

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

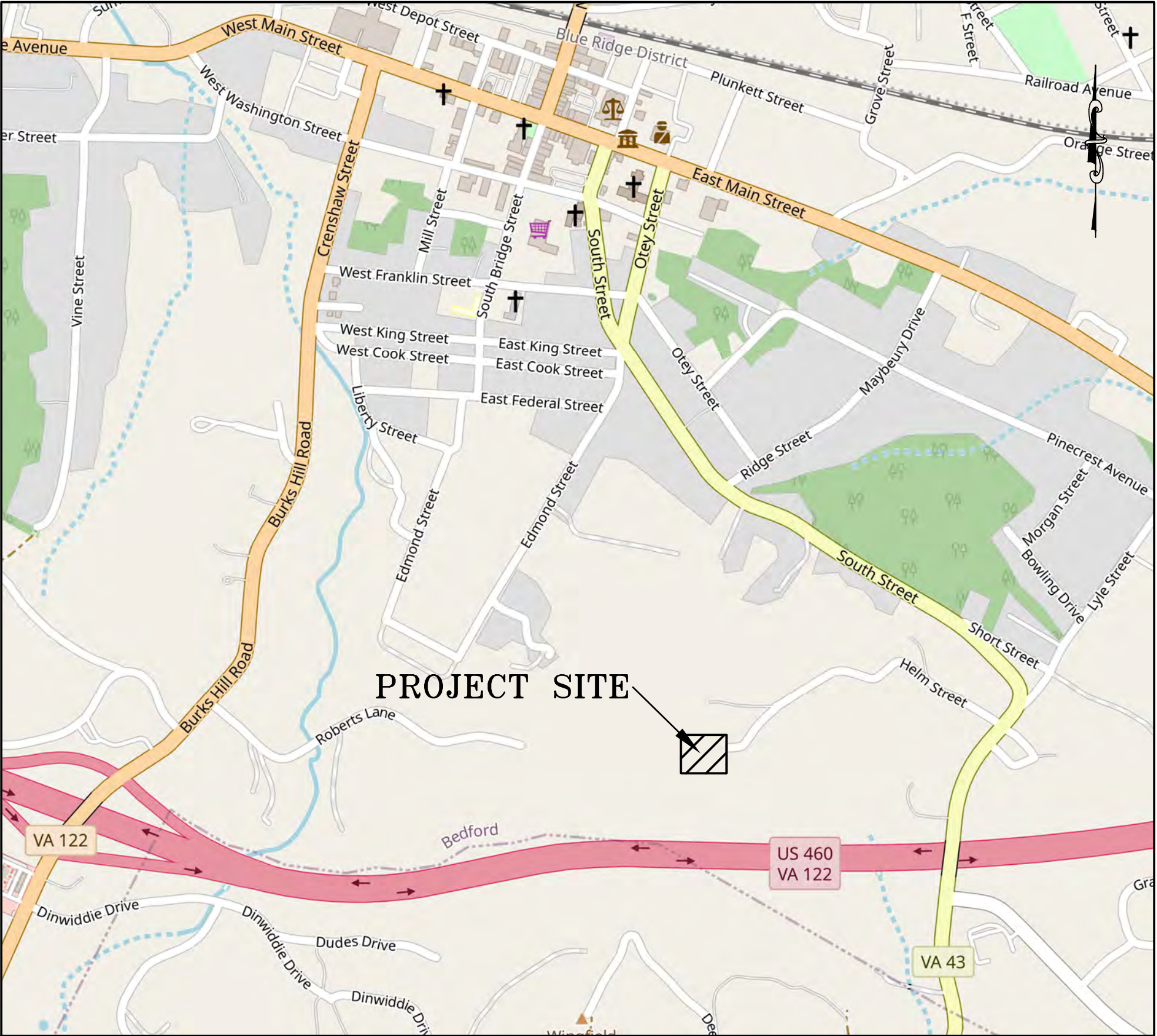
SOURCE OF TOPOGRAPHY: FIELD SURVEY BETWEEN 04/27/2022 - 05/11/2022

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

NOVEMBER 1, 2023

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NO.	DATE	BY	REVISIONS



SCALE:
HORIZ.: AS SHOWN
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
TITLE SHEET AND VICINITY MAP

SHEET
1
OF
30

DRAWING

G-1

GENERAL NOTES

- 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.
- 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.
- 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.
- 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.
- THE OWNER WILL INSPECT ALL PIPELINES, AND APPURTENANCES THERETO, AS SHOWN ON THE APPROVED UTILITY PLANS, LOCATED WITHIN THE BWRA OWNED PARCEL.
- CONTRACTOR SHALL RESTORE LIMITS OF WORK AND REINSTALL FENCING, LANDSCAPING, LIGHT AND POWER POLES, DITCHES, ETC. DISTURBED OR TEMPORARILY RELOCATED DURING THE WORK.
- ALL FITTINGS AND APPURTENANCES SHALL BE RESTRAINED WITH CONCRETE THRUST BLOCKS OR MECHANICAL JOINT RESTRAINT AS INDICATED.
- INGRESS AND EGRESS OF ACCESS ROADS SHALL BE MAINTAINED AT ALL TIMES.
- 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.
- 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.
- STAKE OUT OF PIPELINES AND TANK SHALL BE BY A LICENSED LAND SURVEYOR.
- DO NOT DISCARD/DISCHARGE CHLORINATED WATER. ALL WATER SHALL BE DE-CHLORINATED PRIOR TO DISCHARGE.
- AT TIE-INS TO EXISTING UTILITIES, CONTRACTOR SHALL FIELD VERIFY VERTICAL AND HORIZONTAL LOCATION OF EXISTING UTILITIES.
- 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.
- 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.
- ALL SPOIL AREAS SHALL BE RETURNED TO NATURAL GROUND AT THE COMPLETION OF THE PROJECT.
- ALL BOUNDARY OR PROPERTY LINE MARKERS DISTURBED SHALL BE REPLACED AT THEIR ORIGINAL LOCATION AT NO ADDITIONAL COST BY A LICENSED LAND SURVEYOR.
- 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.
- 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.
- 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.
- MINIMUM CLEARANCE OF WATER AND STORM DRAINS SHALL BE 18" EDGE TO EDGE.
- WATER MAINS SHALL BE TESTED AT A PRESSURE OF 200 PSI.
- VALVE EXTENSIONS SHALL BE USED WHEN THE DEPTH TO TOP OF VALVE NUT IS GREATER THAN 4 FEET.
- 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.



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

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

HELM STREET TANK REPLACEMENT
GENERAL NOTES AND SURVEY CONTROL POINTS

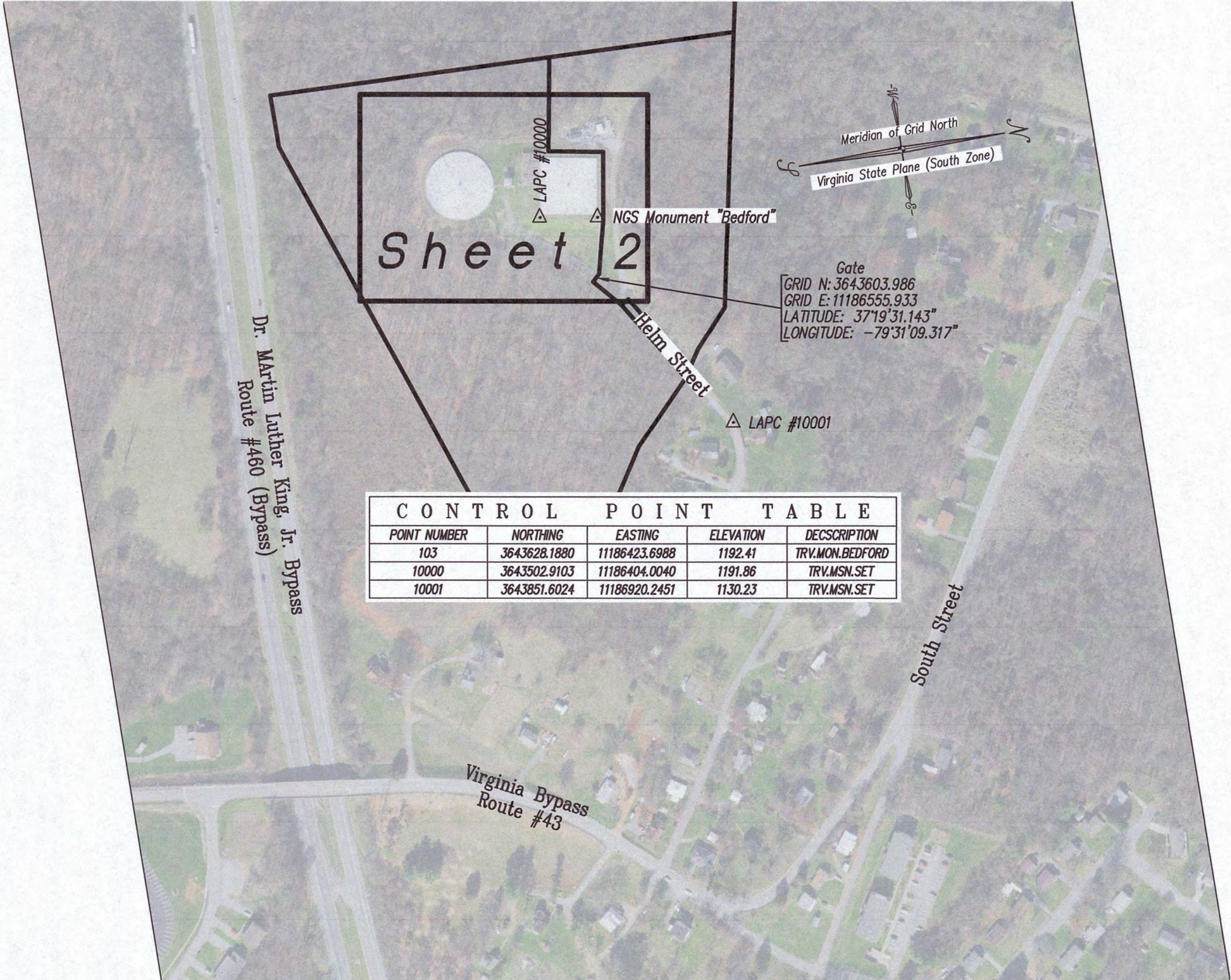
SHEET
2
OF
30

DRAWING

G-2

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.I.P	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	DESCRIPTION
103	3643628.1880	11186423.6988	1192.41	TRY.MON.BEDFORD
10000	3643502.9103	11186404.0040	1191.86	TRY.MSN.SET
10001	3643851.6024	11186920.2451	1130.23	TRY.MSN.SET

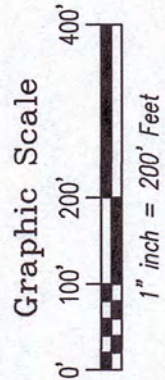
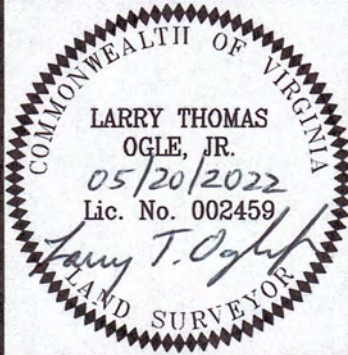
Pattern Legend	
	Concrete
	Metal Tank Roof
	Building
	Gravel

Linetype Legend	
Linetype	Description
	Chainlink Fence
	Ditch

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIA

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ROANOKE, VIRGINIA 24018

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E-MAIL: MAIL@LUMSDENPC.COM



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		DESCRIPTION
NO.	DATE	
1	8/7/2022	Added Headwall and 18" RCP
2	8/7/2023	Added Tank Note & Approximate Fence
3		
4		
5		

DATE: May 20, 2022

SCALE: 1" = 200'

COMMISSION NO.: 2022-063

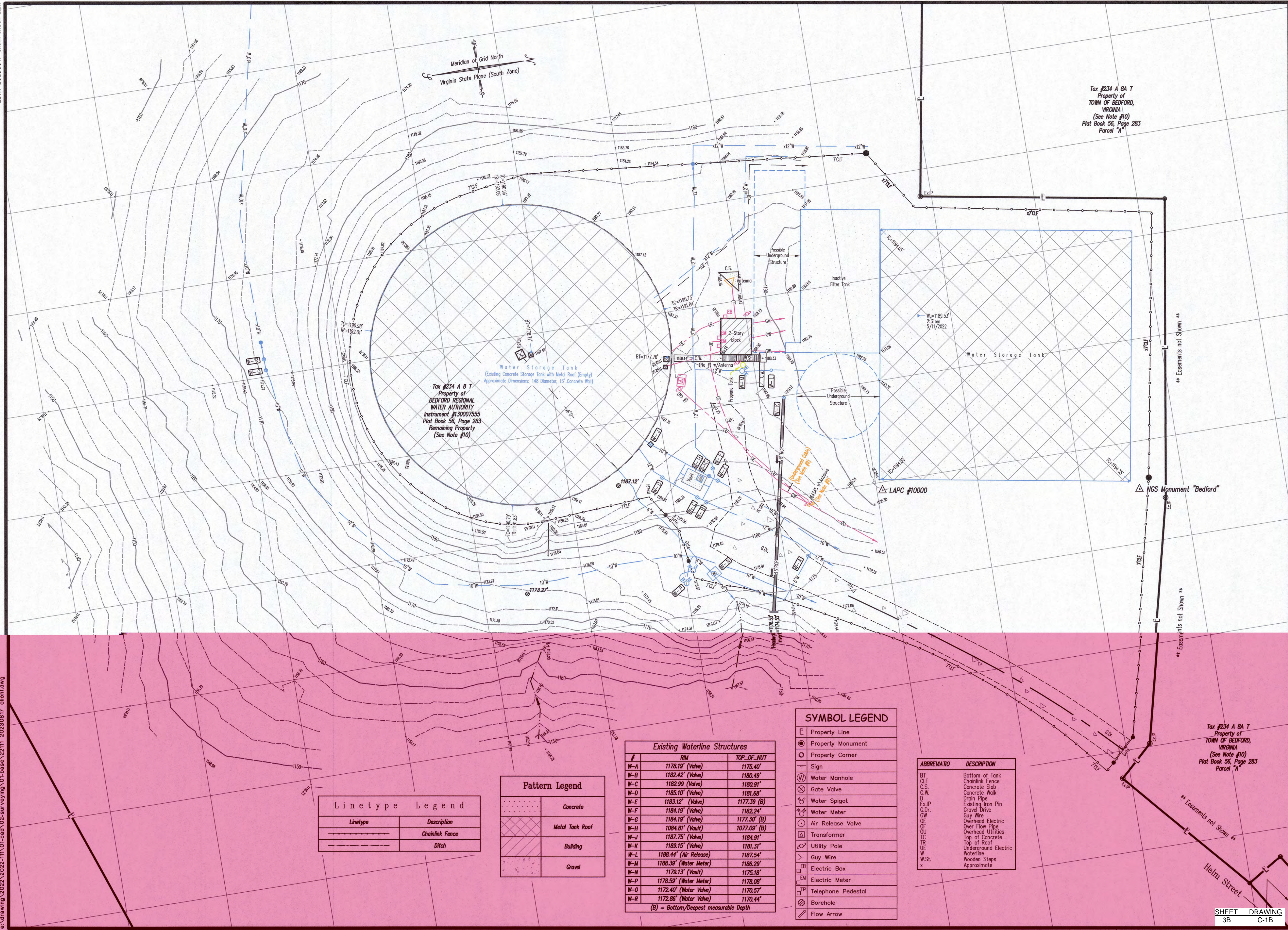
SHEET 1 OF 2

- NOTES:
- THIS PLAT IS BASED ON A CURRENT FIELD SURVEY.
 - THIS PLAT DOES NOT CONSTITUTE A BOUNDARY SURVEY.
 - 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.
 - 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).
 - THE HORIZONTAL (NAD 83) & VERTICAL CONTROL (NAVD 88) FOR THIS PROJECT WAS BASED TRIMBLE'S KEYNET VRS GPS NETWORK.
 - 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.
 - CONTOURS AS SHOWN ARE AT A 2-FOOT INTERVAL.
 - 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.
 - 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".
 - TAX PARCELS #234 A B 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.

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.

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 DelMarsh	(540)871-6455	(540)586-7679	Marked
Bedford Regional Sewer (BRA177)	Howard DelMarsh	(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 Sagra (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)	Utilquest	(804)286-1721	(888)483-1233	No Conflict





Linetype Legend	
Linetype	Description
---	Chainlink Fence
---	Ditch

Pattern Legend	
[Pattern]	Concrete
[Pattern]	Metal Tank Roof
[Pattern]	Building
[Pattern]	Gravel

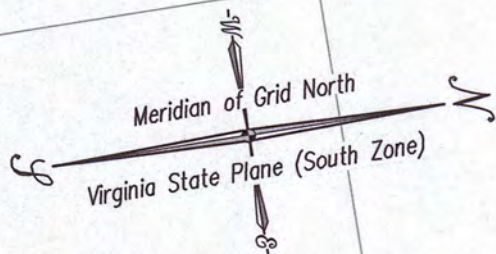
Existing Waterline Structures		
#	RIM	TOP OF NUT
W-A	1178.19' (Valve)	1175.40'
W-B	1182.42' (Valve)	1180.49'
W-C	1182.99' (Valve)	1180.91'
W-D	1185.10' (Valve)	1181.68'
W-E	1183.12' (Valve)	1177.39' (B)
W-F	1184.19' (Valve)	1182.24'
W-G	1184.19' (Valve)	1177.30' (B)
W-H	1084.81' (Vault)	1077.09' (B)
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		

SYMBOL LEGEND

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

ABBREVIATION	DESCRIPTION
BT	Bottom of Tank
CLF	Chainlink Fence
C.S.	Concrete Slab
C.W.	Concrete Walk
D	Drain Pipe
Exp	Existing Iron Pin
G.D.R.	Gravel Drive
GW	Guy Wire
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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

Tax #234 A 8A T
Property of
TOWN OF BEDFORD,
VIRGINIA
(See Note #10)
Plat Book 56, Page 283
Parcel "A"

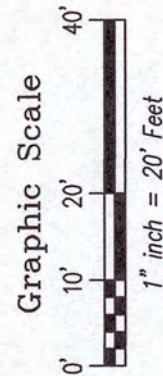
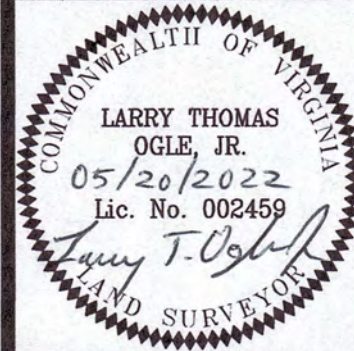


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Partial
Water
Tank Replacement
situated at
the terminus of Helm Street
Town of Bedford,
Bedford County, Virginia
prepared for the
WRRA &
Bedford Regional Water Authority

REVISIONS		DATE	DESCRIPTION
NO.	DATE	DESCRIPTION	
1	6/27/2022	Added Horizontal and 1" 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 2 OF 2

SHEET 3B
DRAWING C-1B

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.

