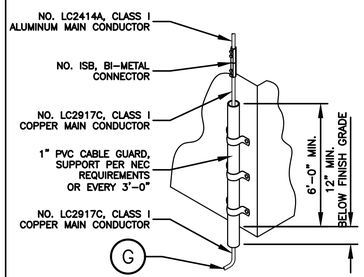
(C) TYPICAL BODIES OF INDUCTANCE AS NOTED BELOW. USE SECONDARY SIZE (SMALLER) CONDUCTOR AND APPROPRIATE FITTING SHOWN FOR CONNECTION.

(D) BONDING CONNECTIONS AND FITTINGS SHOWN ARE TYPICAL EXAMPLES. MAKE ALL CONNECTIONS REQUIRED TO MEET CODES AS NOTED BELOW. ADJUST FITTING TYPE AS REQUIRED TO SUIT FIELD CONDITIONS.

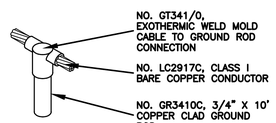


GENERAL INSTALLATION NOTES

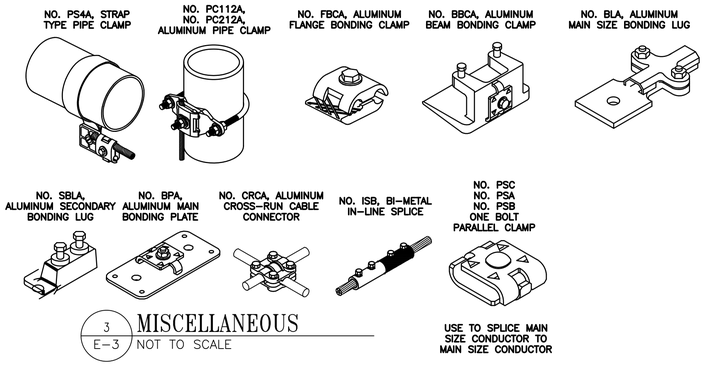
1. LOCATE AIR TERMINALS AS SHOWN. TAKE CARE TO ENSURE THAT ALL POINTS ARE WITHIN 2'-0" (609mm) OF OUTSIDE BUILDING EDGE, OUTSIDE CORNERS, RIDGE ENDS, AND THAT MAX SPACING DOES NOT EXCEED 20'-0" (6,096mm), AND THAT MIN PROJECTION ABOVE OBJECT PROTECTED IS 10" (254mm); POINTS PROJECTING 24" (609mm) MAY BE SPACED @ 25'-0" (7,520mm) MAX.
2. MAINTAIN HORIZONTAL OR DOWNWARD COURSING OF MAIN CONDUCTOR. ENSURE THAT ALL BENDS HAVE AT LEAST AN 8" (203mm) RADIUS AND DO NOT EXCEED 90 DEGREES.
3. ATTACH ALL EXPOSED WATER TANK, DOWN LEAD AND BONDING CABLES AT 3'-0" (914mm) ON CENTER MAX. VERIFY COMPATIBILITY OF ADHESIVE ON MEMBRANE ROOF APPLICATION PRIOR TO INSTALLATION.
4. GROUND ROD ELECTRODES SHALL BE INSTALLED AS SHOWN, BUT IN NO INSTANCE SHALL THEY BE LESS THAN 1'-0" (304mm) BELOW GRADE AND 2'-0" (609mm) FROM FOUNDATION WALL. DRIVEN RODS SHALL PENETRATE THE EARTH AT LEAST 10'-0" (3,048mm).
5. BOND TO WATER SERVICE AND OTHER PIPING SYSTEMS AS SHOWN AND AS REQUIRED BY CODE.
6. MAIN SIZE LIGHTNING CONDUCTOR BONDED TO MAIN GROUND BUS FIELD VERIFY LOCATION 1 1/4" CONDUIT FOR ACCESS, INSTALLED BY OTHERS. INTERCONNECT LIGHTNING PROTECTION GROUND TO TELEPHONE AND OTHER BUILDING GROUND SYSTEMS LOCATION FIELD DETERMINED OR AS REQUIRED BY CODE.
7. LB'S AND SIMILAR CONDUIT BODIES MAY NOT BE USED IN THE INSTALLATION OF DOWNLEAD CONDUITS, AS THEY DO NOT ADHERE TO THE REQUIRED 8" (203mm) MINIMUM BEND RADIUS.
8. SYSTEM SHALL BE INSTALLED AS SHOWN TO ENSURE PROPER CODE COMPLIANCE AND SYSTEM CERTIFICATION. ANY MAJOR VARIANCE SHALL BE RESUBMITTED FOR APPROVAL.
9. ALL MATERIALS TO BE UNDERWRITER'S LABORATORIES APPROVED WITH APPROPRIATE UL96 MARKINGS.
10. FINAL SYSTEM INSPECTION AND QUALITY CONTROL
    - A) THE CONTRACTOR SHALL FURNISH AN LPI-IP CERTIFICATE OR A UL CERTIFICATE UPON COMPLETION OF THE INSTALLATION.
    - B) LPI CERTIFICATION IF REQUIRED, REQUIRES SIGNATURE BY A REPRESENTATIVE OF THE OWNER AT MULTIPLE STAGES OF INSTALLATION & BY THEIR THIRD PARTY FIELD STAFF. UL CERTIFICATION IF REQUIRED, REQUIRES INSPECTION BY THEIR THIRD-PARTY FIELD STAFF AFTER COMPLETION OF THE INSTALLATION.
    - C) AS-BUILT DRAWINGS SHALL BE COMPLETED AND STAMPED BY AN LPI CERTIFIED MASTER DESIGNER – INSTALLER OF LIGHTNING PROTECTION SYSTEMS.
    - D) FINAL INSPECTION REPORT – A FINAL INSPECTION AND INSPECTION REPORT SHALL BE COMPLETED BASED ON ANSI/TIA/EIA 607, NEC, NFPA 780, AND UL96A INDUSTRY STANDARDS AS APPLICABLE. THE SCOPE OF THE INSPECTION AND REPORT SHALL INCLUDE;
      - a. TEST AND EVALUATION OF THE GROUNDING SYSTEM. RECORD FINAL SYSTEMS TO GROUND RESISTANCE LEVEL.
      - b. EVALUATION AND TESTING OF THE INTERNAL BONDING AND GROUNDING SYSTEMS.
      - c. EVALUATION AND TESTING OF EQUIPMENT GROUNDING.
      - d. EVALUATION OF AC SURGE SUPPRESSION INSTALLATION.
      - e. EVALUATION OF TELCO SURGE SUPPRESSION INSTALLATION.
      - f. COPY OF THE LPI-IP OR UL LIGHTNING PROTECTION CERTIFICATION.
      - g. FINAL AS-BUILT REVIEW AND SUBMISSION.
    - E) REPORT SHALL INCLUDE DETAILED REPORTING AND TEST RESULTS WITH CORRESPONDING PHOTOS OF EACH EVALUATION CATEGORY.
11. SYSTEM DESIGNED UTILIZING UL LISTED T&B/FURSE MATERIALS.



CG E-3 PVC CABLE GUARD FOR DOWNLEAD CABLE
NOT TO SCALE



G E-3 VFCWELD EXOTHERMIC WELD MOLD
NOT TO SCALE



3 E-3 MISCELLANEOUS
NOT TO SCALE

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DESIGNED: PD
DRAWN: PD
CHECKED: IK
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
LIGHTNING PROTECTION PLAN

SHEET 23 OF 30

DRAWING E-3

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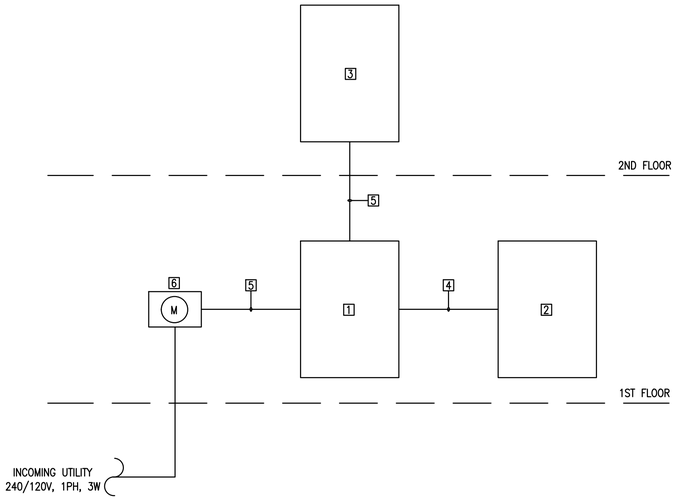

1 E-4 POWER RISER DIAGRAM
NOT TO SCALE

NEW LOAD CENTER 'A'