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

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 OVER FLOW PIPE TO BE ABANDONED
EXISTING 12" WATER MAIN TO BE ABANDONED

EXISTING UNDERGROUND ELECTRIC TO BE ABANDONED

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

1 EA. - WATERLINE BULKHEAD ANCHOR 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

PLUG OR CAP EXISTING 6" WATER MAIN

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

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

YARD HYDRANT TO BE REMOVED

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

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

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

EXISTING 6" DRAIN LINE TO BE REMOVED

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

Tax #234 A B T
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)

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

N:\46626-003\CADD\46626003C1-02.DWG

NO.	DATE	BY	REVISIONS

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



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

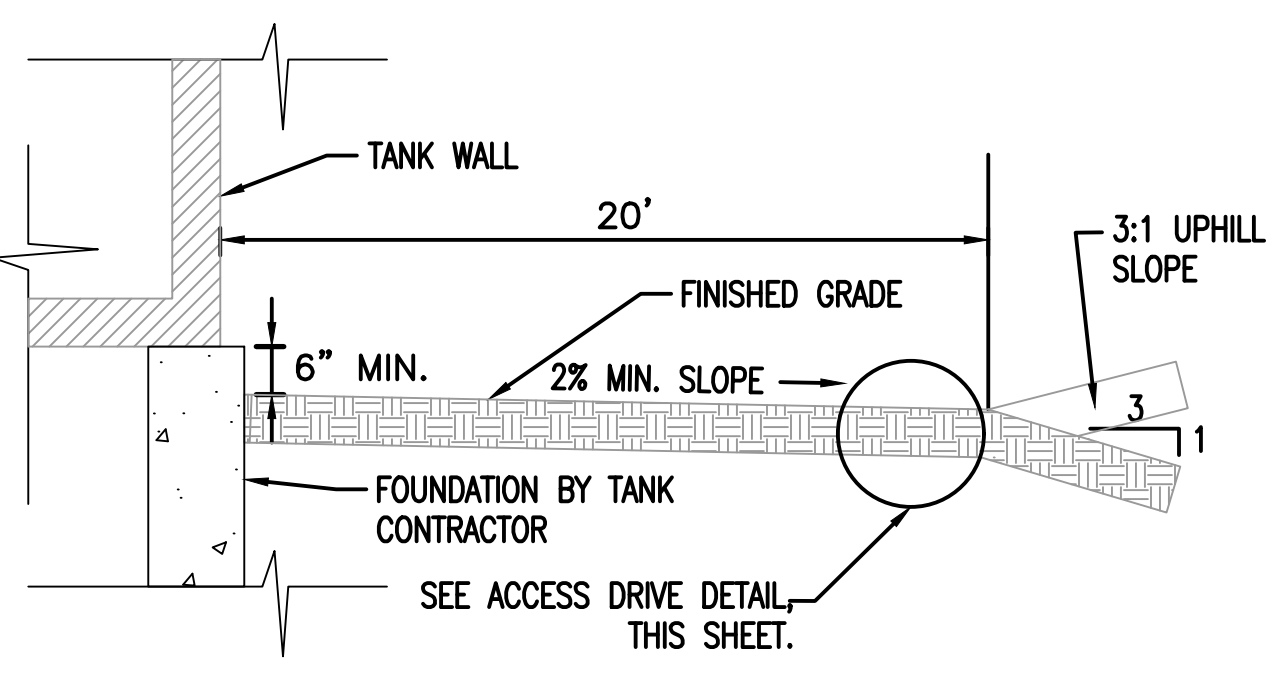
STRUCTURE SCHEDULE

- 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.

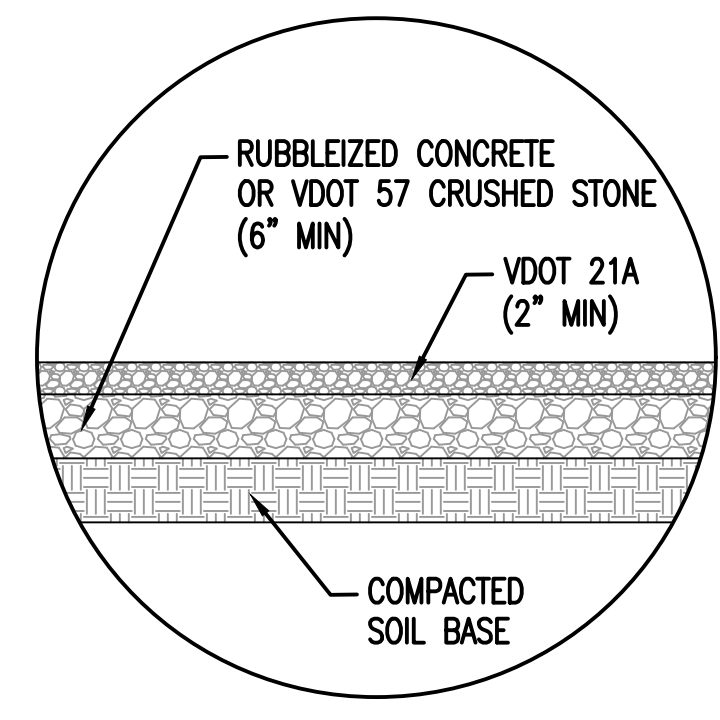
E&S SYMBOL LEGEND

(SOME SYMBOLS SHOWN MAY NOT BE USED)

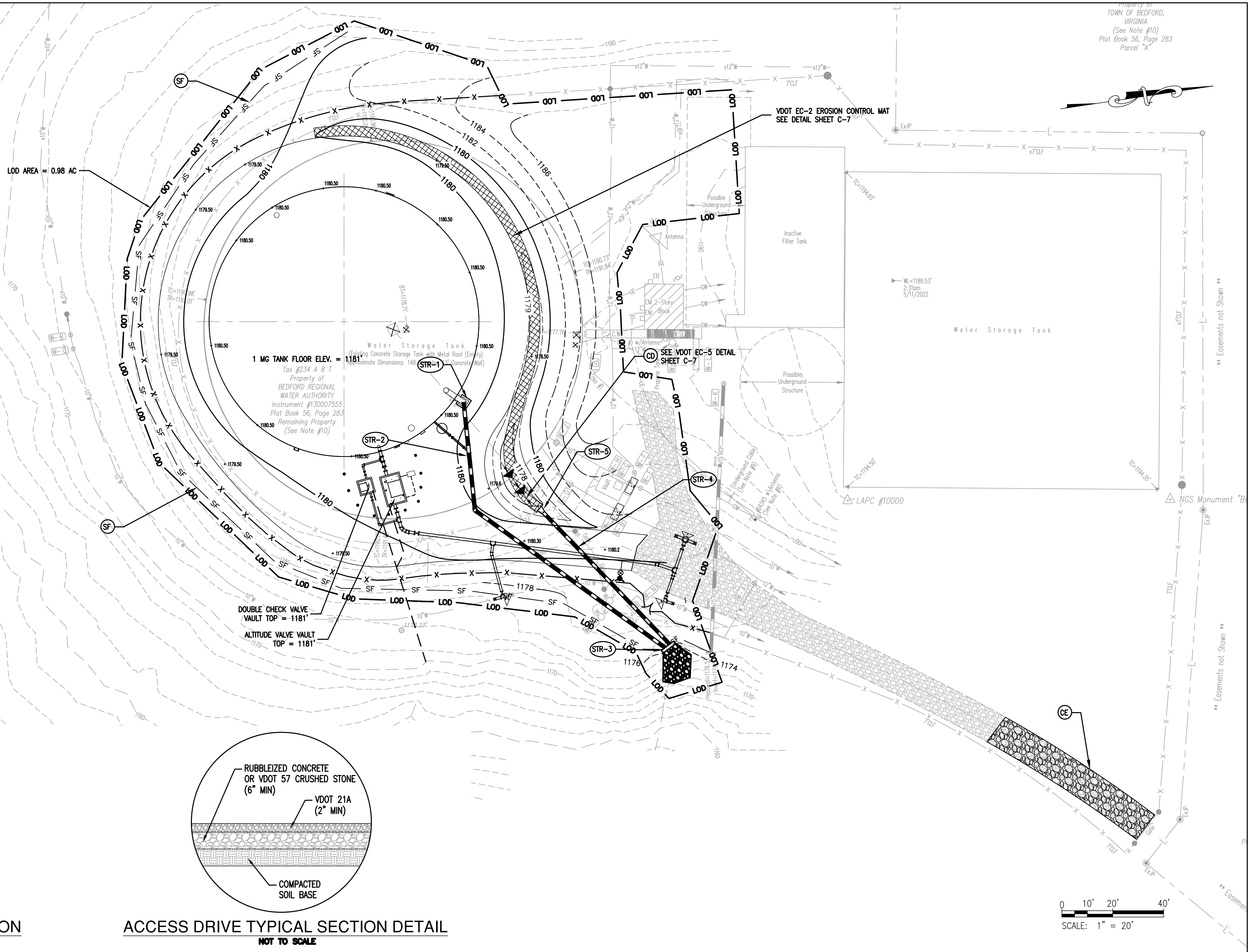
- LIMITS OF DISTURBANCE LOD
- TEMPORARY STONE CONSTRUCTION ENTRANCE
- SEDIMENT BASIN
- SILT FENCE
- SUPER SILT FENCE
- DIVERSION DIKE
- TREE PROTECTION
- STORM DRAIN INLET PROTECTION
- CULVERT INLET PROTECTION
- ROCK CHECK DAM



ACCESS DRIVE AROUND TANK FOUNDATION
NOT TO SCALE



ACCESS DRIVE TYPICAL SECTION DETAIL
NOT TO SCALE



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NO.	DATE	BY	REVISIONS

WRA
Whitman, Reardon & 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	DRAWING
5	C-3
OF	
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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 OF 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 GOVERNMENT. 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 INDEX GROUP | WIND ERODIBILITY INDEX (TONS/ACRES/Y EAR) |
| | 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

- 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.
- ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
- 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

- SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
- CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED SILT FENCE RESULTING FROM END RUNS AND UNDERCUTTING.
- 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.
- SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
- 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 SEEDDED.

3.20 ROCK CHECK DAMS

- 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.
- 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

- 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.
- EXCESS EXCAVATION DISPOSED OF OFF THE SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.
- 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.
- EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED SO THAT THE SEDIMENT CARRYING RUNOFF FROM THE SITE WILL NOT ENTER STORM DRAINAGE FACILITIES.
- EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED UNTIL THE DISTURBED AREA IS STABILIZED.
- PROPERTIES ADJOINING THE SITE SHALL BE KEPT CLEAN OF MUD OR SILT CARRIED FROM THE SITE BY VEHICULAR TRAFFIC OR RUNOFF.
- 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.
- STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
- 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.
- CONTRACTOR SHALL CONFORM TO THE MINIMUM STANDARDS OF THE VIRGINIA AND EROSION AND SEDIMENT CONTROL REGULATIONS.
- NO DEBRIS SHALL BE BURIED ON SITE.
- THE LAND DISTURBING PERMIT SHALL BE POSTED ON-SITE IN CLEAR VIEW FROM THE ROAD FROM ALL TIMES.
- 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.
- 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:

- 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.
- 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.
- 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.
- 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.
- STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
- SEDIMENT TRAPS AND SEDIMENT BASINS SHALL BE DESIGNED AND CONSTRUCTED BASED UPON THE TOTAL DRAINAGE AREA TO BE SERVED BY THE TRAP OR BASIN.
 - 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.
 - 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.
- 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.
- CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME OR SLOPE DRAIN STRUCTURE.
- WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED.
- 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.
- 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.
- 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.
- 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.
- ALL APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS PERTAINING TO WORKING IN OR CROSSING LIVE WATERCOURSES SHALL BE MET.
- THE BED AND BANKS OF A WATERCOURSE SHALL BE STABILIZED IMMEDIATELY AFTER WORK IN THE WATERCOURSE IS COMPLETED.
- UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING STANDARDS IN ADDITION TO OTHER APPLICABLE CRITERIA:
 - NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
 - EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
 - 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.
 - MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ORDER TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
 - RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THIS CHAPTER.
 - APPLICABLE SAFETY REQUIREMENTS SHALL BE COMPLIED WITH.
- 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.
- 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.
- 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:
 - 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:

- 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
- (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.
 - 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
 - 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.
- IF EXISTING NATURAL RECEIVING CHANNELS OR PREVIOUSLY CONSTRUCTED MAN-MADE CHANNELS OR PIPES ARE NOT ADEQUATE, THE APPLICANT SHALL:
 - 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
 - IMPROVE THE PIPE OR PIPE SYSTEM TO A CONDITION WHERE THE 10-YEAR STORM IS CONTAINED WITHIN THE APPURTENANCES;
 - 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
 - PROVIDE A COMBINATION OF CHANNEL IMPROVEMENT, STORMWATER DETENTION OR OTHER MEASURES WHICH IS SATISFACTORY TO THE VESCP AUTHORITY TO PREVENT DOWNSTREAM EROSION.
- THE APPLICANT SHALL PROVIDE EVIDENCE OF PERMISSION TO MAKE THE IMPROVEMENTS.
- ALL HYDROLOGIC ANALYSES SHALL BE BASED ON THE EXISTING WATERSHED CHARACTERISTICS AND THE ULTIMATE DEVELOPMENT CONDITION OF THE SUBJECT PROJECT.
- 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.
- 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.
- ALL ON-SITE CHANNELS MUST BE VERIFIED TO BE ADEQUATE.
- 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.
- 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.
- 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.
- 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.
- 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 (VSPM) 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.
- COMPLIANCE WITH THE WATER QUANTITY MINIMUM STANDARDS SET OUT IN ~~9VAC25-870-66~~ OF THE VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSPM) 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.



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

DATE: NOVEMBER 1, 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46826-003

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

HELM STREET TANK REPLACEMENT
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

SHEET

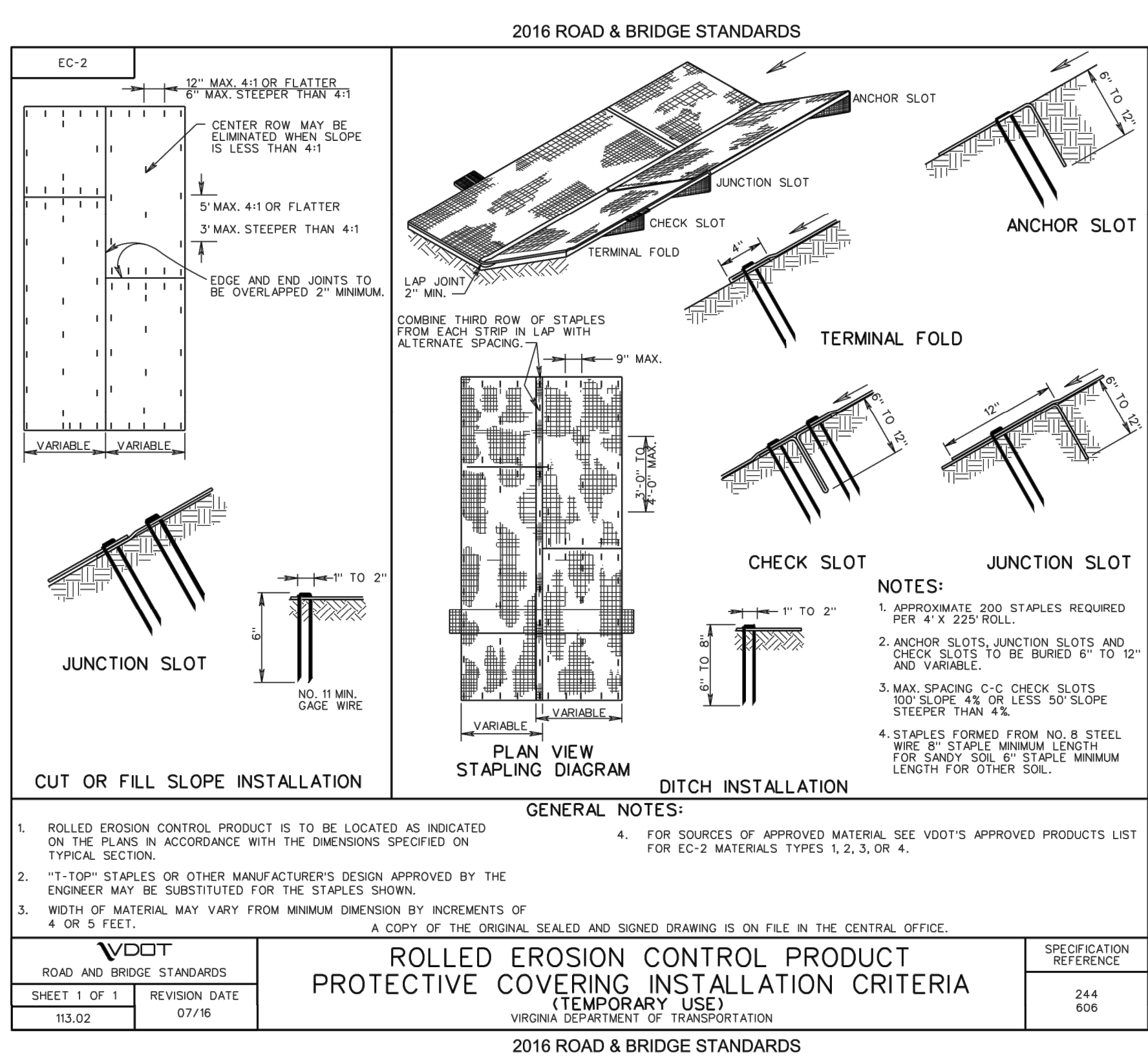
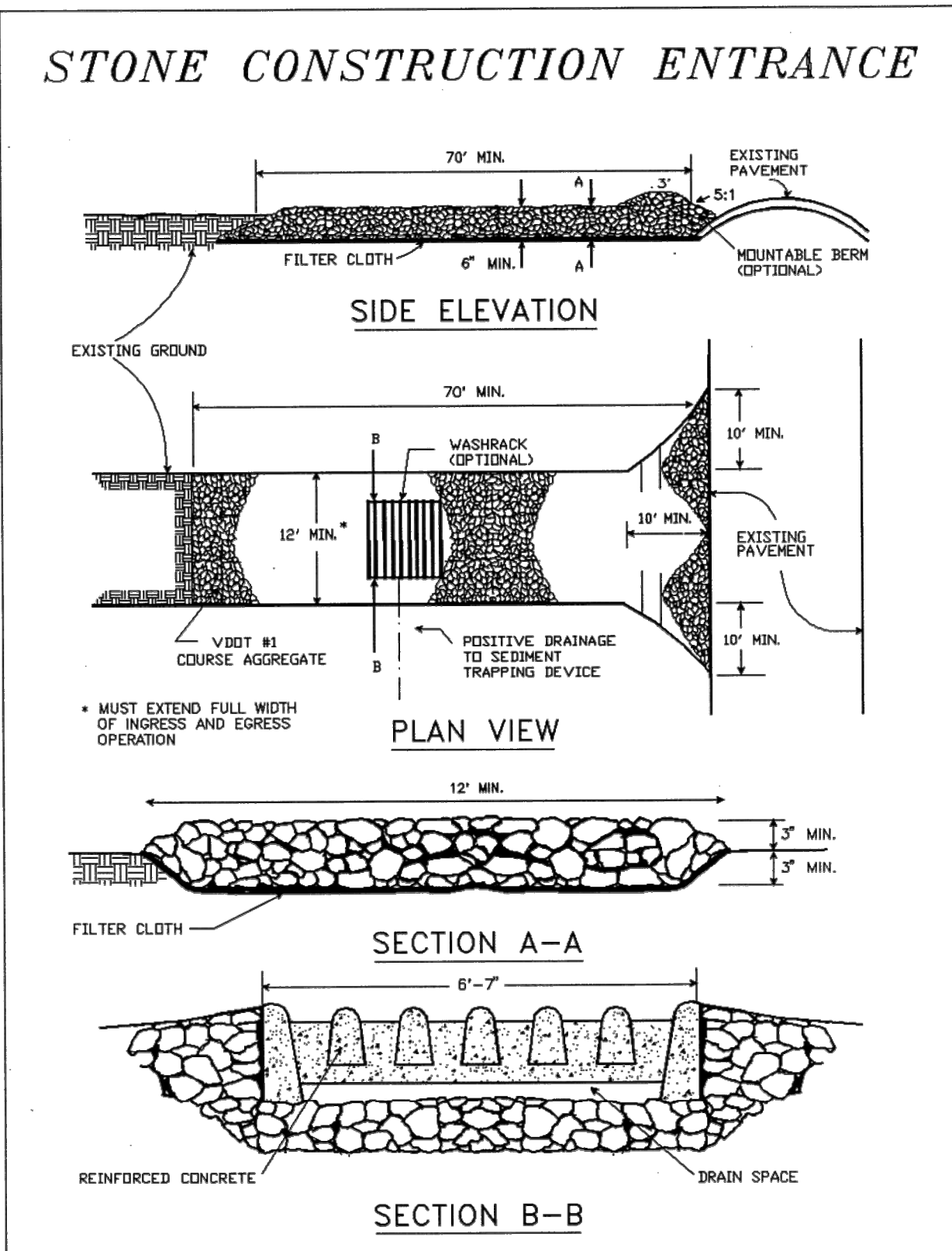
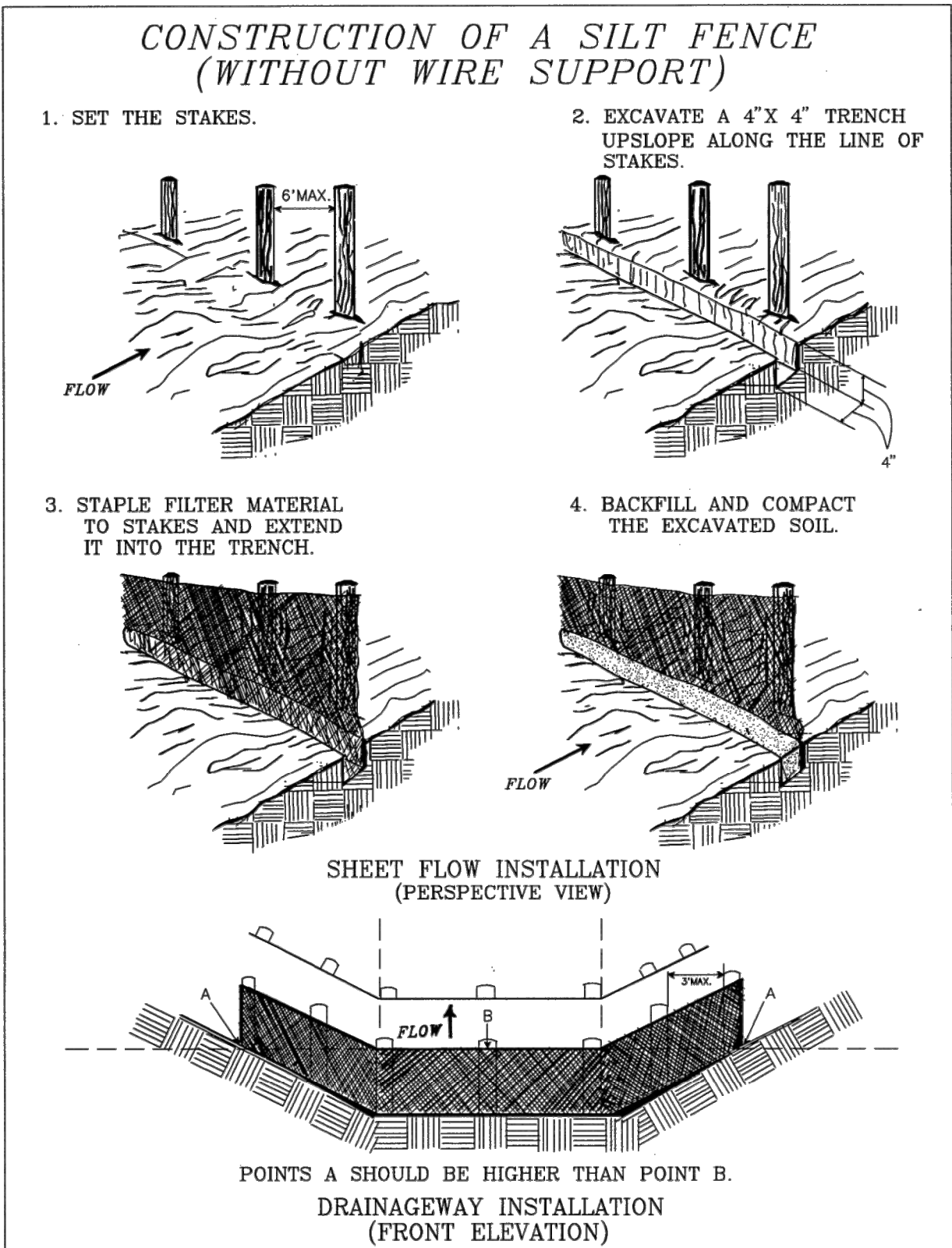
8

OF

30

DRAWING

C-6

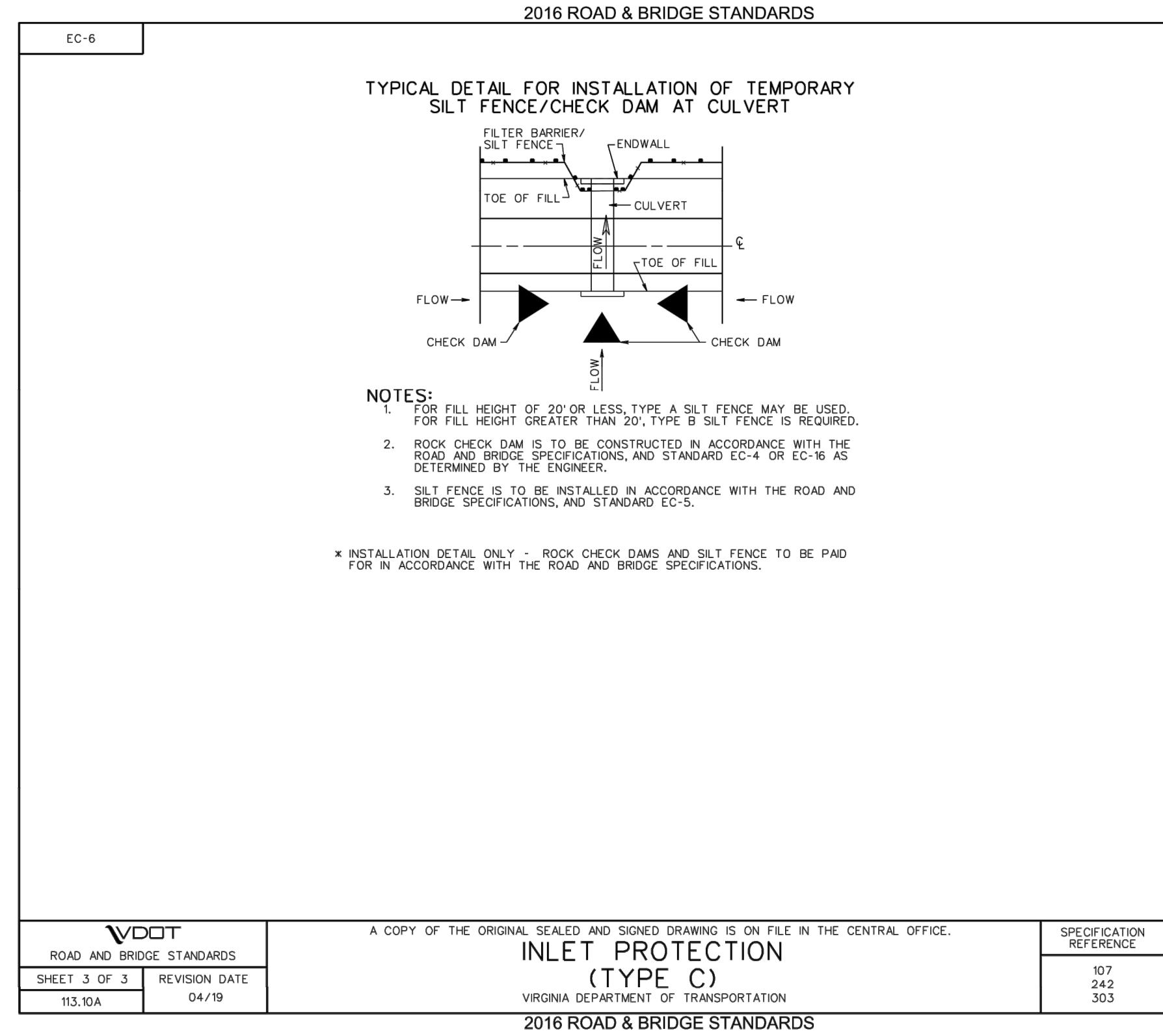
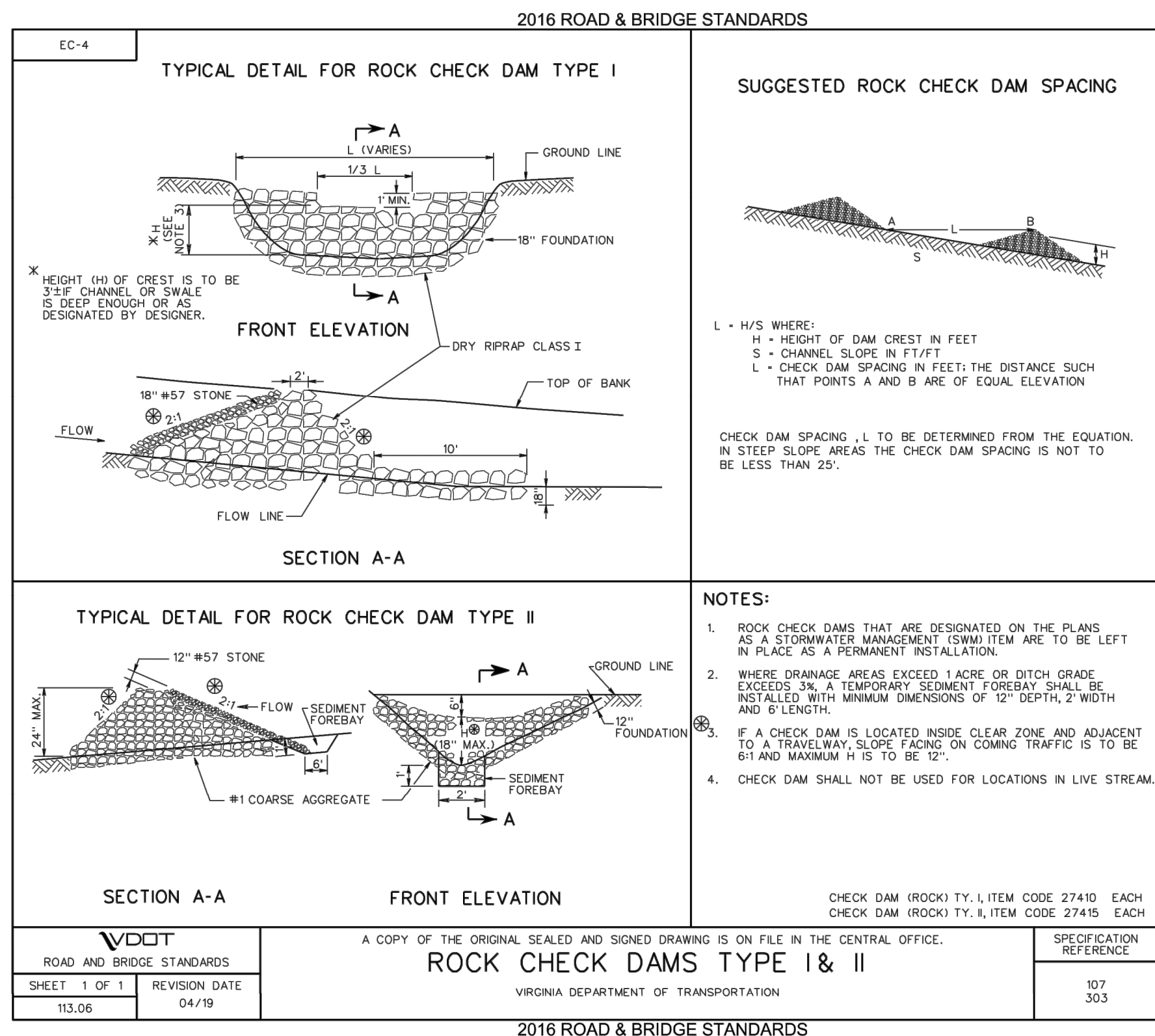
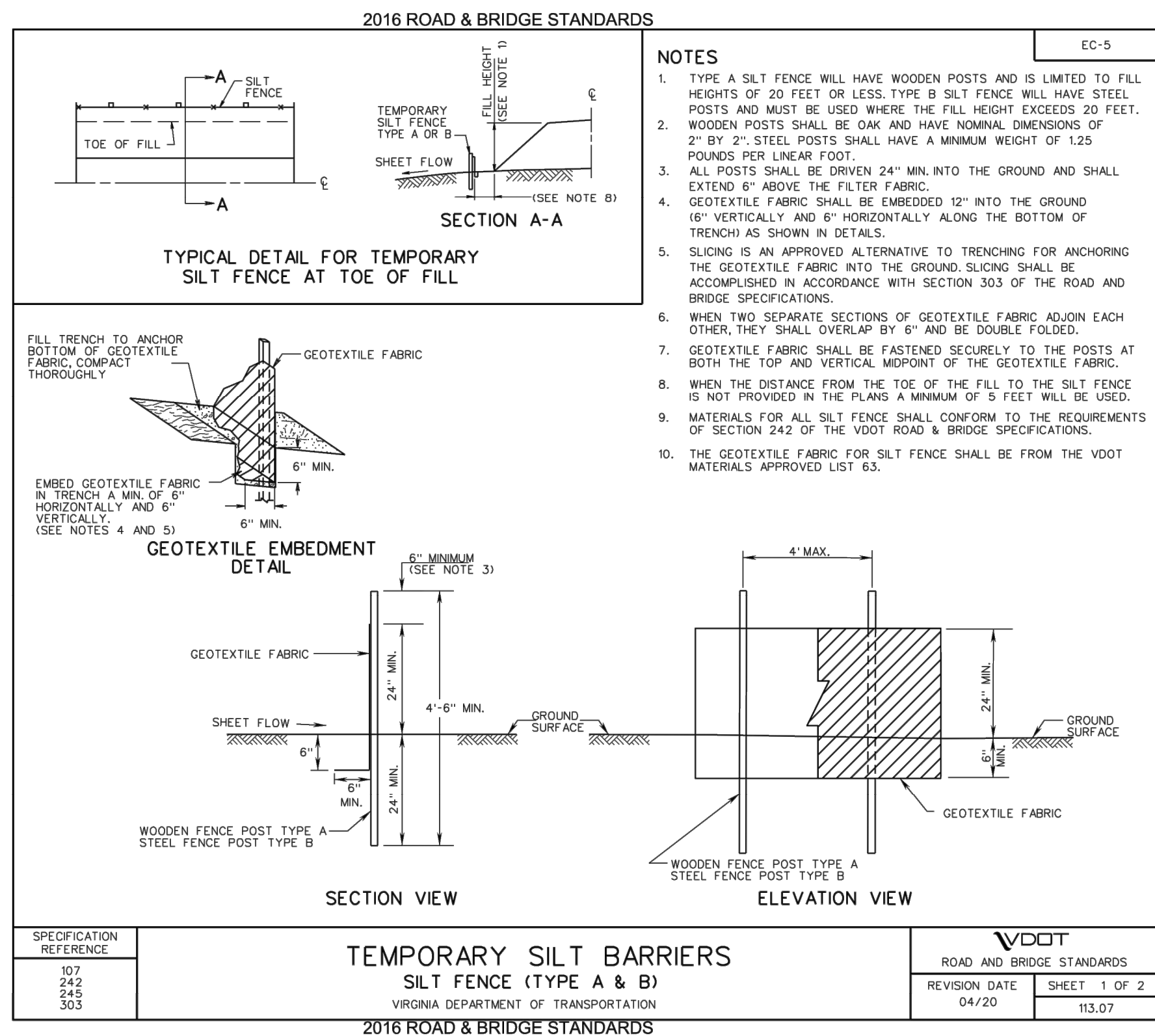