10 kAIC
NEMA 1 ENCLOSURE

60 AMP BUS
240/120 VOLTS
SURFACE MOUNTED

60 AMP MLO
1-PHASE, 3 WIRE + GROUND
FIRST FLOOR BLOCK BUILDING

LOAD SERVED	CIRCUIT BRKR FRAME	CIRCUIT BRKR TRIP	CIRCUIT BRKR P	CKT. NO.	CKT. NO.	CIRCUIT BRKR P	CIRCUIT BRKR TRIP	CIRCUIT BRKR FRAME	LOAD SERVED
CATHODIC PROTECTION CONTROL PNL	100	20	1	1	2	1	20	100	TANK MIXER CONTROLLER [7]
CHLORINE HEAT TAPE [7]	100	20	1	3	4	1	20	100	NEW CONTROL PANEL RTU-1
SPARE	100	20	1	5	6	1	20	100	SPARE
SPARE	100	20	1	7	8	1	20	100	SPARE
SPACE	–	–	–	9	10	–	–	–	SPACE
SPACE	–	–	–	11	12	–	–	–	SPACE
SPACE	–	–	–	13	14	–	–	–	SPACE
SPACE	–	–	–	15	16	–	–	–	SPACE
SPACE	–	–	–	17	18	–	–	–	SPACE

EXISTING LOAD CENTER [1]

10 kAIC
NEMA 1 ENCLOSURE

100 AMP BUS
240/120 VOLTS
SURFACE MOUNTED

100 AMP MCB
1-PHASE, 3 WIRE + GROUND
FIRST FLOOR BLOCK BUILDING

LOAD SERVED	CIRCUIT BRKR FRAME	CIRCUIT BRKR TRIP	CIRCUIT BRKR P	CKT. NO.	CKT. NO.	CIRCUIT BRKR P	CIRCUIT BRKR TRIP	CIRCUIT BRKR FRAME	LOAD SERVED
EXISTING CONTROL PANEL	100	30	1	1	2	1	20	100	EXISTING LOAD
EXISTING LOAD	100	20	1	3	4	1	20	100	EXISTING LOAD
EXISTING LOAD	100	20	1	5	6	1	20	100	EXISTING LOAD
EX. 2ND FLOOR BLOCK BUILDING LC	100	30	2	7	8	1	20	100	EXISTING LOAD
				9	10	1	20	100	EXISTING LOAD
SPACE	–	–	–	7	12	–	–	–	SPACE

EXISTING LOAD CENTER (PROPOSED)

10 kAIC
NEMA 1 ENCLOSURE

100 AMP BUS
240/120 VOLTS
SURFACE MOUNTED

100 AMP MCB
1-PHASE, 3 WIRE + GROUND
FIRST FLOOR BLOCK BUILDING

LOAD SERVED	CIRCUIT BRKR FRAME	CIRCUIT BRKR TRIP	CIRCUIT BRKR P	CKT. NO.	CKT. NO.	CIRCUIT BRKR P	CIRCUIT BRKR TRIP	CIRCUIT BRKR FRAME	LOAD SERVED
SPARE	100	30	1	1	2	1	20	100	EXISTING LOAD
EXISTING LOAD	100	20	1	3	4	1	20	100	EXISTING LOAD
EXISTING LOAD	100	20	1	5	6	1	20	100	EXISTING LOAD
EX. 2ND FLOOR BLOCK BUILDING LC	100	30	2	7	8	1	20	100	EXISTING LOAD
				9	10	2	30	100	NEW LOAD CENTER 'A' [2]
EXISTING LOAD	100	20	1	11	12				

KEYNOTES:

[1] EXISTING LOAD CENTER IS GE, 240/120V, 1 PH, 3 WIRE PANEL. RELOCATE A 20A, 1P CIRCUIT BREAKER TO CREATE A 2P SPACE TO PROVIDE A 30A, 2P CIRCUIT AND 3-#10 AND 1-#10G THHN IN 3/4" RGS CONDUIT.

[2] NEW LOAD CENTER 'A' LOCATED ADJACENT TO EXISTING LOAD CENTER ON THE FIRST FLOOR OF THE BLOCK BUILDING.

[3] EXISTING LOAD CENTER TO REMAIN.

[4] PROVIDE 3-#10 AND 1-#10G THHN IN 3/4" RGS CONDUIT.

[5] EXISTING FEEDER TO REMAIN.

[6] EXISTING UTILITY METER.

[7] PROVIDE GROUND FAULT CIRCUIT BREAKER.

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BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
ONE LINE DIAGRAM AND SCHEDULES

SHEET 24 OF 30

DRAWING E-4

GENERAL NOTES

1. SEE ELECTRICAL DRAWINGS FOR POWER DISTRIBUTION, DISCONNECT REQUIREMENTS, EQUIPMENT LOCATIONS AND FEEDER REQUIREMENTS.
2. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR EQUIPMENT LOCATIONS AND POWER REQUIREMENTS. CONTRACTOR SHALL COORDINATE EQUIPMENT LOCATIONS SUCH AS NOT TO CAUSE INTERFERENCE WITH NEW AND/OR EXISTING EQUIPMENT.
3. ENCLOSURE DIMENSIONS SHOWN ARE MINIMUM REQUIREMENTS. ENCLOSURES SHALL BE SIZED TO ACCOMMODATE EQUIPMENT, CONTROLS AND COMPONENTS AS SHOWN, SPECIFIED AND REQUIRED FOR AN OPERABLE SYSTEM.
4. CIRCUITS SHOWN SHALL BE INSTALLED IN CONDUIT SIZES AS INDICATED IN THE GENERAL CIRCUIT/CONDUIT TAG IDENTIFICATION SCHEDULE.
5. ALL PENETRATIONS THROUGH EXISTING SOLID CONCRETE STRUCTURES AND VAULT'S WALLS WHERE SLEEVES HAVE NOT BEEN PROVIDED SHALL BE CORE DRILLED AND SIZED TO ACCEPT MECHANICAL LINK SEALS.
6. DISCRETE OUTPUTS SHALL BE PROVIDED WITH INTERPOSING RELAYS COMPATIBLE FOR USE WITH PLC OUTPUTS.
7. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. EXPOSED CONDUITS ABOVE SUSPENDED CEILINGS AND FURRED WALLS SHALL BE INSTALLED PARALLEL TO THE BEAMS AND WALLS.
8. PROVIDE ALL REQUIRED PULL BOXES AND JUNCTION BOXES FOR INSTALLATION OF THE WIRING IN ACCORDANCE WITH CONTRACT SPECIFICATIONS THOUGH THE BOXES MAY NOT BE INDICATED ON THE DRAWINGS.
9. ALL INDICATION AND CONTROL WIRING IN JUNCTION BOXES SHALL BE WIRED TO NUMBERED TERMINAL STRIPS AND IDENTIFIED AS TO START AND END OF RUN.
10. CABLE AND CONDUCTOR REQUIREMENTS VARY BETWEEN DIFFERENT MANUFACTURERS OF EQUIPMENT AND INSTRUMENTATION. CONTRACTOR SHALL VERIFY MANUFACTURERS REQUIREMENTS AND PROVIDE CONDUIT AND CABLES AS REQUIRED.
11. EXISTING EQUIPMENT AND WIRE IS SHOWN IN A LIGHT GRAY SCALE, NEW EQUIPMENT AND WIRING IS SHOWN BOLD. ALL WORK SHALL BE ASSUMED TO BE NEW UNLESS OTHERWISE INDICATED.
12. ALL CONTROL, MONITORING, INSTRUMENTATION, AND SIGNAL CONDUCTORS SHALL BE STRANDED COPPER.
13. ALL CONTROL WIRING SHALL CONFORM TO THE FOLLOWING:

1	LINE AND LOAD CIRCUITS (AC OR DC POWER)	BLACK	#12 AWG (MIN) STRANDED
2	NEUTRAL	WHITE	#12 AWG (MIN) STRANDED
3	AC CONTROL CIRCUITS	RED	#16 AWG (MIN) STRANDED
4	DC CONTROL CIRCUITS (+)	BLUE	#16 AWG (MIN) STRANDED
5	DC CONTROL CIRCUITS (-)	BLUE/BLACK	#16 AWG (MIN) STRANDED
6	INTERLOCK CONTROL CIRCUITS ON THE PANEL ENERGIZED FROM EXTERNAL SOURCE	YELLOW	#16 AWG (MIN) STRANDED
7	EQUIPMENT GROUNDING CONDUCTORS	GREEN	#12 AWG (MIN) STRANDED
8	ANALOG SIGNALS TWISTED SHIELDED PAIR	BLACK/RED	#18 AWG (MIN) STRANDED

NOTE: WIRE SIZES LISTED ARE MINIMUM REQUIREMENTS

ABBREVIATIONS

A/C	=	AIR CONDITIONING
AI	=	ANALOG INPUT
AMP	=	AMPERE
AO	=	ANALOG OUTPUT
AUTO	=	AUTOMATIC
AUX	=	AUXILIARY
ATS	=	AUTOMATIC TRANSFER SWITCH
BMS	=	BUILDING MANAGEMENT SYSTEM
COMM	=	COMMUNICATION
CR	=	CONTROL RELAY
DI	=	DISCRETE INPUT
DO	=	DISCRETE OUTPUT
E-NET	=	ETHERNET
E-STOP	=	EMERGENCY STOP
ETM	=	ELAPSE TIME METER
EX	=	EXISTING
F/B	=	FEEDBACK
F/C	=	FIBER/COPPER
FO	=	FIBER OPTIC
FPP	=	FIBER OPTIC PATCH PANEL
GFI	=	GROUND FAULT INTERRUPTER
GND	=	GROUND
HMI	=	HUMAN MACHINE INTERFACE
HOA	=	HAND-OFF-AUTO
HX	=	HEAT EXCHANGER
IAW	=	IN ACCORDANCE WITH
I/O	=	INPUT/OUTPUT
ISB	=	INTRINSICALLY SAFE BARRIER
ISR	=	INTRINSICALLY SAFE RELAY
J-BOX	=	JUNCTION BOX
L	=	LINE
LLS	=	LEAD-LAG-STANDBY
LOR	=	LOCK OUT RELAY
L/R	=	LOCAL/REMOTE
LS	=	LIMIT SWITCH
MAX	=	MAXIMUM
MCC	=	MOTOR CONTROL CENTER
MFR	=	MANUFACTURER
MIN	=	MINIMUM
MMS	=	MANUAL MOTOR STARTER
MPR	=	MOTOR PROTECTION RELAY
MOD	=	MOTOR OPERATED DAMPER
MOV	=	MOTOR OPERATED VALVE
N	=	NEUTRAL
NC	=	NORMALLY CLOSED
NEMA	=	NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION
NO	=	NORMALLY OPEN
NTS	=	NOT TO SCALE
OIT	=	OPERATOR INTERFACE TERMINAL
OL	=	OVERLOAD
PC	=	PERSONAL COMPUTER
PCS	=	PLANT CONTROL SYSTEM
PIO	=	POINT I/O
PLC	=	PROGRAMMABLE LOGIC CONTROLLER
PS	=	POWER SUPPLY
PSI	=	POUNDS PER SQUARE INCH
PVCC	=	PVC COATED
QTY	=	QUANTITY
RCT	=	REPEAT CYCLE TIMER
RGS	=	RIGID GALVANIZED STEEL
RIO	=	REMOTE I/O
RTD	=	RESISTANCE TEMPERATURE DEVICE
RTU	=	REMOTE TELEMETRY UNIT
RVSS	=	REDUCED VOLTAGE SOFT STARTER
SCADA	=	SUPERVISORY CONTROL AND DATA ACQUISTION
SF	=	SUPPLY FAN
SPD	=	SURGE PROTECTIVE DEVICE
TR	=	TIMING RELAY
TSP	=	TWISTED SHIELDED PAIR
TST	=	TWISTED SHIELDED TRIAD
T-STAT	=	THERMOSTAT
TVSS	=	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	=	TYPICAL
UON	=	UNLESS OTHERWISE NOTED
UPS	=	UNINTERRUPTIBLE POWER SUPPLY
VAC	=	VOLTS/ALTERNATING CURRENT
VCP	=	VENTILATION CONTROL PANEL
VDC	=	VOLTS/DIRECT CURRENT
VFD	=	VARIABLE FREQUENCY DRIVE

INSTRUMENTATION IDENTIFICATION SCHEDULE

	FIRST LETTER			SUCCEEDING LETTER		
	VARIABLE	MODIFIER		PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS			ALARM		AUTOMATIC
B	BREAKER			USER'S CHOICE		BYPASS
C	COMMUNICATIONS			USER'S CHOICE	CONTROL	CLOSE
D	DENSITY	DIFFERENTIAL			OPEN OR START	
E	VOLTAGE (EMF)			PRIMARY ELEMENT	SENSOR	
F	FLOW RATE	RATIO		FAIL	FAIL	FAIL
G				GAUGE	GATE	LOCAL/MANUAL/HAND
H	HAND					HIGH
I	CURRENT			INDICATE		INTERMEDIATE
J	POWER	SCAN				
K	TIME	TIME RATE				
L	LEVEL			LIGHT	CONTROL STATION	LOW
M	MOTOR	MOMENTARY			MOTOR	MIDDLE
N	TORQUE			INPUT	FORWARD	ON OR OPERATE
O					OFF	OVERLOAD OR OPEN
P	PRESSURE	PNEUMATIC		POINT (TEST)	POSITION	
Q	QUANTITY OR EVENT	TOTALIZE			EMERGENCY/ABNORMAL	
R	RADIOACTIVITY			RECORD OR PRINT	REMOTE	RUN
S	SPEED OR FREQUENCY	SUM		SWITCH	SWITCH	STOP
T	TEMPERATURE				TRANSMIT	
U	MULTIVARIABLE			MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VARIABLE OR VISCOSITY				VALVE OR DAMPER	VFD/VALVE
W	WEIGHT OR FORCE			WELL		
X	MOD. LIGHT OR VALVE			UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	INTERLOCK				RELAY OR COMPUTE	RESET
Z	POSITION				DRIVE OR ACTUATOR	

INSTRUMENT, EQUIPMENT AND CONTROL DEVICE EXAMPLES

FE	=	FLOW ELEMENT	TSH	=	TEMPERATURE SWITCH HIGH
FIT	=	FLOW INDICATING TRANSMITTER	ZSC	=	POSITION SWITCH CLOSED
PE	=	PRESSURE ELEMENT	ZSO	=	POSITION SWITCH OPEN
PIT	=	PRESSURE INDICATING TRANSMITTER	FS	=	FLOW SWITCH
PI	=	PRESSURE INDICATOR	LSL	=	LEVEL SWITCH LOW
PSH	=	PRESSURE SWITCH HIGH	LSH	=	LEVEL SWITCH HIGH

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DATE: AUGUST 2023
DESIGNED: HDL
DRAWN: HDL
CHECKED: GAH
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
INSTRUMENTATION ABBREVIATIONS, SCHEDULES, & GENERAL NOTES

SHEET 25 OF 30

DRAWING I-1

PROCESS AND INSTRUMENTATION DIAGRAM SYMBOLS

- FIELD MOUNTED DEVICE
- PANEL MOUNTED DEVICE
- X — INDICATING LAMP – X INDICATES LENS COLOR R = RED, A = AMBER G = GREEN, W = WHITE
- ABC 123 — ABC – LETTERS INDICATE FUNCTION ACCORDING TO ISA SCHEDULE: 123 DIGITS IDENTIFY ASSOCIATED EQUIPMENT (SEE LOOP IDENTIFICATION SCHEDULE)
- HS 123 XXX — SELECTOR SWITCH (MAINTAINED CONTACTS) XXX = H/O/A : HAND–OFF–AUTO L/L/S : LEAD–LAG–STANDBY
- ABC 123 — PROGRAMMABLE LOGIC CONTROLLER (PLC) I/O POINT
- I — INTERLOCK–PLC LOGIC OR HARDWIRED AS SHOWN ON DRAWINGS:
- PROCESS PUMP
- M — FAN MOTOR
- FE — MAGNETIC FLOW METER
- VENTURI METER
- D — DENSITY METER
- XXX — LEVEL FLOAT SWITCH
- XXX — ULTRASONIC LEVEL TRANSMITTER
- XXX — RADAR LEVEL TRANSMITTER
- XXX — SUBMERSIBLE LEVEL TRANSDUCER
- NEEDLE VALVE
- BALL VALVE
- PLUG VALVE
- CHECK VALVE
- M — MIXER
- PI — PRESSURE GAUGE WITH INLINE ANNULAR SEAL
- PI XXX — PRESSURE GAUGE AND SWITCH WITH INLINE ANNULAR SEAL
- PI — PRESSURE GAUGE WITH DIAPHRAGM SEAL
- PI XXX — PRESSURE GAUGE AND SWITCH WITH DIAPHRAGM SEAL
- VFD/RVSS KEYPAD

SIGNAL LINE TYPES

- COMMUNICATIONS SIGNAL
- ELECTRONIC OR ELECTRICAL CONTINUOUSLY VARIABLE OR BINARY SIGNAL
- PNEUMATIC SIGNAL
- HYDRAULIC SIGNAL