SEEDING REQUIREMENTS

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 than 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		



N:\46626-003\CA07\46626003C1-07.DWG

NO.	DATE	BY	REVISIONS

WRA

Whitman, Reardon & Associates, LLP

1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

COMMONWEALTH OF VIRGINIA

PAULA J. MOORE

Lic. No. 035821

8/2/2023

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

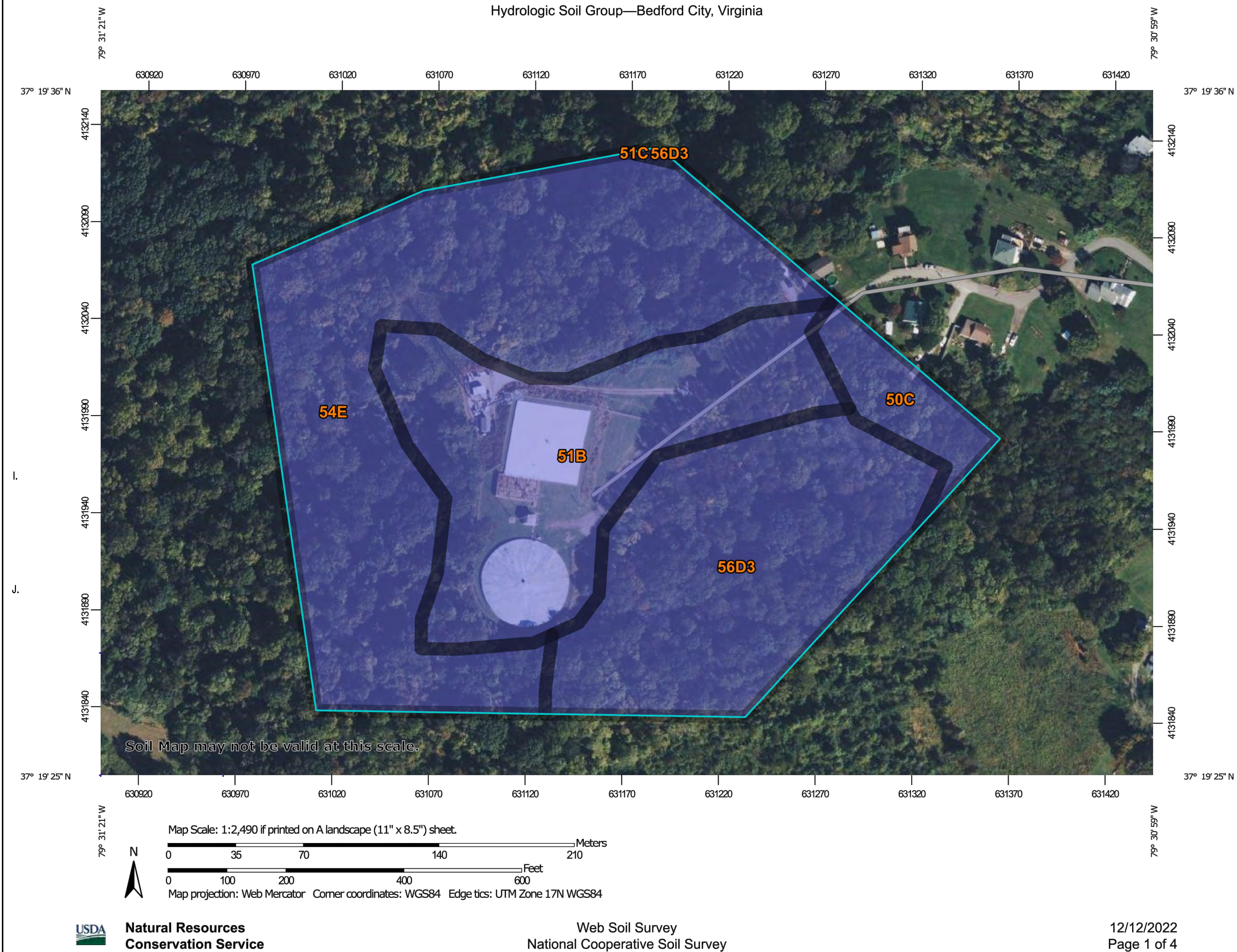
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DRAWING

C-7

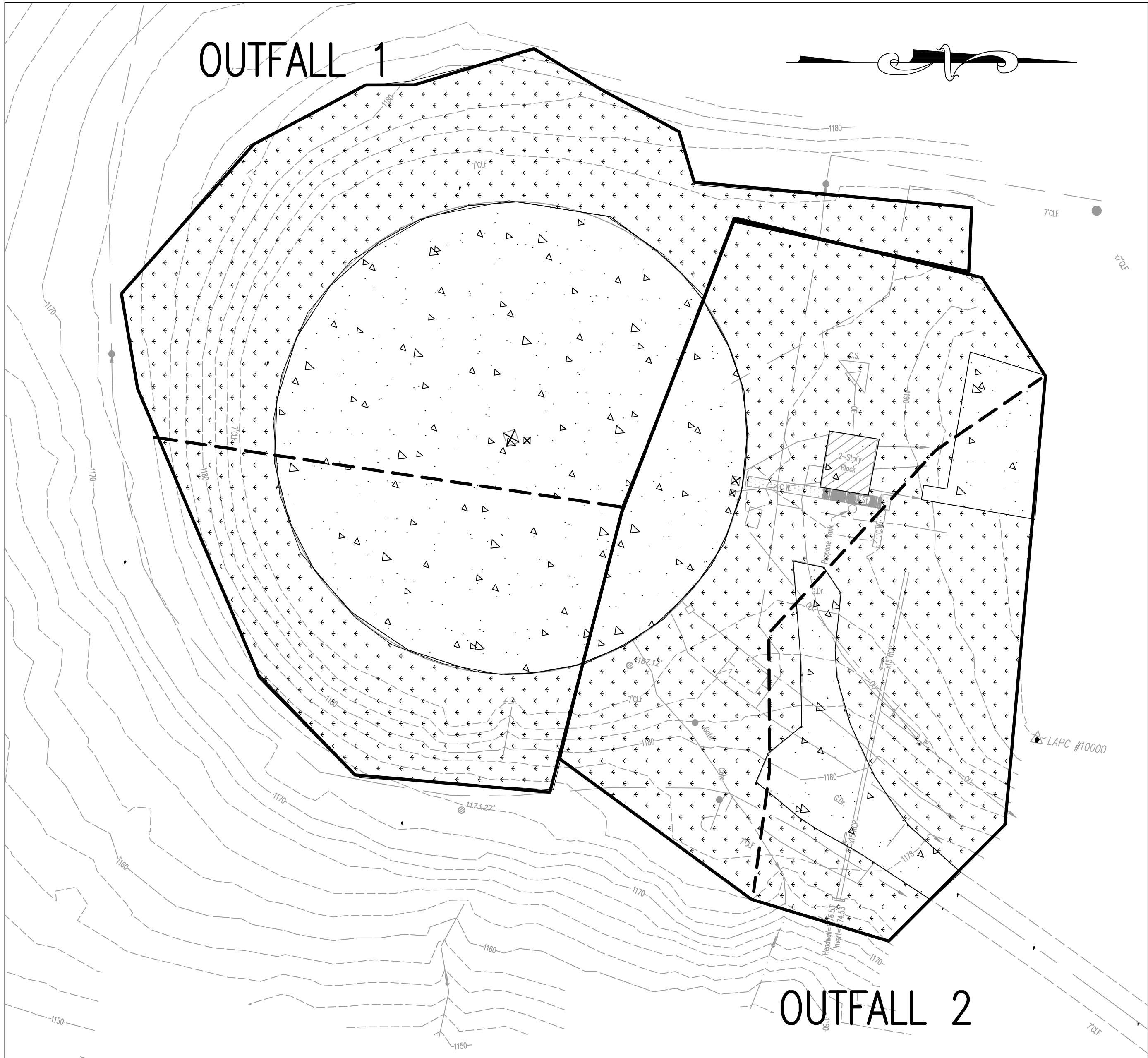
Hydrologic Soil Group

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%

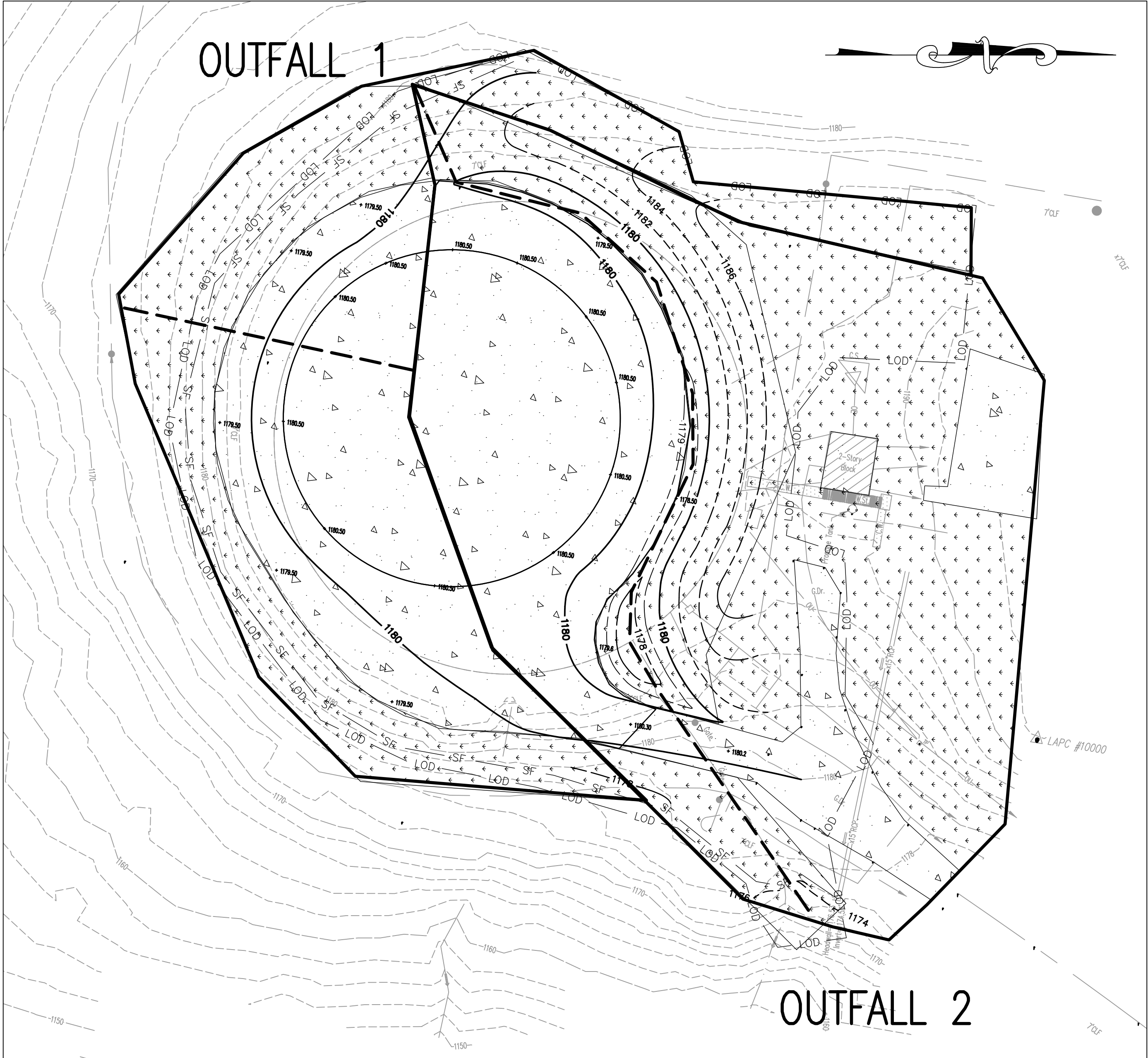


N:\46626-003\CADD\46626003C1-08.DWG

NO.	DATE	BY	REVISIONS	<div><div><p>Whitman, Requardt & Associates, LLP 1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060</p></div><div><p>SCALE: HORIZ.: <u>N/A</u> VERT.: <u>N/A</u> DATE: <u>AUGUST 2023</u> DESIGNED: <u>MSS</u> DRAWN: <u>MSS</u> CHECKED: <u>PJM</u> PROJECT NO.: <u>46626-003</u></p></div></div>	BEDFORD REGIONAL WATER AUTHORITY 1723 FALLING CREEK ROAD, BEDFORD, VA	SHEET 10 OF 30	DRAWING C-8
					HELM STREET TANK REPLACEMENT EROSION AND SEDIMENT CONTROL NOTES AND DETAILS		



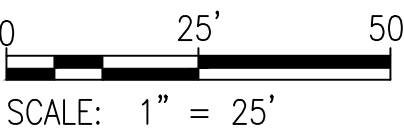
PRE-DEVELOPMENT DRAINAGE AREAS



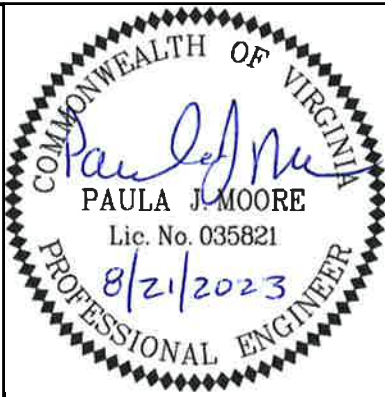
POST-DEVELOPMENT DRAINAGE AREAS

LEGEND

- TIME OF CONCENTRATION PATH — — —
- TURF [Symbol]
- IMPERVIOUS [Symbol]



NO.	DATE	BY	REVISIONS



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

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

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

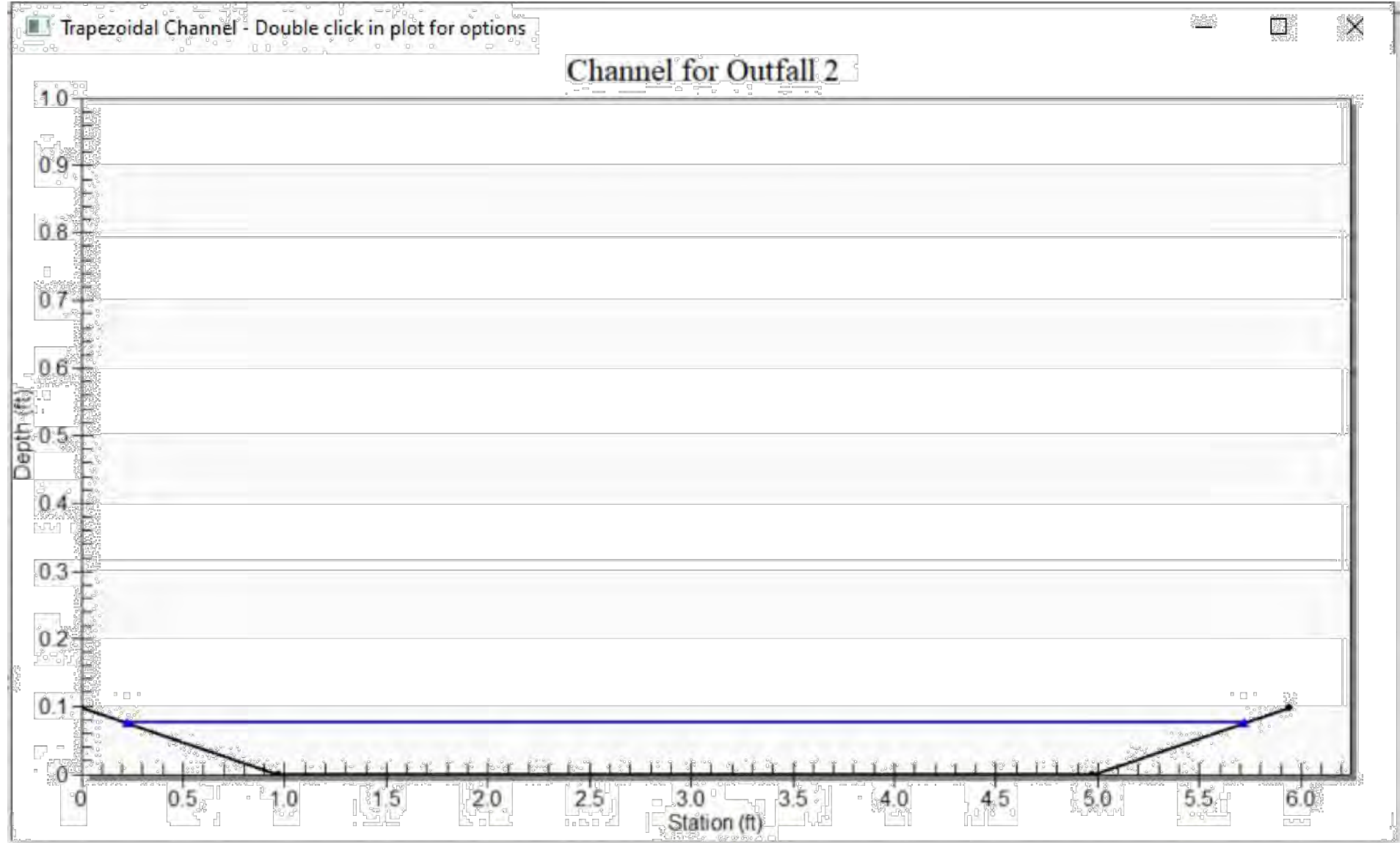
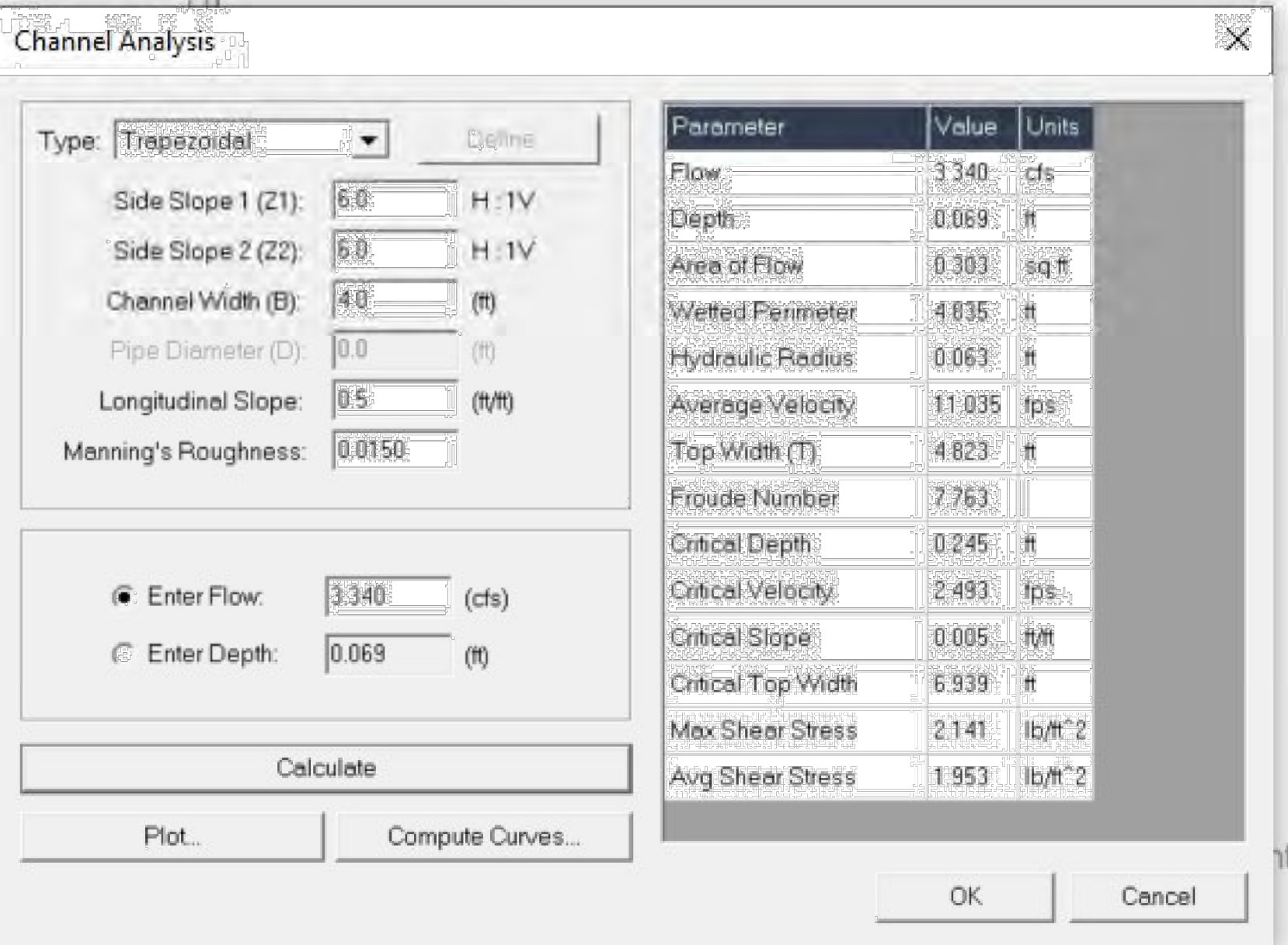
TIME OF CONC. (Tc)	LENGTH	SLOPE	HEIGHT	AVG. VEL	TRAVEL TIME	C	PIPE DIA.
TRAVEL PATH	FT.	FT/FT	FT.	FPS	MIN.		IN.
PRE-DEVELOPMENT							
OVERLAND (SEELYE) A - B	150.0	0.040	6.0	0.4	6.80	0.50	
SWALE (KIRPICH)	49.0	0.061	3.0	1.6	0.51		
TOT. LENGTH =	199	4.52%	9.0	TOT Tc=	7.31 MIN.	AVG. V=0.5	

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
OCCURRING.

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

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: <u>HELM STREET TANK</u>										DITCH TYPE		BW	SS	PROJECT: <u>HELM STREET TANK</u> COUNTY: <u>BEDFORD</u> BY: <u>WHITMAN, REQUARDT AND ASSOCIATES, LLP</u>										DESIGNED BY: JBD CHECKED BY: DSG																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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VDOT CULVERT ANALYSIS - STD. FORM LD-269

Project:

Helm Street Tank

Location:

Bedford, VA

Structure No.:

15" Culvert

HYDROLOGICAL DATA:

DISCHARGES USED:

FREQ.	Q (CFS)	TW	PROPOSED CONDITIONS					
2-YR	1.4	0.25						
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

Upstream EOP Elevation

1180

C.L. TOP ELEV. 1180.50

SKEW = 58

COVER = 3.06

1178.00 INV. IN

So = 0.051

L = 78

1174.00 INV. OUT

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

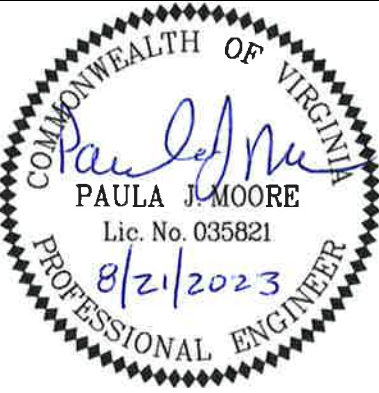
TYPE	I.C. CHART		PIPE DIA. (IN.)	BOX WIDTH (FT.)	BOX/PIPE HEIGHT (FT.)	NO. OF BRL's	Q (CFS)	Q/B
	NO.	SCALE						
PROPOSED CONDITIONS	1	2	15	0	1.25	1	1.4	N.A.
	1	2	15	0	1.25	1	1.9	N.A.
	1	2	15	0	1.25	1	2.4	N.A.
	1	2	15	0	1.25	1	2.9	N.A.
	1	2	15	0	1.25	1	3.3	N.A.

HEADWATER COMPUTATIONS

INLET CONTROL		OUTLET CONTROL								CONTR. HW ELEV. (FT)	OUTLET VELOCITY (FPS)	END TREATMENT REQ'D	COMMENTS	ADJ. OVER-TOP HW EL.	FINAL HW/D RATIO
HW/D	HW (FT.)	Ke	dc (FT.)	(dc+D)/2 (FT.)	ho (FT.)	H (FT.)	Lso (FT.)	HW (FT.)							
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	
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	
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	
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	
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	

N:\46626-003\CA00\46626003C1-11.DWG

NO.	DATE	BY	REVISIONS



SCALE:

HORIZ:

N/A

VERT.:

N/A

DATE:

AUGUST 2023

DESIGNED:

JBD

DRAWN:

JBD

CHECKED:

PJM

PROJECT NO.:

46626-003

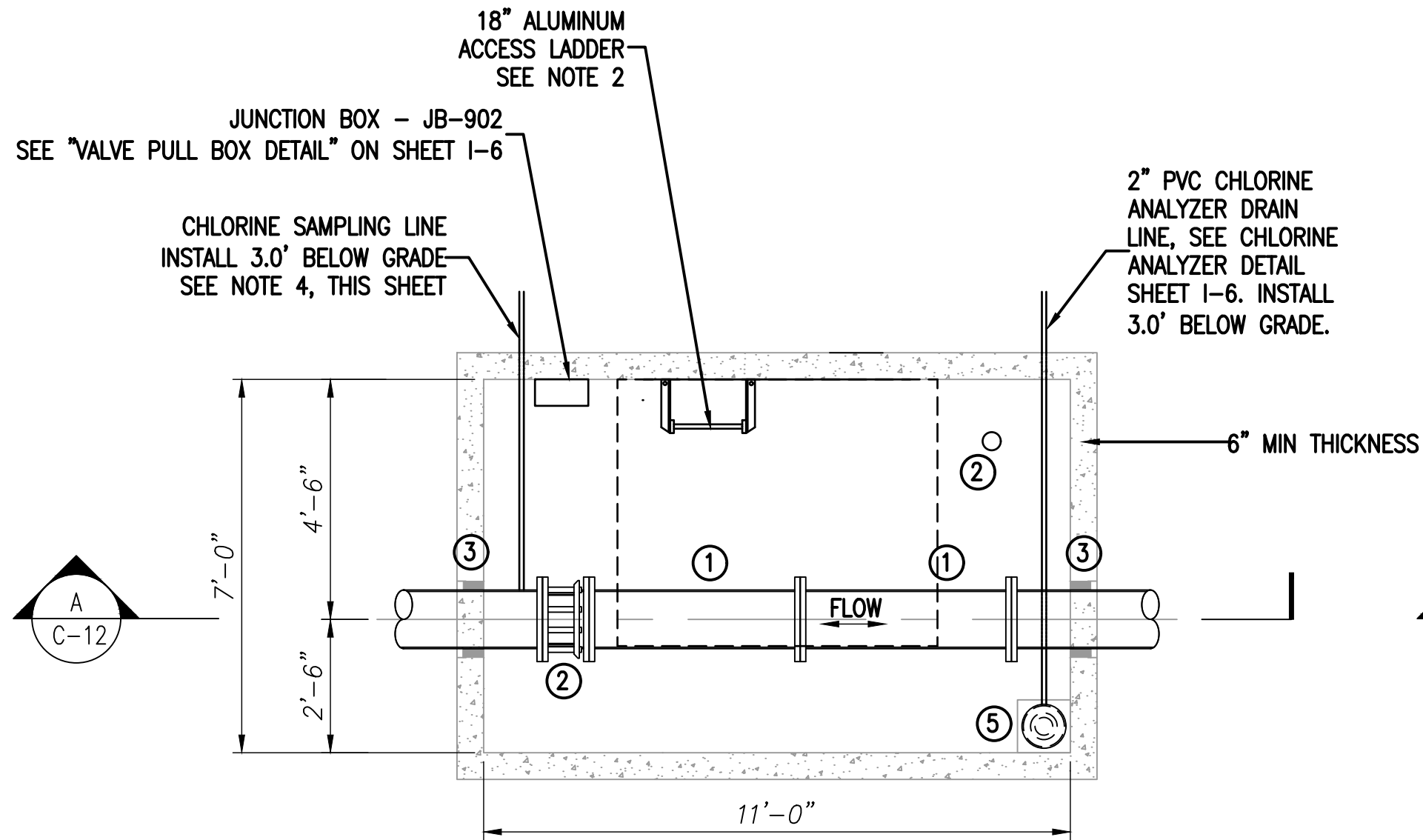
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DRAINAGE CALCULATIONS

SHEET
13
OF
30

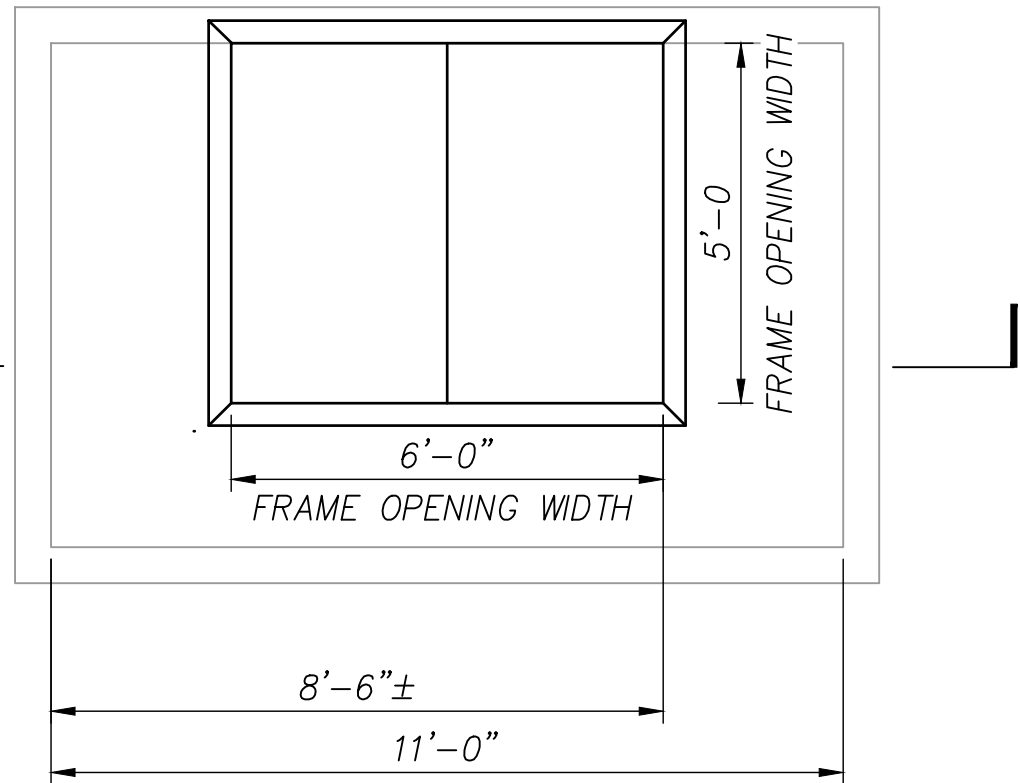
DRAWING

C-11



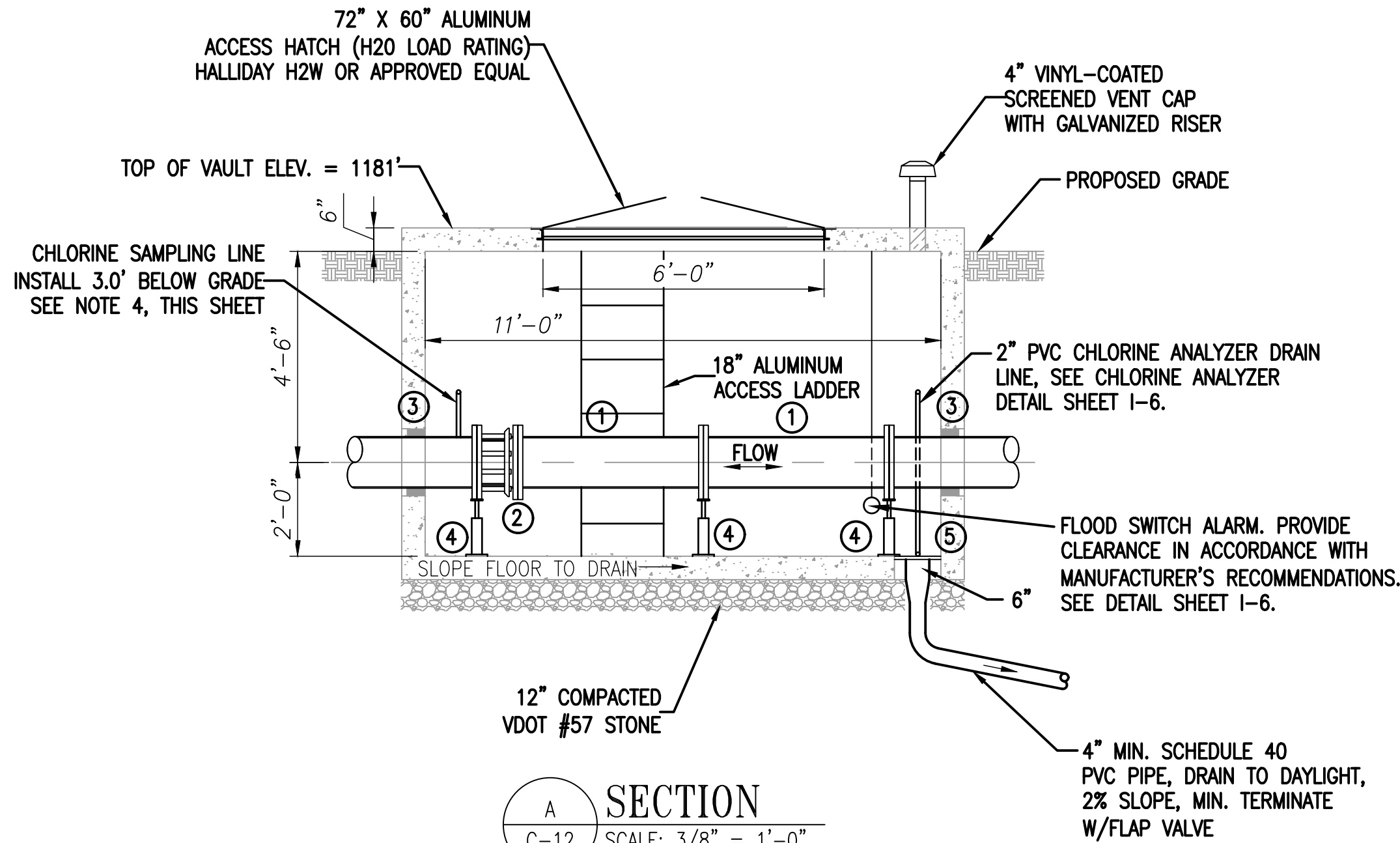
ALTITUDE VALVE VAULT PLAN

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



ROOF PLAN

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



SECTION

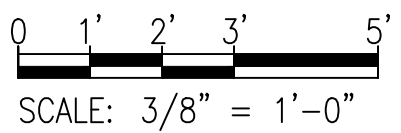
SCALE: 3/8" = 1'-0"

EQUIPMENT LIST

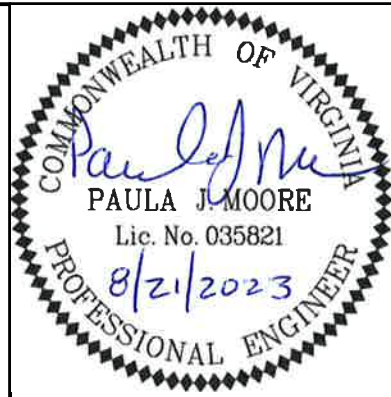
- 12" SPOOL PIECE, FLANGED
- 12" DISMANTLING JOINT
- DOUBLE LINK-SEAL
- ADJUSTABLE PIPE STAND
- FLOOR DRAIN WITH STAINLESS STEEL GRATE
- FLOOD SWITCH ALARM