SIGNAL INTERFACE

- ANALOG INPUT
- ANALOG OUTPUT
- DISCRETE INPUT
- DISCRETE OUTPUT

ELEMENTARY WIRING SYMBOLS

- CRXX CR — CONTROL RELAY
- XXX — NORMALLY OPEN CONTACT
- XXX — NORMALLY CLOSED CONTACT
- TRXX TR — TIMING RELAY
- NORMALLY OPEN TIMED CLOSED CONTACT
- NORMALLY CLOSE TIMED OPEN CONTACT
- FUSE
- CIRCUIT BREAKER
- XOO — SELECTOR SWITCH XOO= REPRESENT THE NUMBER OF SWITCH POSITIONS
- PUSH BUTTON, NORMALLY OPEN
- PUSH BUTTON, NORMALLY CLOSED
- EMERGENCY STOP PUSH BUTTON, NORMALLY OPEN
- EMERGENCY STOP PUSH BUTTON, NORMALLY CLOSED
- W — PUSH–TO–TEST PILOT LIGHT R=RED, G=GREEN, A=AMBER, W=WHITE
- PLC OUTPUT VIA INTERPOSING RELAY
- M — MOTOR
- MOD — MOTOR OPERATED DAMPER
- TERMINAL BLOCK
- THERMOSTAT, CLOSE ON RISING/TEMPERATURE
- THERMOSTAT, OPEN ON RISING/TEMPERATURE
- LIMIT SWITCH, NORMALLY OPEN
- LIMIT SWITCH, NORMALLY CLOSED
- INTRINSICALLY SAFE RELAY
- INTRINSICALLY SAFE BARRIER
- MMS — MANUAL MOTOR STARTER WITH OVERLOAD AND SELECTOR SWITCH
- OVERLOAD
- G — GROUND
- FLOAT SWITCH, NORMALLY OPEN
- FLOAT SWITCH, NORMALLY CLOSED
- PRESSURE SWITCH, NORMALLY CLOSED, PRESSURE OPEN
- PRESSURE SWITCH, NORMALLY OPEN, PRESSURE CLOSE
- FLOW SWITCH, NORMALLY OPEN
- FLOW SWITCH, NORMALLY CLOSED
- SOV — SOLENOID VALVE
- ETM — ELAPSED TIME METER
- CONTROL POWER TRANSFORMER
- NEW CONTROL WIRING
- NEW FIELD CONTROL WIRING
- COMMUNICATION SIGNAL

PROCESS CONTROL SYSTEM (PCS) ARCHITECTURE SYMBOLS

- PROGRAMMABLE LOGIC COMPUTER (PLC) WITH I/O RACK AND COMMUNICATIONS MODULES
- REMOTE I/O RACK WITH COPPER ETHERNET PORT
- ROUTER
- LAYER 2 NETWORK SWITCH (TYPE "X") X = SEE NETWORK HARDWARE SCHEDULE
- LAYER 3 NETWORK SWITCH (TYPE "X") X = SEE NETWORK HARDWARE SCHEDULE
- FIBER OPTIC CABLE
- CAT6 ETHERNET CABLE
- HARDWIRED I/O SIGNALS
- EXISTING FIBER OPTIC CABLE
- EXISTING CAT6 ETHERNET CABLE

PLAN SYMBOLS

- ABC 123 — FIELD MOUNTED DEVICE/INSTRUMENT TAG
- T_H — THERMOSTAT, HIGH TEMP.
- T_F — FREEZESTAT
- CONTROL ENCLOSURE
- HOME RUN CONDUIT/CABLE
- C–X — CONDUIT TAG. SEE TAG IDENTIFICATION SCHEDULE

GENERAL CIRCUIT/CONDUIT TAG IDENTIFICATION

TAG	CONDUIT SIZE	CONDUCTORS	NOTES
C–X (Y)	3/4" (X=2 THRU 18) 1" (X=19 THRU 30) 2" (X=31 THRU 100)	X–#16, 1–#12G	(Y) DENOTES ADDITIONAL SPARES
P–X (Y)	3/4" (X=2 THRU 14) 1" (X=15 THRU 24) 2" (X=25 THRU 80)	X–#12, 1–#12G	(Y) DENOTES ADDITIONAL SPARES
RTD–X (Y)	3/4" (X=1 THRU 4) 1" (X=5 THRU 7) 1 1/2" (X=8 THRU 14)	X–#18 SHIELDED PAIR	(Y) DENOTES ADDITIONAL SPARES
TSP–X (Y)	3/4" (X=1,2) 1" (X=3,4) 2" (X=5 THRU 16)	X–#18 TWISTED SHIELDED PAIR	(Y) DENOTES ADDITIONAL SPARES
TST–X (Y)	3/4" (X=1,2) 1" (X=3,4) 2" (X=5 THRU 16)	X–#18 TWISTED SHIELDED TRIAD	(Y) DENOTES ADDITIONAL SPARES
ETH–X (Y)	1" (X=1 THRU 4)	X–# OF CAT6 CABLES	(Y) DENOTES ADDITIONAL SPARES
FO–X	1" (X=2–12) 2" (X=12–48)	X–# OF MULTIMODE FIBER OPTIC STRANDS	COORDINATE CONDUIT AND INSTALLATION REQUIREMENTS WITH F.O. CABLE MANUFACTURER'S CABLE SIZE AND BEND RADIUS REQUIREMENTS.
M–X	CONDUIT SIZE AS REQUIRED	X–MANUFACTURER SUPPLIED CABLE	CABLE AS PROVIDED OR RECOMMENDED BY EQUIPMENT MANUFACTURER. COORDINATE CONDUIT AND INSTALLATION REQUIREMENTS WITH MANUFACTURER.
AC–X (Y)	1" (X=1,2)	X–ANTENNA CABLE	(Y) DENOTES ADDITIONAL SPARES
TOTAL CONDUCTORS REQUIRED = X + Y			

NO.	DATE	BY	REVISIONS

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SCALE: HORIZ: N/A VERT.: N/A
DATE: AUGUST 2023
DESIGNED: HDL
DRAWN: HDL
CHECKED: GAH
PROJECT NO.: 46626–003

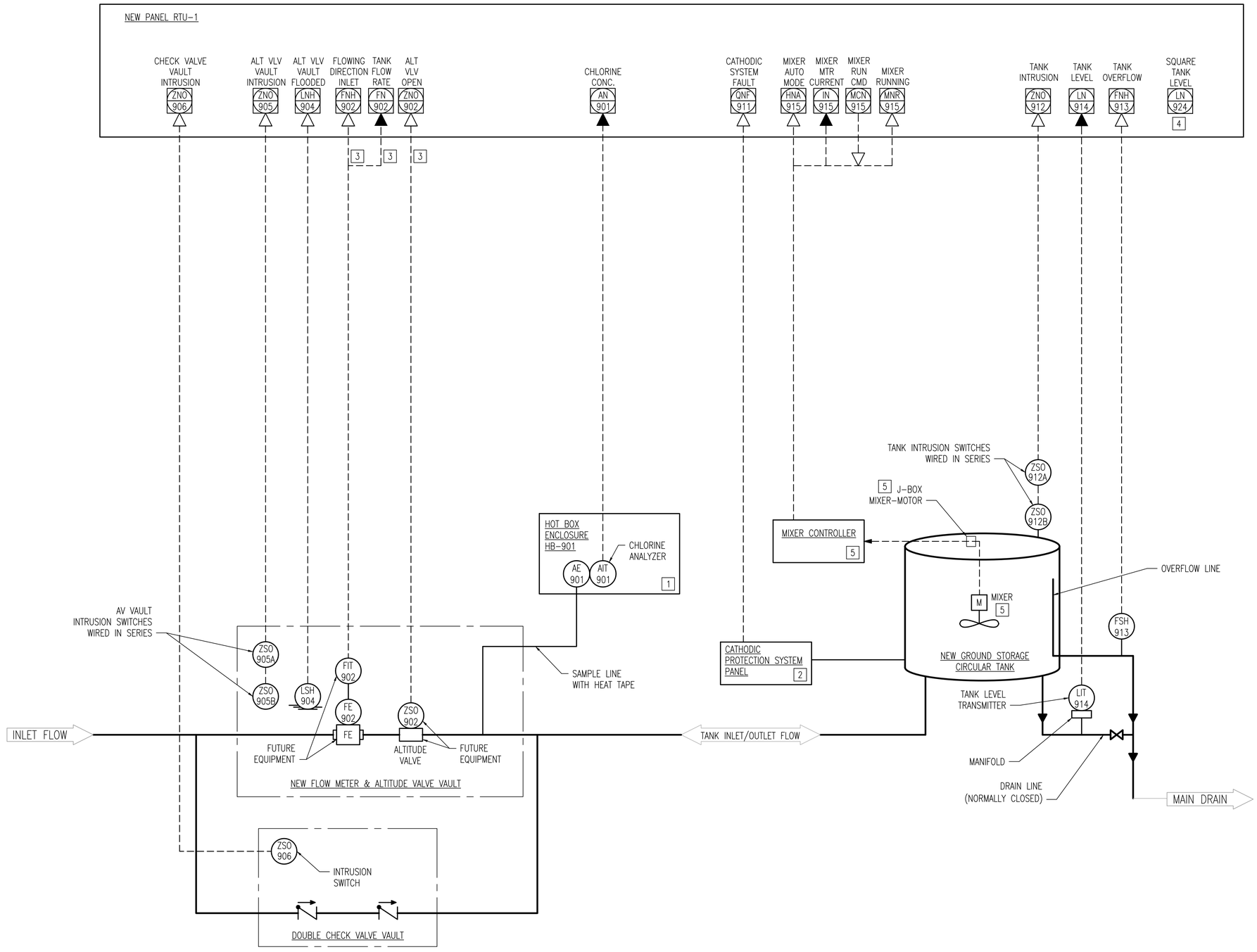
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
INSTRUMENTATION SYMBOLS & LEGENDS

SHEET 26 OF 30

DRAWING I-2

N:\46626–003\CAD\46626003–2 GEN SYM LEGEND.DWG



GENERAL NOTES

1. SEE I&C SYMBOLS, LEGENDS AND ABBREVIATIONS SHEETS FOR DETAILS.
2. P&ID SHOWN TO INDICATE CONTROL SYSTEM REQUIREMENTS AND DOES NOT REPRESENT A COMPLETE REFLECTION OF ALL PROCESS REQUIREMENTS. SEE MECHANICAL DRAWINGS FOR ADDITIONAL REQUIREMENTS.
3. REFER TO ELECTRICAL & MECHANICAL DRAWINGS FOR ADDITIONAL INSTALLATION, LOCATIONS, AND EQUIPMENT REQUIREMENTS.
4. NOT ALL REQUIRED I/O SHOWN FOR CLARITY.
5. EXISTING-TO-REMAIN EQUIPMENT SHOWN HALF-TONE. NEW WORK SHOWN BOLD.
6. NOT ALL I/O AND DEVICES SHOWN FOR INTERNAL RTU CONTROL LOGIC.
7. PROCESS CONNECTION DETAILS NOT SHOWN. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DETAILS.

[X] SPECIFIC NOTES

1. HOT BOX ENCLOSURE AND ACCESSORIES PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
2. CATHODIC PROTECTION SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
3. I/O POINTS ARE FUTURE. THE NEW RTU-1 PANEL SHALL COUNT THESE FUTURE I/O POINTS AS PART OF THE SYSTEM, NOT PART OF SPARES.
4. EXISTING I/O IS FROM EX. RTU-0 PANEL. RELOCATE AND TERMINATE FIELD CONDUCTORS AND ASSOCIATED CONDUITS FROM EX. RTU-0 PANEL TO NEW RTU-1 PANEL.
5. TANK MIXING SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.

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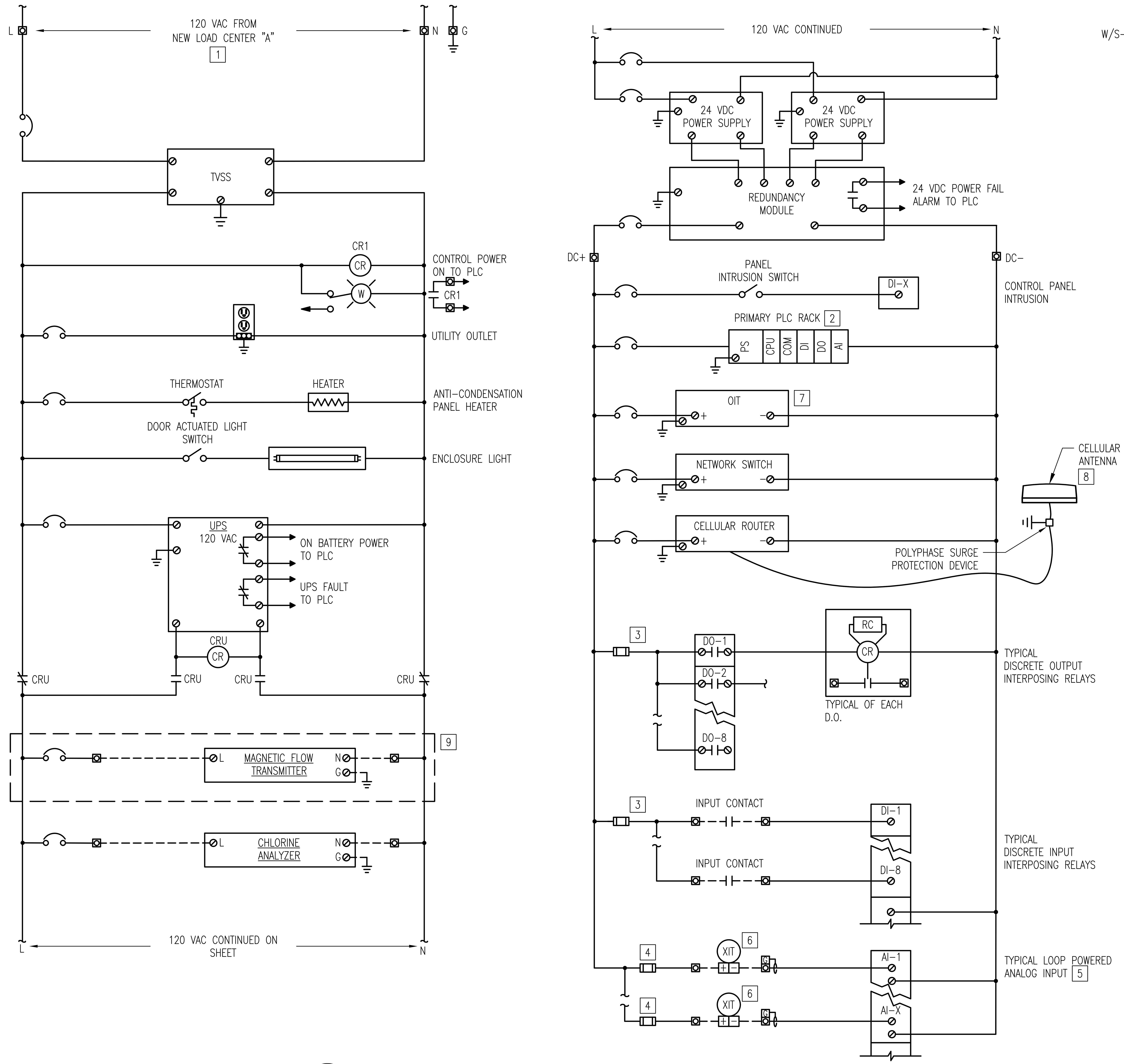
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
PROCESS AND INSTRUMENTATION DIAGRAM