NOTES

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



NO.	DATE	BY	REVISIONS



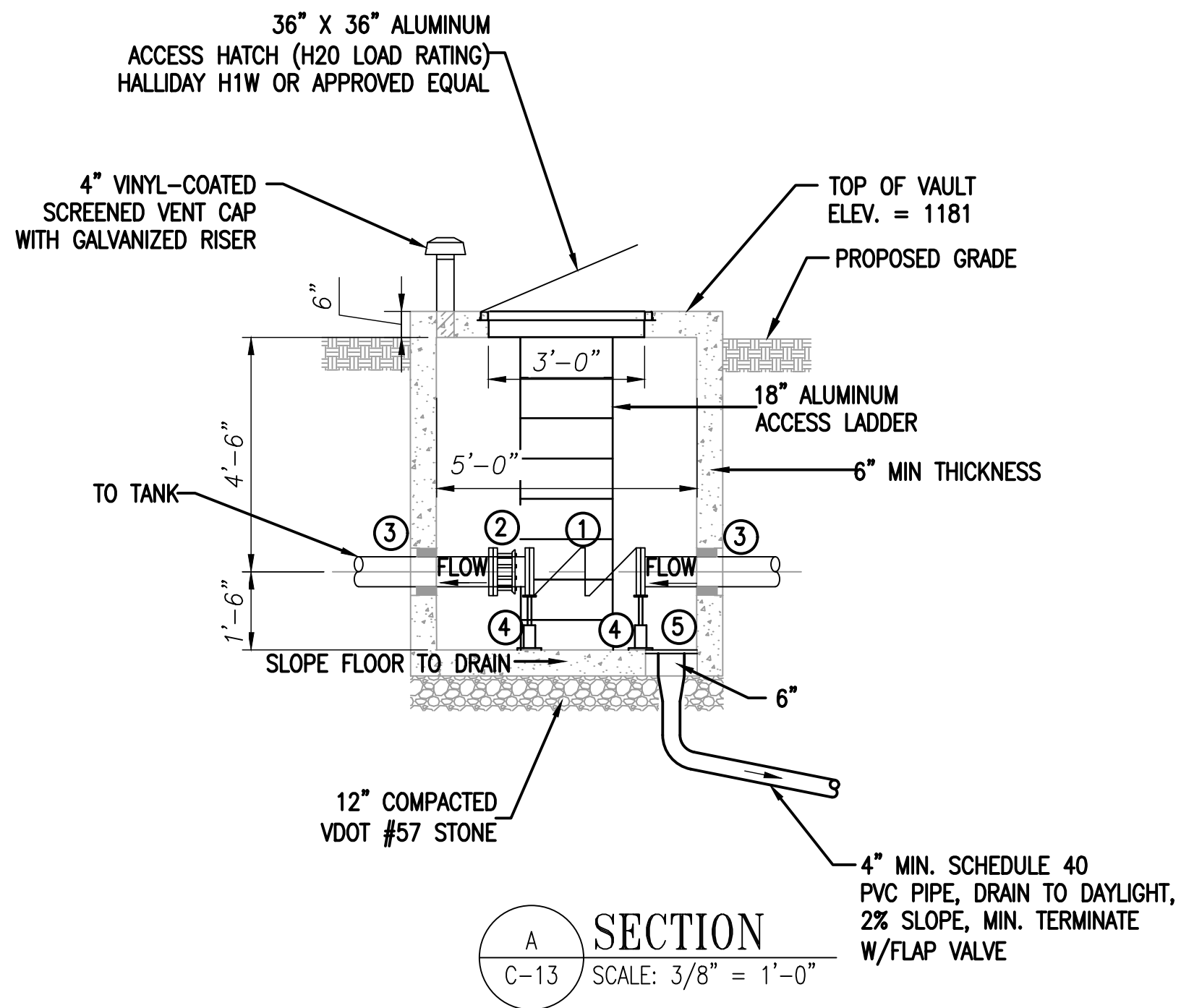
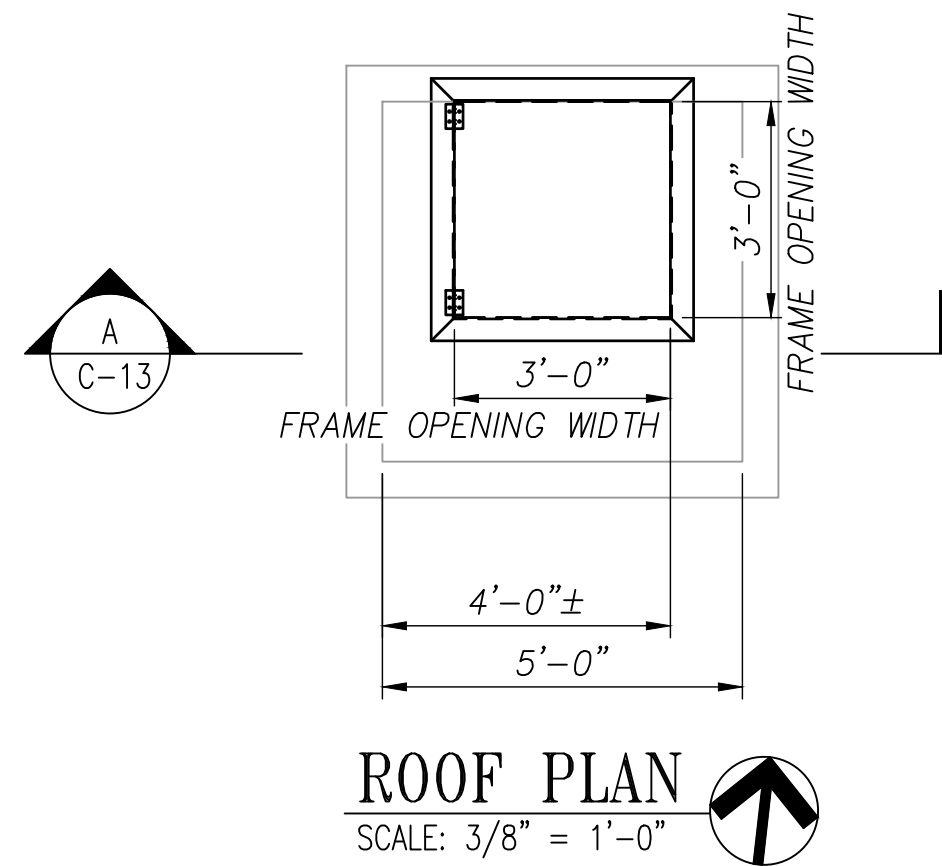
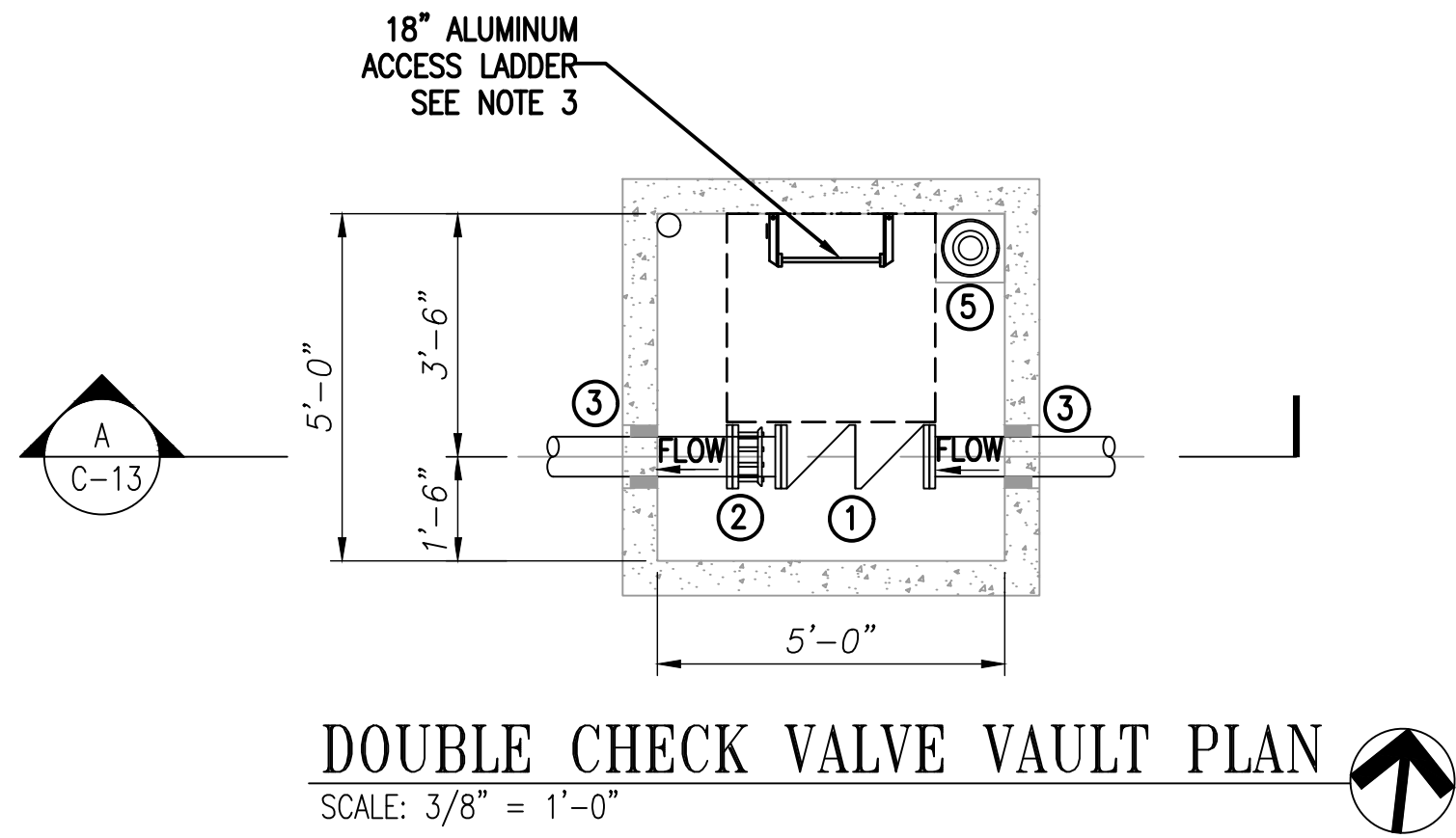
SCALE:	HORIZ: 3/8"=1'
VERT:	N/A
DATE:	AUGUST 2023
DESIGNED:	MSS
DRAWN:	MSS
CHECKED:	PJM
PROJECT NO.:	46626-003

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

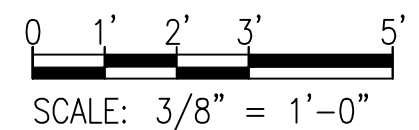


EQUIPMENT LIST

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

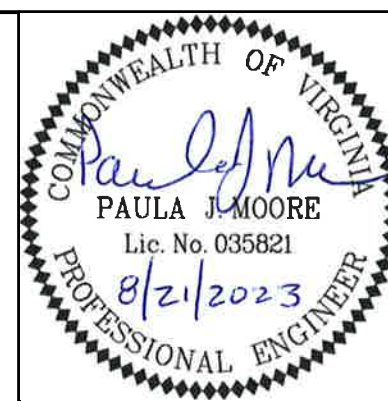
NOTES

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.