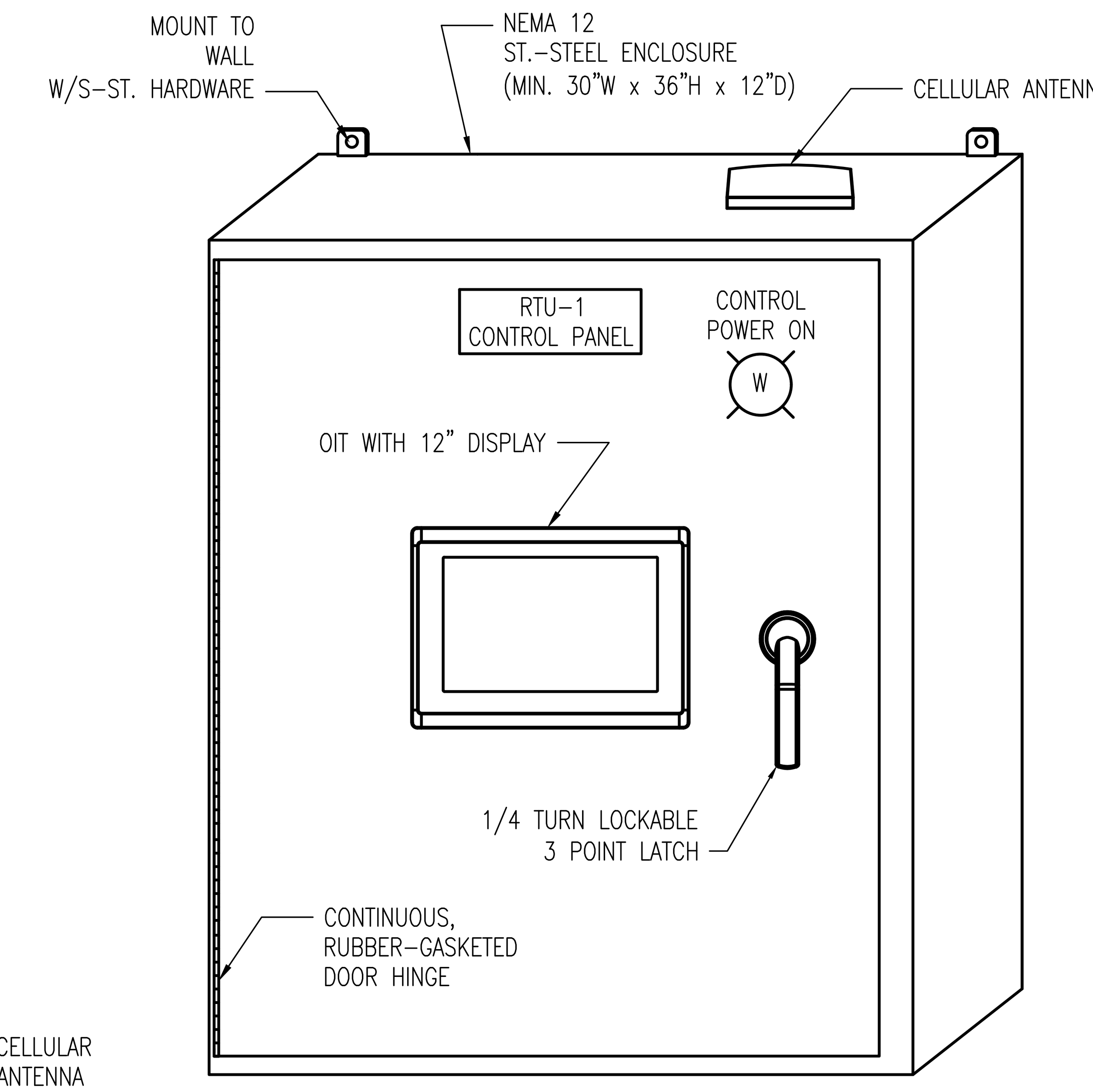
SHEET 27 OF 30

DRAWING I-3

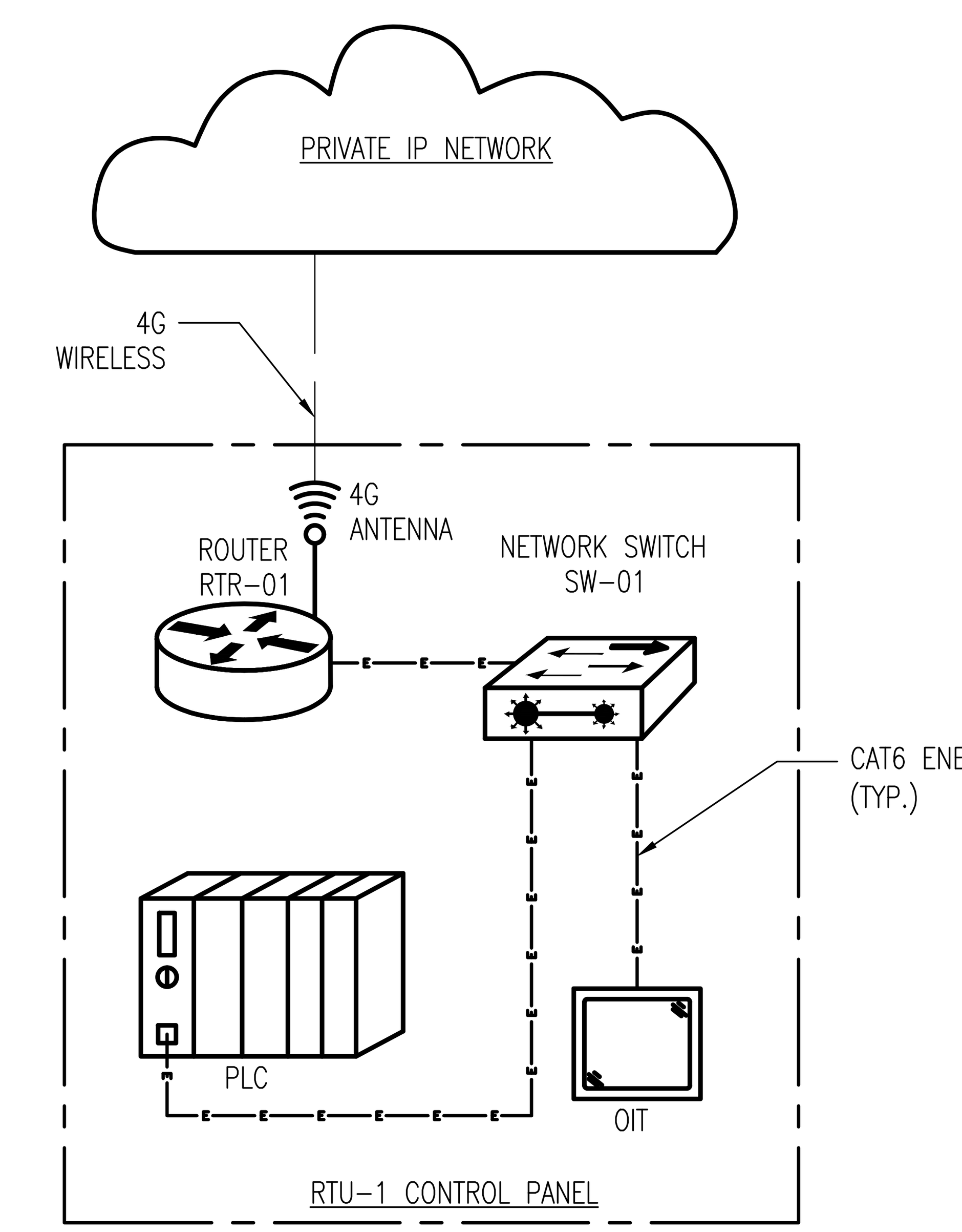
N:\46626-003\CADD\46626003-3 P-ID.DWG



RTU−1 CONTROL PANEL ELEMENTARY
1
I−4
NTS



RTU−1 CONTROL PANEL ELEVATION
2
I−4
NTS



RADIO & NETWORK ARCHITECTURE
3
I−4
NTS

GENERAL NOTES

1. SEE I&C SYMBOLS, LEGENDS AND ABBREVIATIONS SHEETS FOR DETAILS.
2. NOT ALL I/O WIRING AND CONNECTIONS TO I/O CARDS ARE SHOWN. PROVIDE WIRING FOR I/O AS REQUIRED FOR ACTIVE AND SPARE I/O, AS APPLICABLE. PROVIDE INTERPOSING RELAYS WITH RC OR DIODE SNUBBER CIRCUITS FOR DISCRETE OUTPUTS, BOTH ACTIVE AND SPARES. PROVIDE FUSES ON ANALOG INPUTS AND OUTPUTS, BOTH ACTIVE AND SPARES. PROVIDE WIRING OF ALL I/O INCLUDING SPARES, TO FIELD TERMINAL STRIPS.
3. LABEL ALL EQUIPMENT WITHIN THE CONTROL PANEL INCLUDING TERMINAL BLOCKS, RELAYS AND CIRCUIT BREAKERS WITH ASSOCIATED CIRCUIT OR ID NUMBER.
4. REFER TO ADDITIONAL INSTRUMENTATION DRAWINGS FOR ADDITIONAL INSTALLATION, LOCATIONS, AND EQUIPMENT REQUIREMENTS.

X SPECIFIC NOTES

1. REFER TO ELECTRICAL DRAWINGS FOR CIRCUIT LOCATION.
2. GENERAL PLC CONFIGURATION SHOWN. REFER TO I/O LIST FOR REQUIRED I/O MODULES.
3. PROVIDE FUSED POWER TO DISCRETE I/O POINTS IN GROUPS OF 8 FOR BOTH ACTIVE AND SPARE.
4. PROVIDE INDIVIDUAL 0.1A FUSED ANALOG INPUT CIRCUITS FOR EACH ANALOG SIGNAL.
5. LOOP DIAGRAMS SHOWN SIMPLIFIED FOR CLARITY. USE TWISTED SHIELDED CONDUCTORS WITH DRAIN WIRES GROUNDED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS FOR ALL ANALOG POINTS.
6. TYPICAL LOOP POWERED TRANSMITTERS. REFER TO SITE PLANS FOR ADDITIONAL INFORMATION.
7. EQUIPMENT LOCATED ON THE FACE OF THE CONTROL PANEL.
8. PROVIDE A RUGGED, LOW PROFILE, IMPACT RESISTANT (VANDAL PROOF) CELLULAR ANTENNA WITH POLYPHASE SURGE PROTECTOR.
9. FIELD DEVICE IS FUTURE. CONTROL PANEL TO ACCOUNT FOR THIS FUTURE DEVICE & ASSOCIATED I/O. REFER TO INSTRUMENTATION, SITE PLANS AND I/O LIST FOR ADDITIONAL INFORMATION.

NO.	DATE	BY	REVISIONS

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Lic. No. 0402065255
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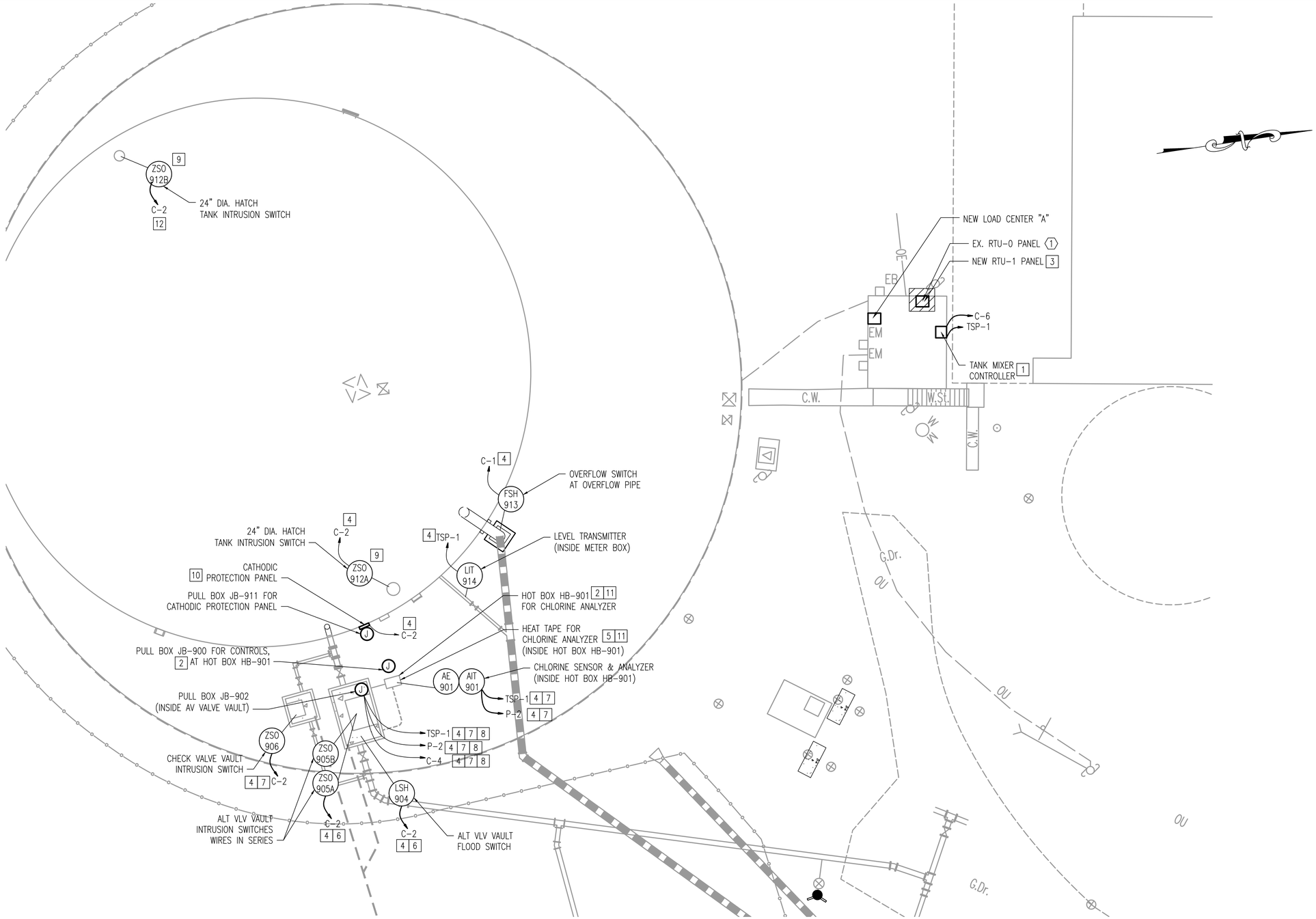
VERT.: N/A
DATE: AUGUST 2023
DESIGNED: HDL
DRAWN: HDL
CHECKED: GAH
PROJECT NO.: 46626-003

BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
ELECTRICAL CONTROL DIAGRAM & NETWORK DETAILS

SHEET 28 OF 30

DRAWING I-4



1 I-5 INSTRUMENTATION SITE PLAN - DEMO & NEW WORK
SCALE: 1" = 10'

GENERAL NOTES

1. SEE I&C SYMBOLS, LEGENDS AND ABBREVIATIONS SHEETS FOR DETAILS.
2. REFER TO ELECTRICAL & MECHANICAL DRAWINGS FOR ADDITIONAL INSTALLATION, LOCATIONS, AND EQUIPMENT REQUIREMENTS.
3. TERMINATE ALL CONDUIT AND CONDUCTORS AT THE NEW RTU-1 PANEL UNLESS OTHERWISE NOTED.
4. ISOLATE 120VAC AND 24VDC ANALOG CABLES. PROVIDE BARRIERS IN JUNCTION AND PULL BOXES WHERE REQUIRED TO SEPARATE WIRING. NO SPLICES OR TERMINATIONS PERMITTED IN PULL BOXES.
5. UNLESS OTHERWISE NOTED, ALL DIRECT BURIED CONDUITS SHALL BE PVC SCHEDULE 40 AND ALL OTHER CONDUITS SHALL BE RGS. PROVIDE TRANSITION AS REQUIRED.

[X] SPECIFIC NOTES

1. TANK MIXING SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
2. FOR PULL BOX JB-900 AND HOT BOX HB-901, COORDINATE FINAL ARRANGEMENT ON CONCRETE PAD TO ENABLE ACCESS AND MAINTENANCE FOR BOTH ENCLOSURES.
3. NEW RTU-1 PANEL TO BE INSTALLED IN EX. RTU-0 LOCATION.
4. DIRECT BURIED CONDUITS. REFER TO ELECTRICAL DRAWINGS FOR DIRECT BURIED CONDUIT INSTALLATION DETAIL. COORDINATE CONDUIT ROUTING WITH ELECTRICAL PLAN DRAWINGS.
5. HEAT TAPE POWER CIRCUIT IS ROUTED THRU PULL BOX JB-900 TO LOAD CENTER. SEE ELECTRICAL DRAWINGS FOR CIRCUIT DETAILS. SEE INSTRUMENTATION DETAIL DRAWING FOR LOAD TERMINATION.
6. CABLES ROUTED THRU PULL BOX JB-902 TO PULL BOX JB-900 TO RTU-1.
7. CABLES ROUTED THRU PULL BOX JB-900 TO RTU-1.
8. CABLES ARE FOR FUTURE FLOW METER AND HAVE NO TERMINATION ON BOTH ENDS. INSTALL, COVER AND MARK "SPARES FOR FUTURE".
9. TANK INTRUSION SWITCHES WIRED IN SERIES.
10. CATHODIC PROTECTION SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
11. HOT BOX ENCLOSURE AND ACCESSORIES PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
12. TO ZSO-912A. CONDUIT BETWEEN SWITCHES TO RUN ALONG TANK HANDRAIL. CONTRACTOR TO PROVIDE HARDWARE AS-REQUIRED TO SECURE TO HANDRAIL.

(X) DEMOLITION KEYNOTES

1. DEMO RTU-0 CONTROL PANEL BUT PRESERVE ALL EX. CONTROL CONDUCTORS AND ASSOCIATED CONDUITS. REINSTALL THE EX. CONTROL CONDUCTORS AND ASSOCIATED CONDUITS AT THE NEW RTU-1 CONTROL PANEL. TERMINATE THE EX. CONTROL CONDUCTORS PER NEW CONTROL DRAWINGS.