N:\46626-003\CAUT\46626003C1-13.DWG

NO.	DATE	BY	REVISIONS



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

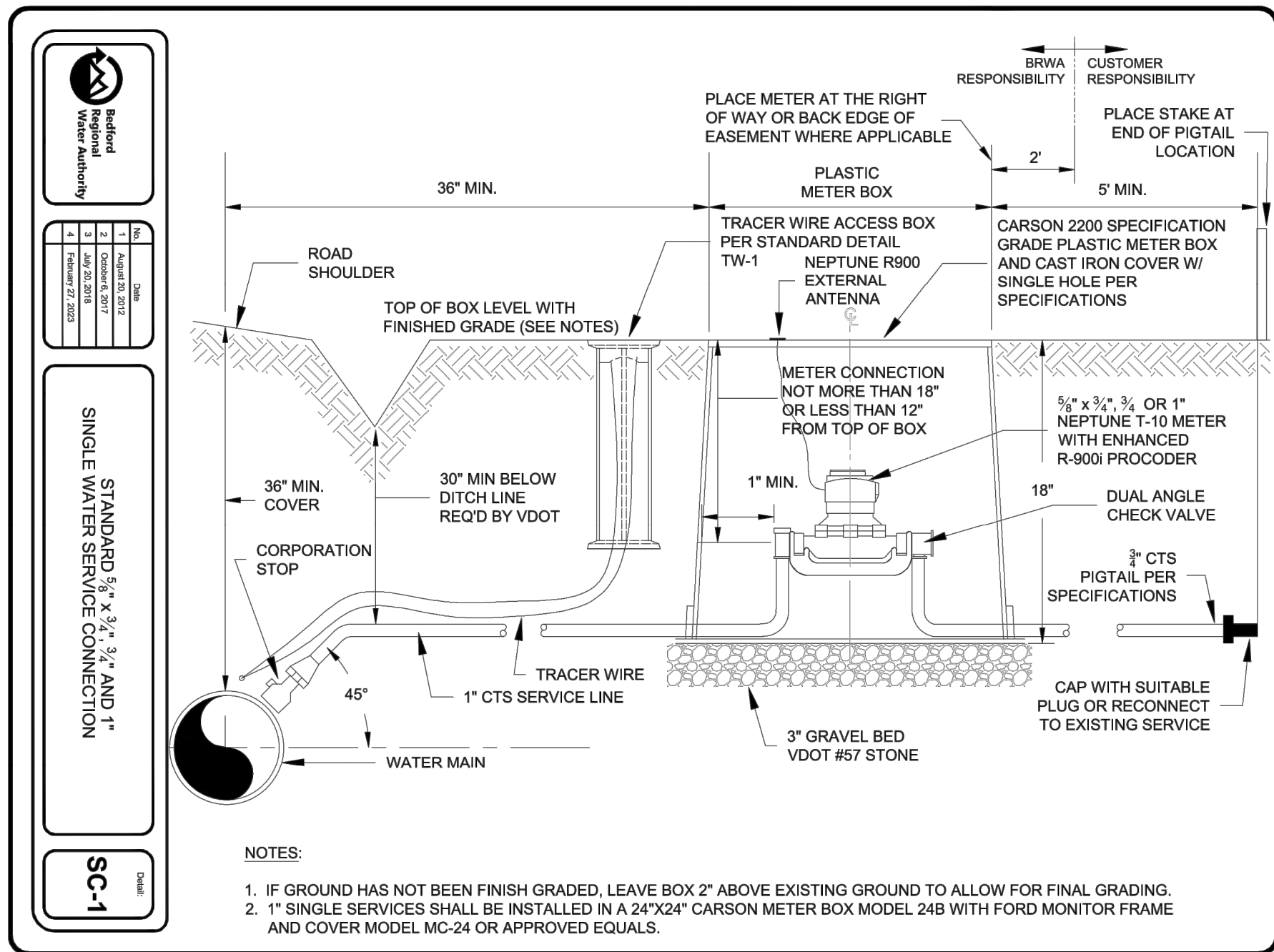
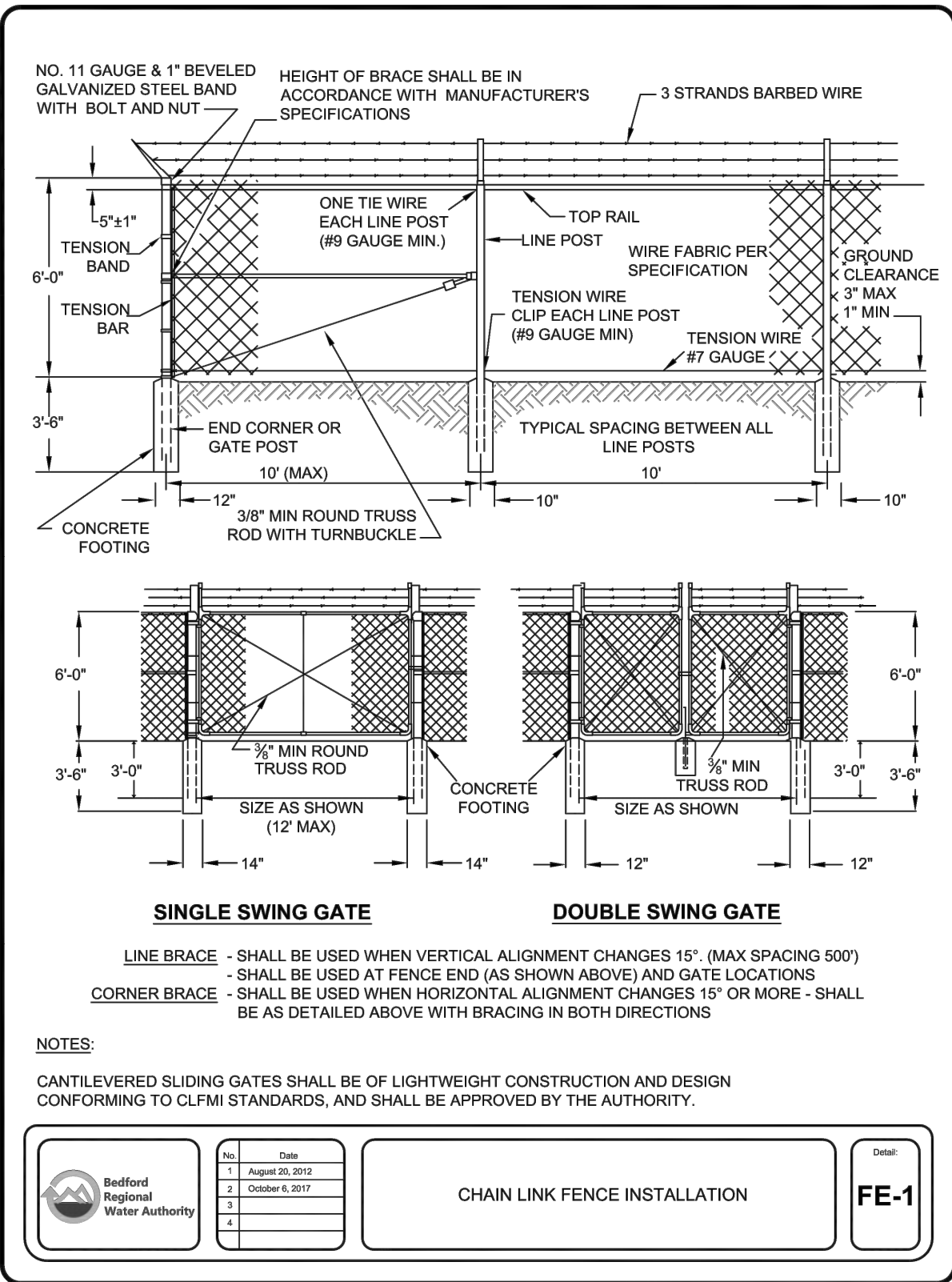
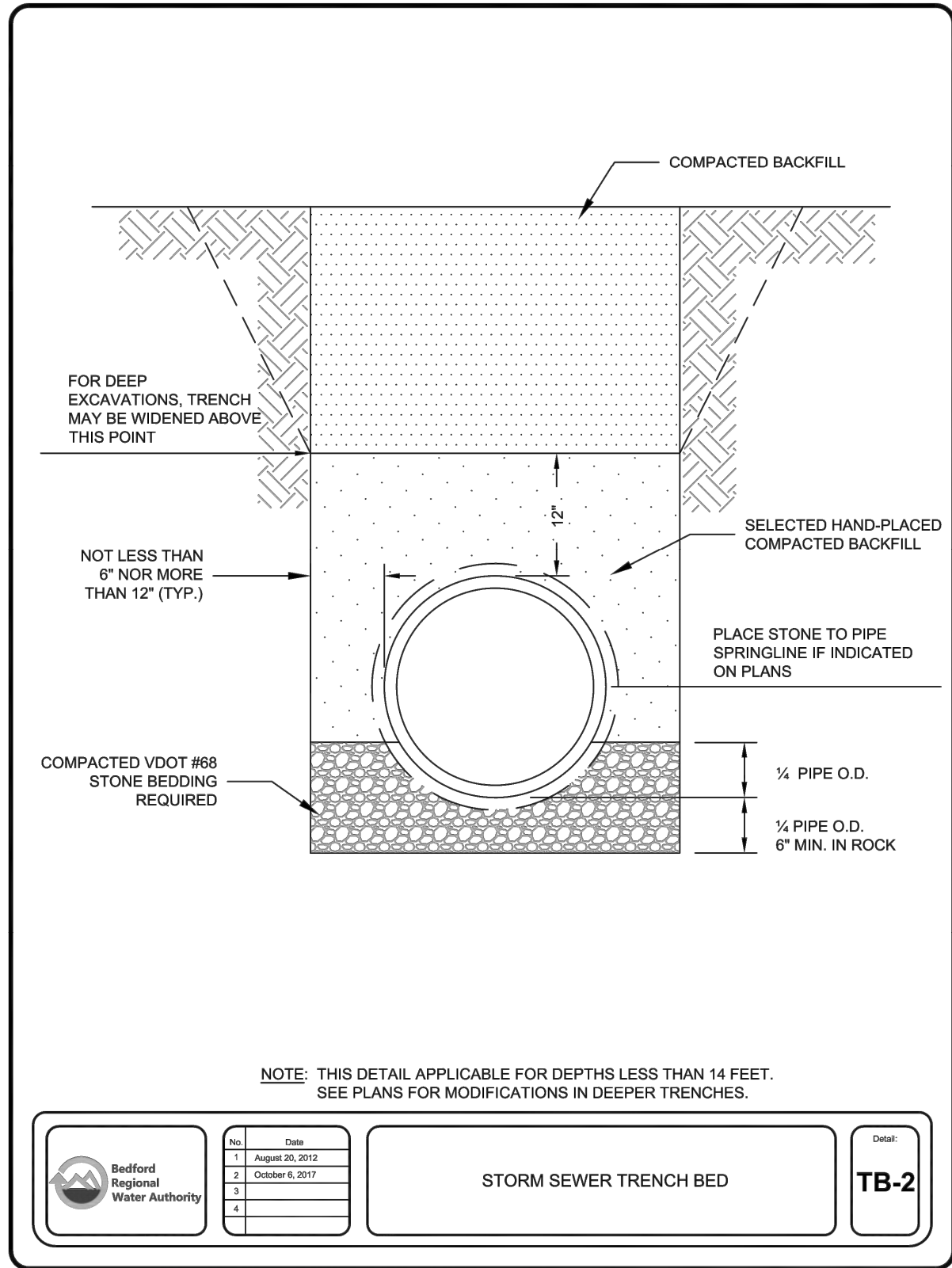
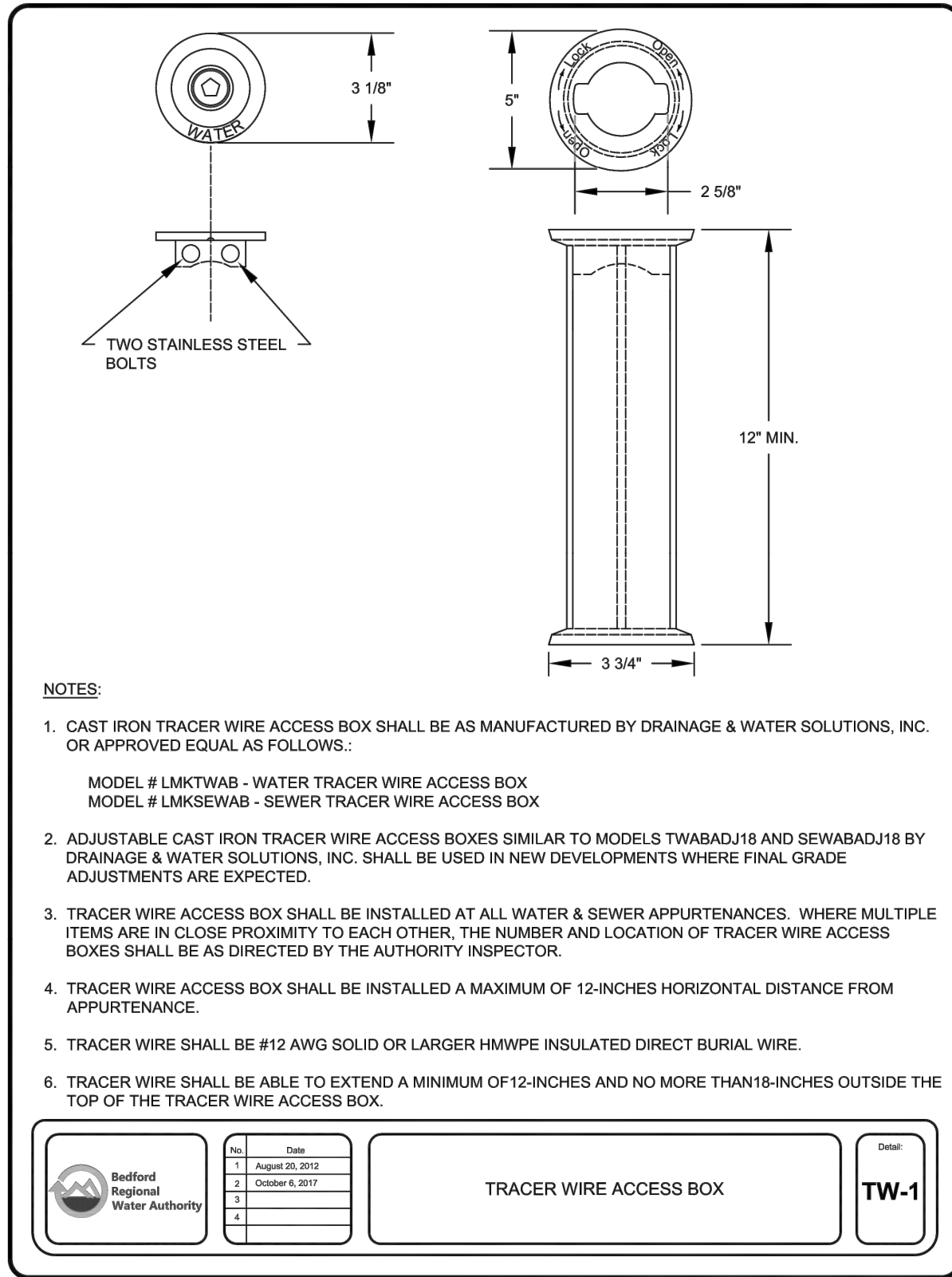
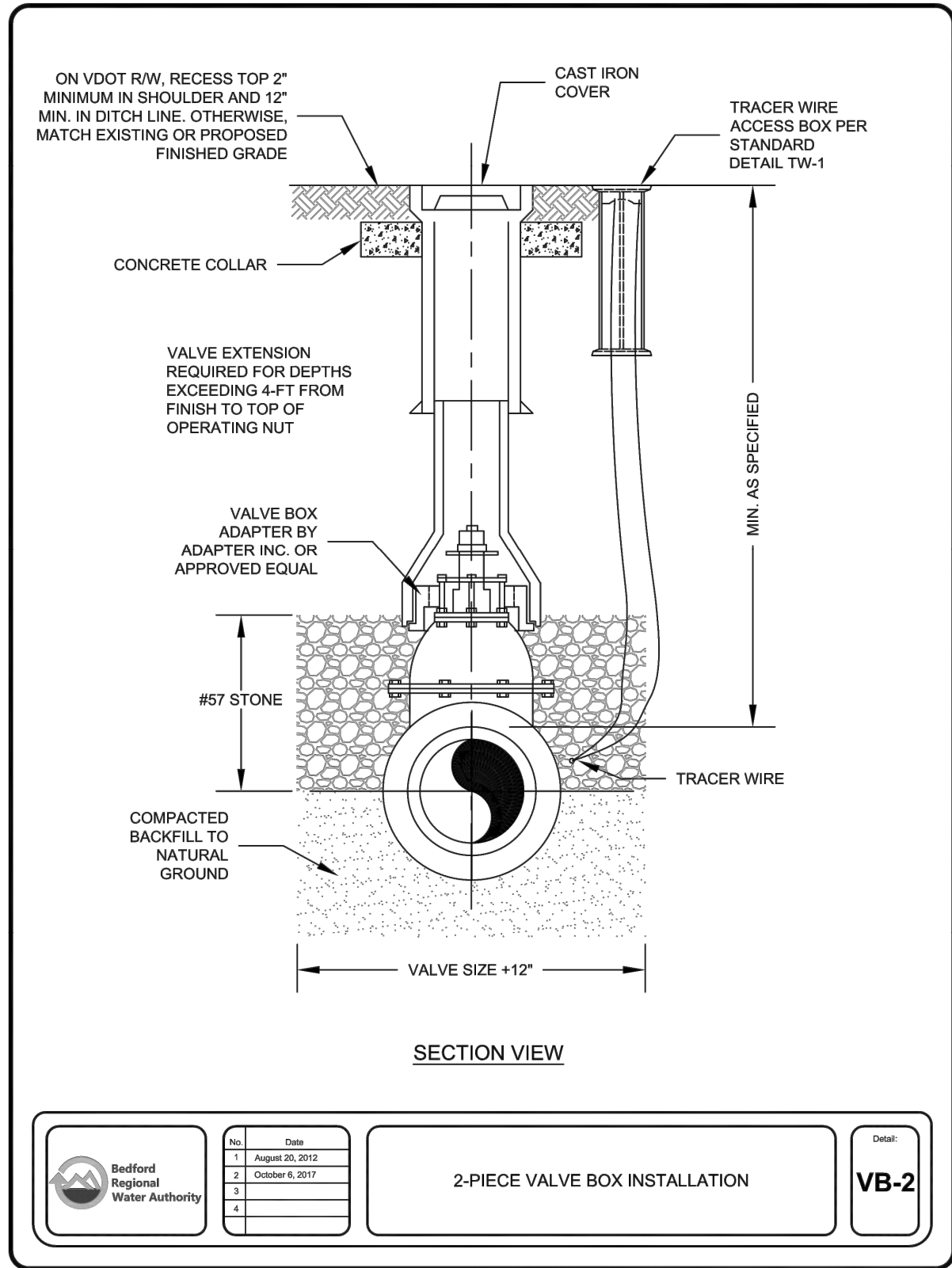
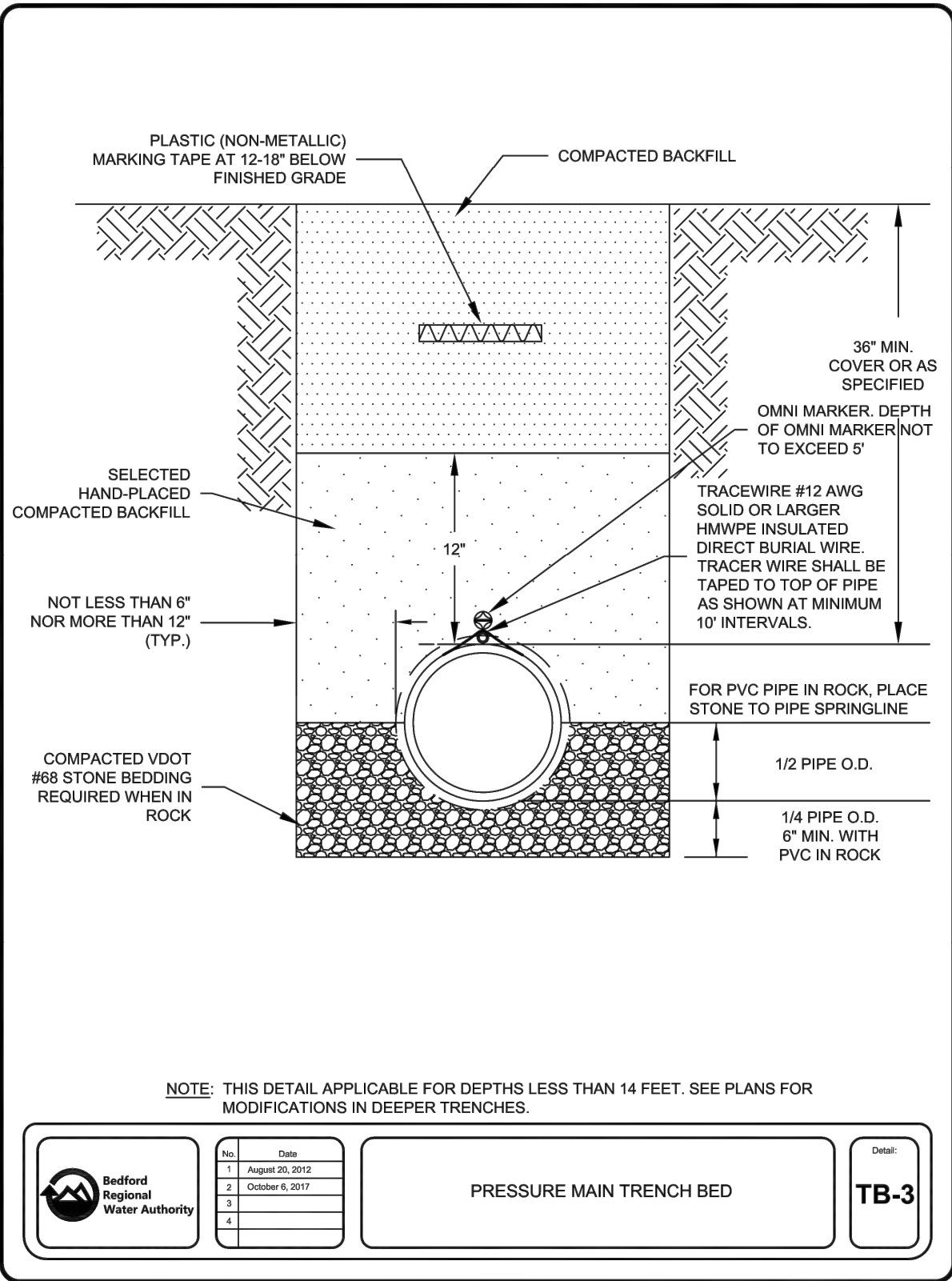
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
DOUBLE CHECK VALVE VAULT

SHEET
15
OF
30

DRAWING

C-13



N:\46626-003\CAD\46626003C1-14.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