GRAPHIC SCALE

0 5' 10' 20'

SCALE: 1" = 10'

NO.	DATE	BY	REVISIONS

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LIC. NO. 0402065255
PROFESSIONAL ENGINEER

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DATE: AUGUST 2023
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BEDFORD REGIONAL WATER AUTHORITY
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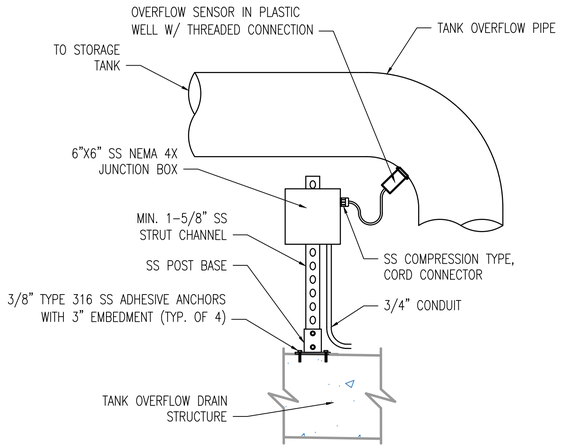
HELM STREET TANK REPLACEMENT
INSTRUMENTATION SITE PLAN

SHEET 29 OF 30

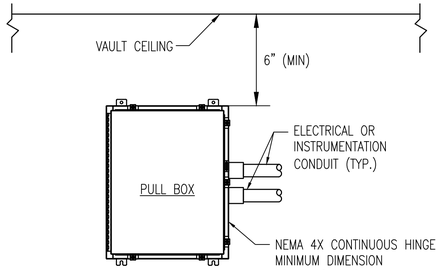
DRAWING I-5

N:\46626-003\CAD\46626003-5 SITE PLAN.DWG



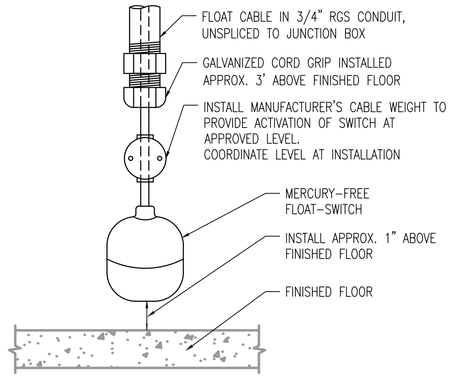
DETAIL NOTES:
1. *UNLESS OTHERWISE NOTED, ALL BOLTS, ANCHORS AND HARDWARE SHALL BE 316 STAINLESS STEEL.*

1 / I-6 OVERFLOW SENSOR INSTALLATION DETAIL
NTS

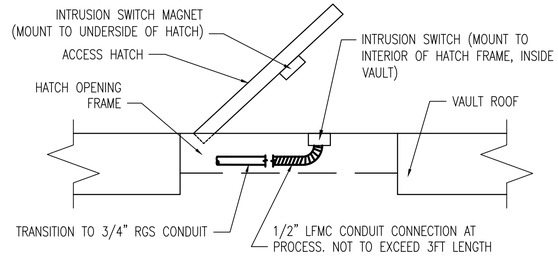


DETAIL NOTES:
1. *UNLESS OTHERWISE NOTED, ALL BOLTS, ANCHORS AND HARDWARE SHALL BE 316 STAINLESS STEEL.*
2. *NO SPLICES OR TERMINATIONS PERMITTED IN PULL BOX.*

2 / I-6 VAULT PULL BOX DETAIL
NTS

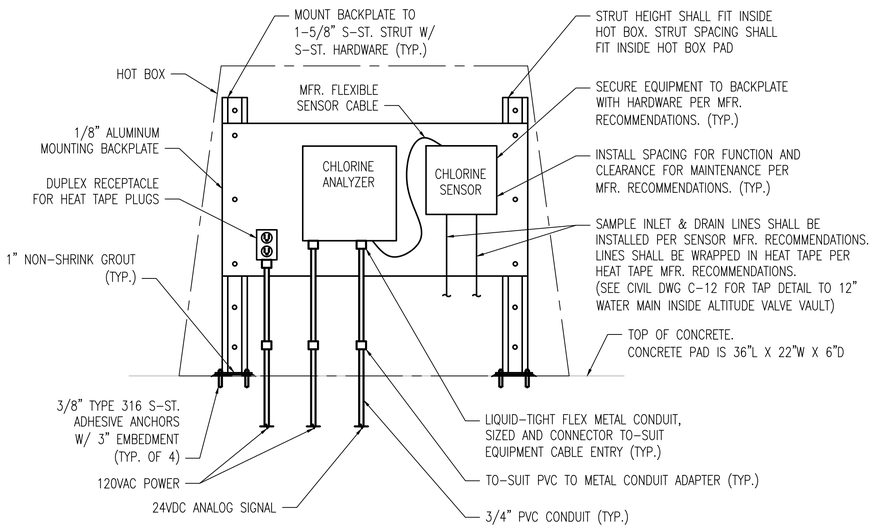


3 / I-6 VALVE VAULT FLOOD SWITCH DETAIL
NTS



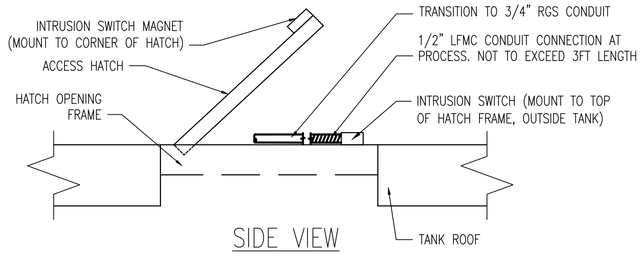
DETAIL NOTES:
1. *HATCH SWITCH LOCATION IS APPROXIMATE.*
2. *INSTALL INTRUSION SWITCH LONG-WAYS, PARALLEL TO DOOR SWING DIRECTION.*
3. *DRILL AND TAP HATCH AND HATCH OPENING FRAME FOR INSTALLATION OF SWITCH. ATTACH WITH STAINLESS STEEL SCREWS PER MFR INSTRUCTIONS.*

4 / I-6 VAULT HATCH INTRUSION SWITCH DETAIL
NTS

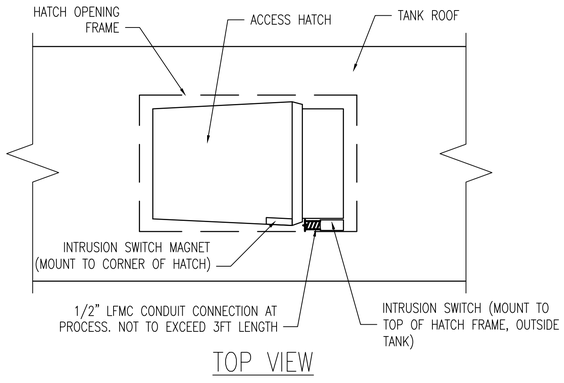


DETAIL NOTES:
1. *FOR HOT BOX AND HEAT TAPE, REFER TO MECHANICAL SPECIFICATIONS FOR ADDITIONAL DETAILS.*
2. *FOR PULL BOX JB-900, REFER TO DETAIL 7, THIS DWG.*

5 / I-6 CHLORINE ANALYZER WITH HOT BOX DETAIL
NTS



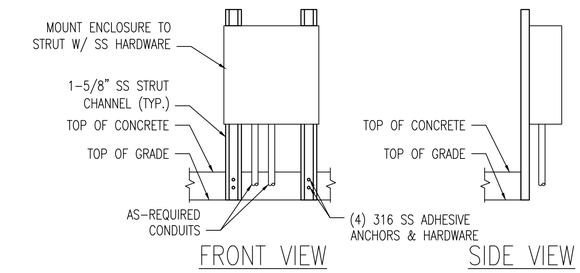
SIDE VIEW



TOP VIEW

DETAIL NOTES:
1. *INSTALL INTRUSION SWITCH MAGNET ON TOP OR ON SIDE OF ACCESS HATCH TO-SUIT WITH INTRUSION SWITCH TO CLOSE CONTACT WHEN ACCESS HATCH IS FULLY CLOSED.*

6 / I-6 TANK HATCH INTRUSION SWITCH DETAIL
NTS



FRONT VIEW SIDE VIEW

DETAIL NOTES:
1. *UNLESS OTHERWISE NOTED, ALL BOLTS, ANCHORS AND HARDWARE SHALL BE 316 STAINLESS STEEL.*

SIDE OF CONCRETE PAD FREE STANDING ENCLOSURE MOUNTING DETAIL
7 / I-6 NTS.

GENERAL NOTES

1. SEE SHEETS I-1 AND I-2 FOR SYMBOLS, ABBREVIATIONS AND LEGENDS.
2. SEE INSTRUMENTATION AND PLAN DRAWINGS FOR CABLE ROUTING INFORMATION.
3. FOR LEVEL TRANSMITTER INSTALL DETAIL, SEE DRAWING C-15.

NO.	DATE	BY	REVISIONS

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HELM STREET TANK REPLACEMENT
INSTRUMENTATION DETAILS

SHEET 30 OF 30

DRAWING I-6

N:\46626-003\CADD\46626003-6 INSTALL DETAILS.DWG