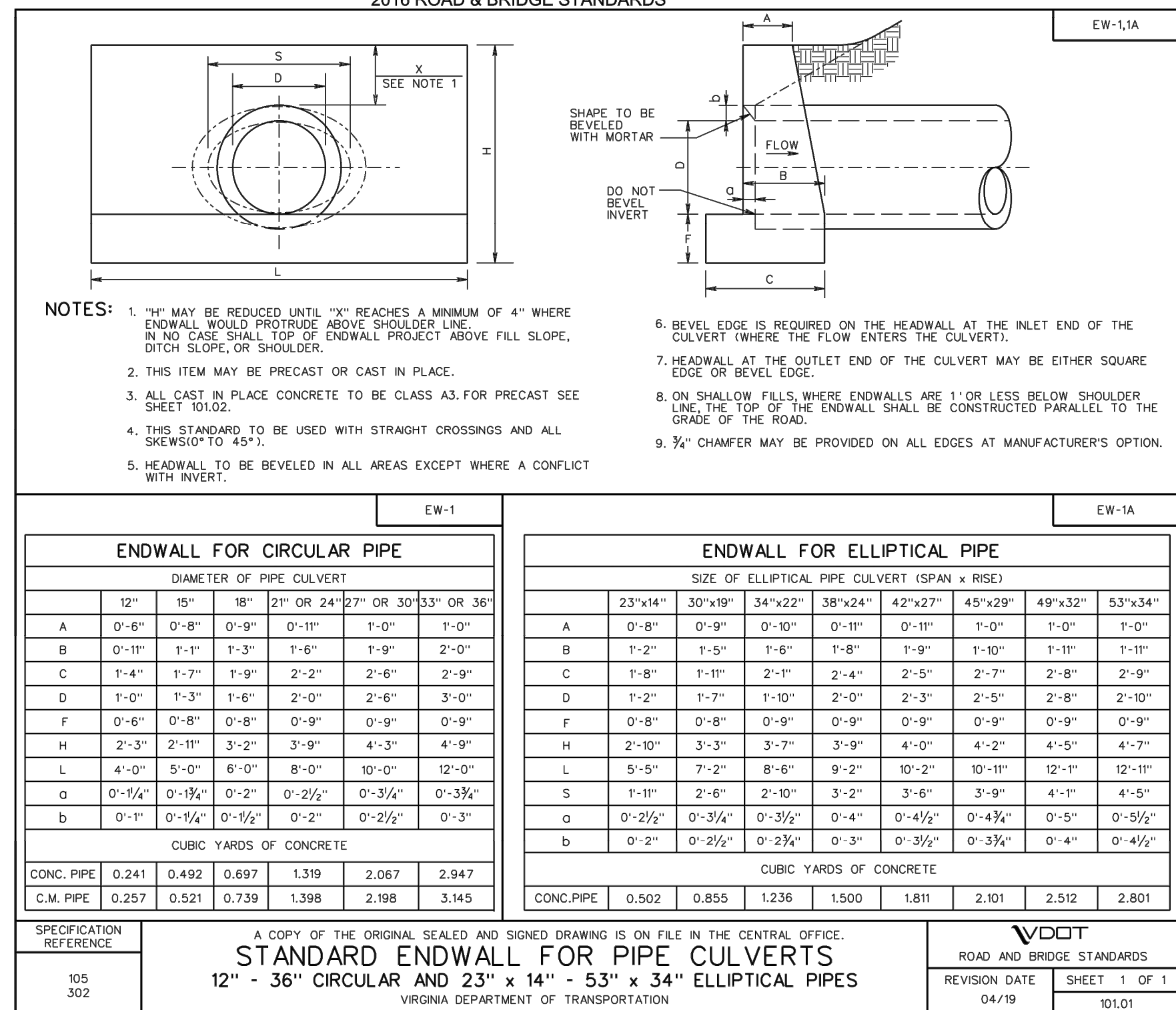
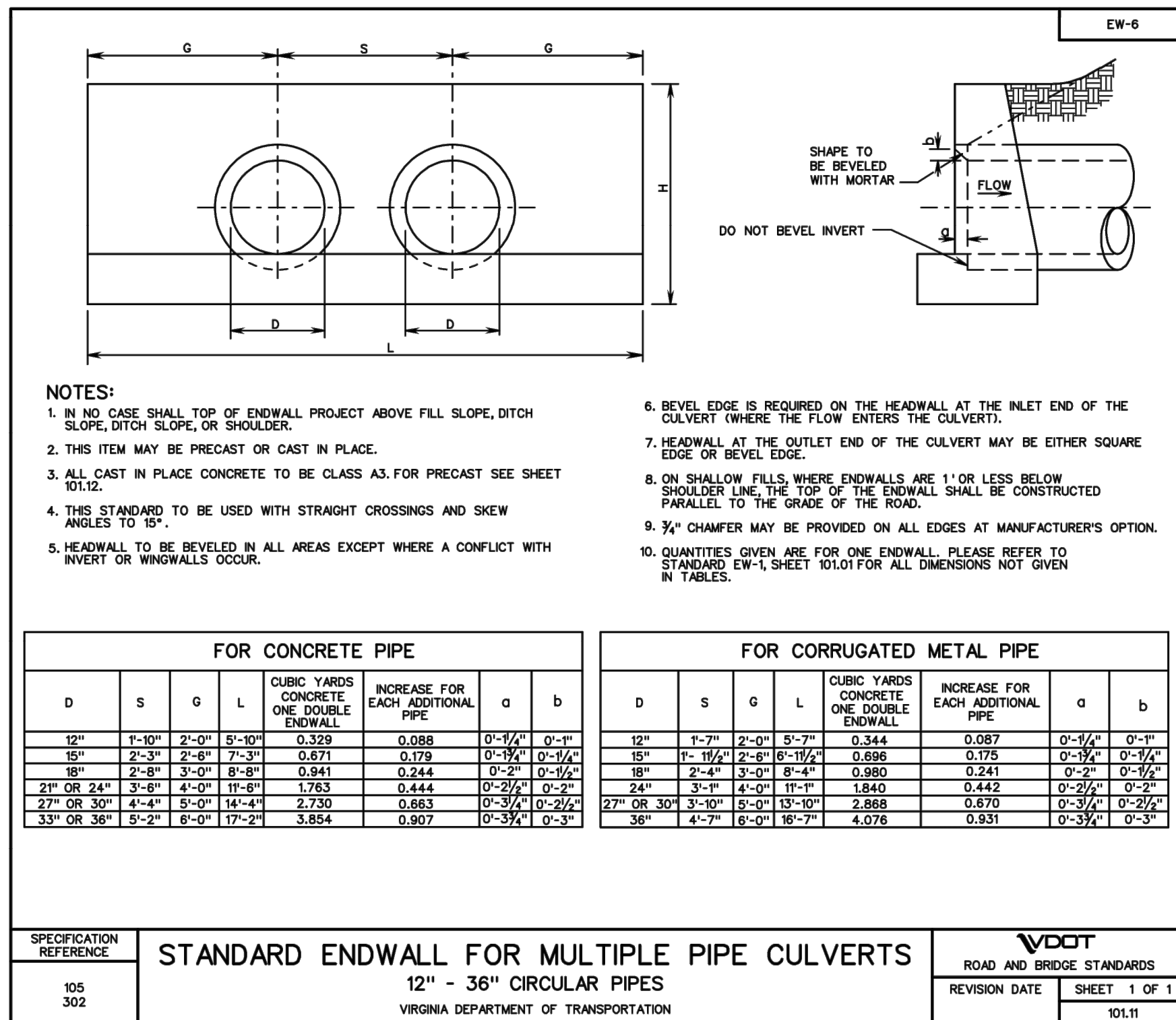
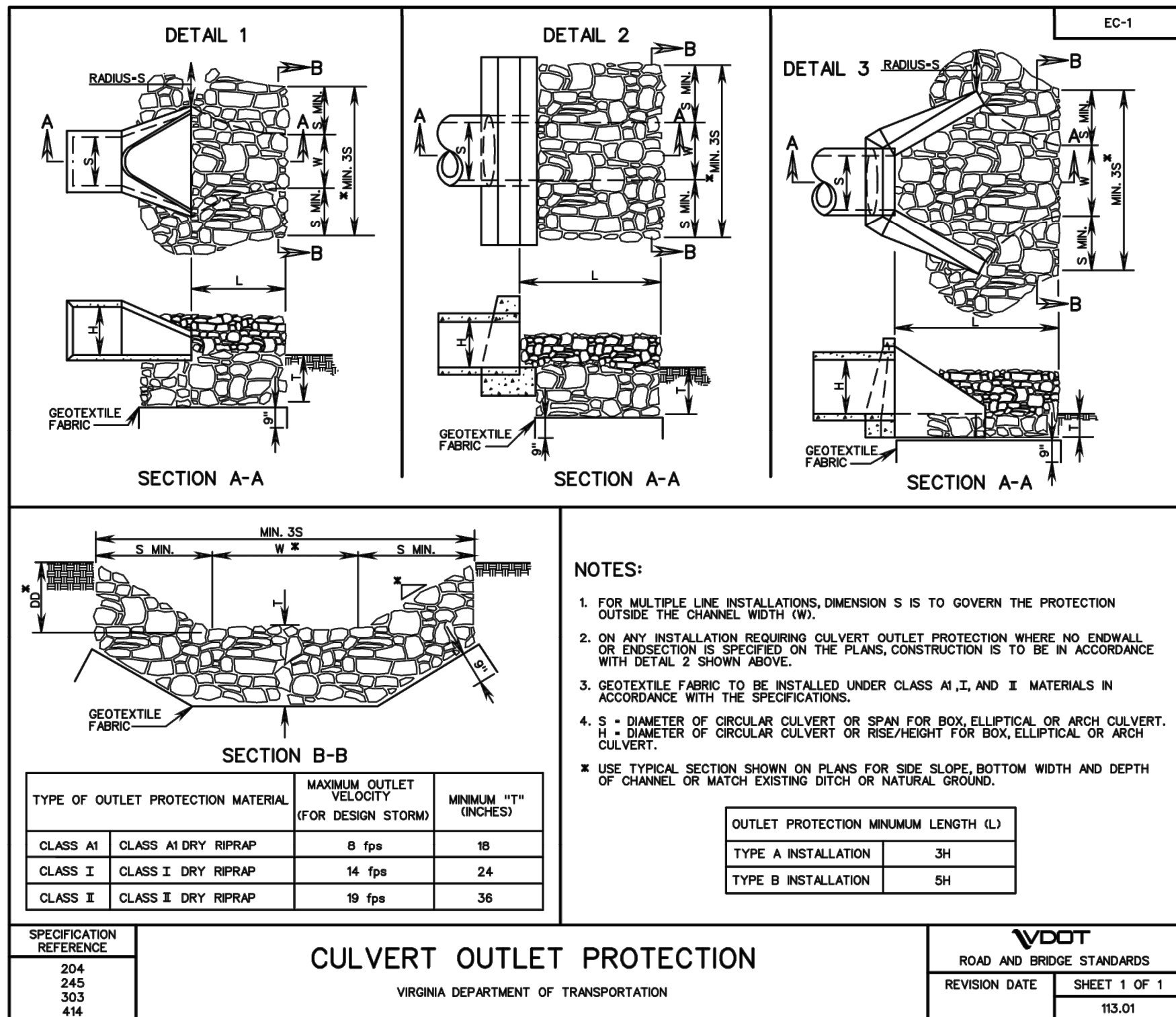
16

OF

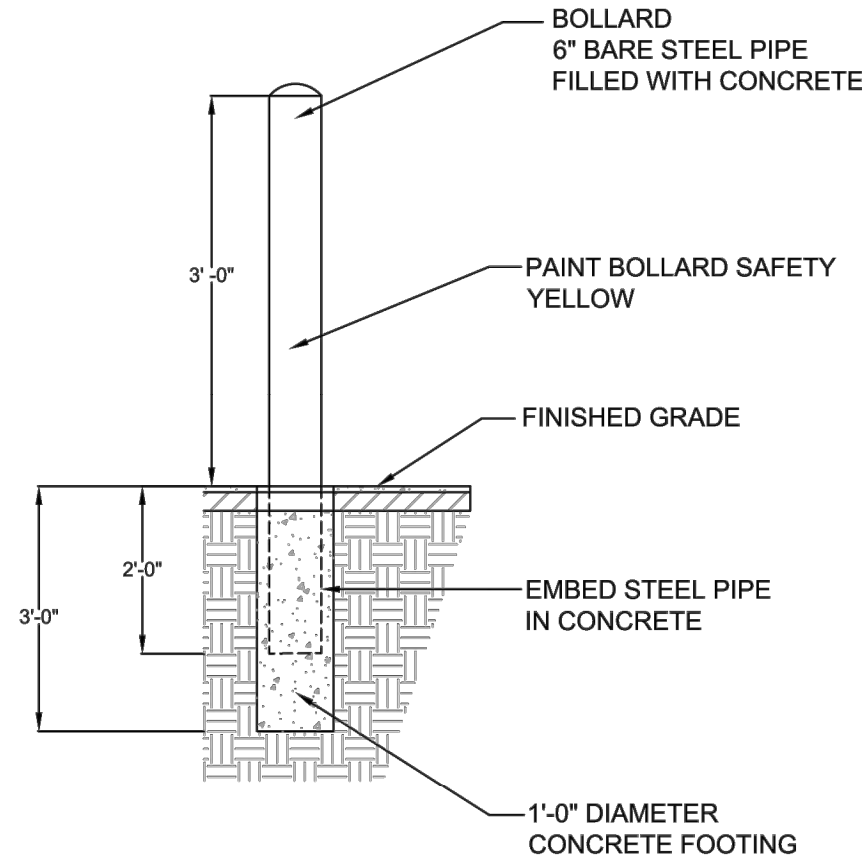
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DRAWING

C-14

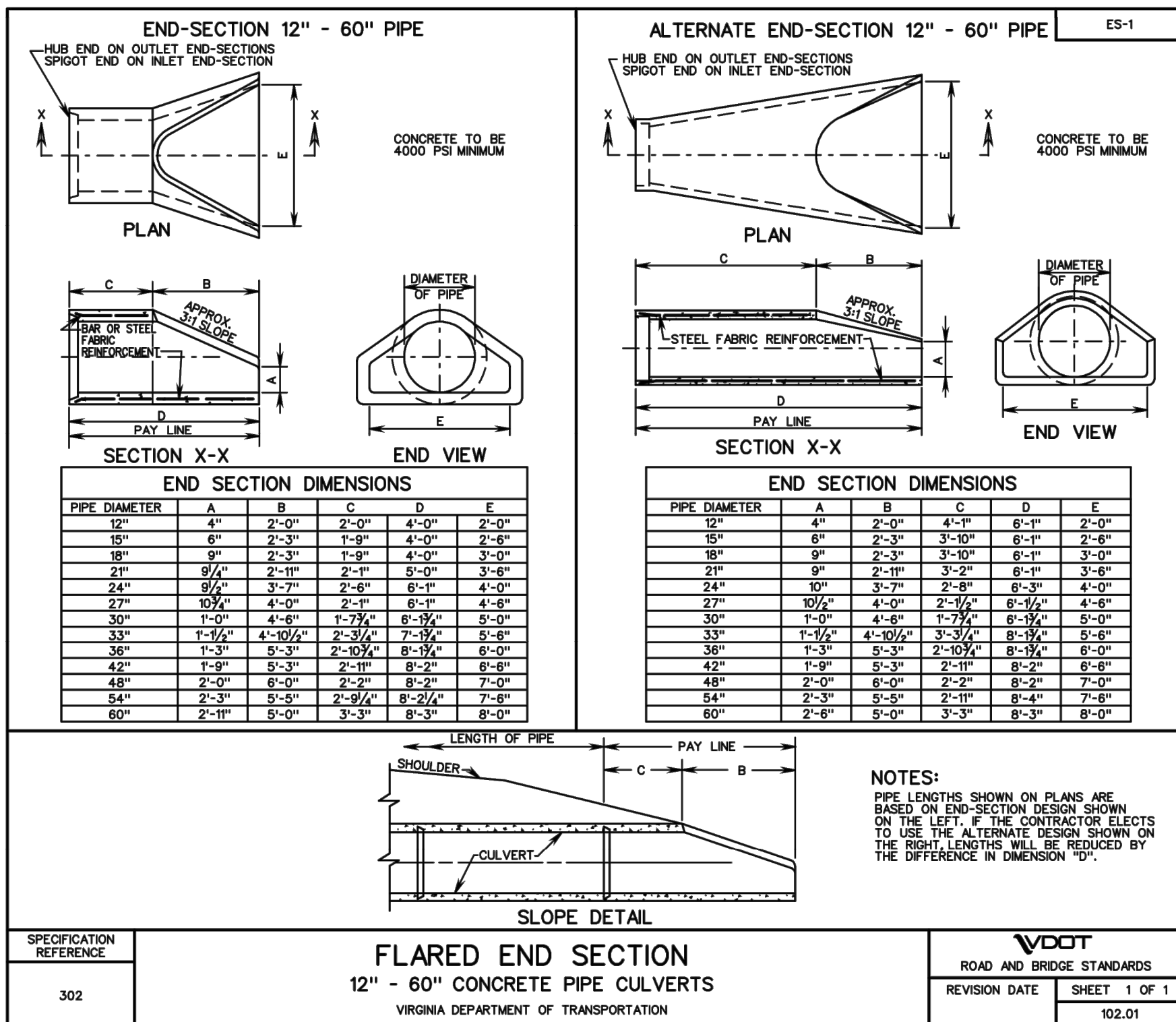
**NOTES:**

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

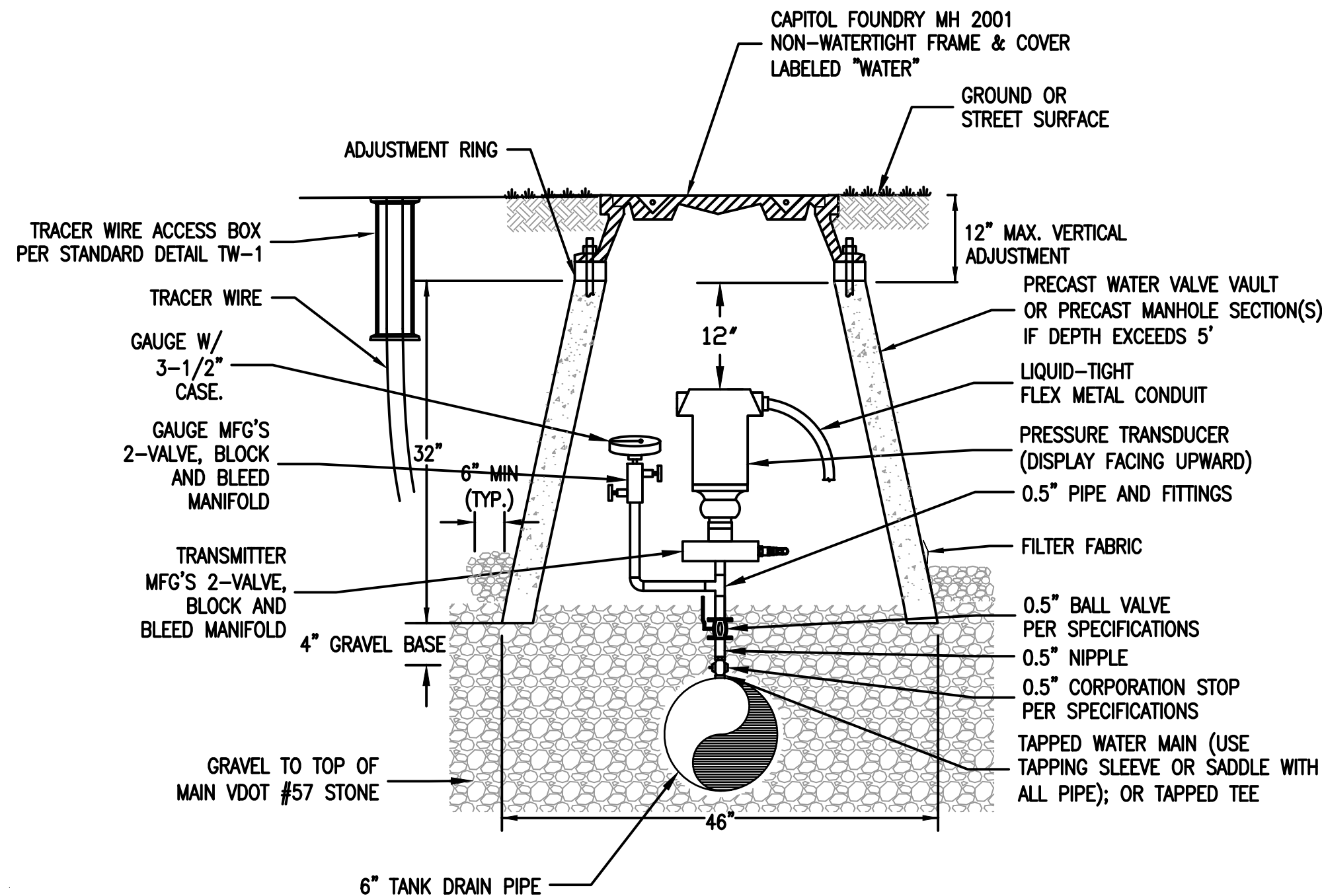


BOLLARD DETAIL

N.T.S.

**NOTES:**

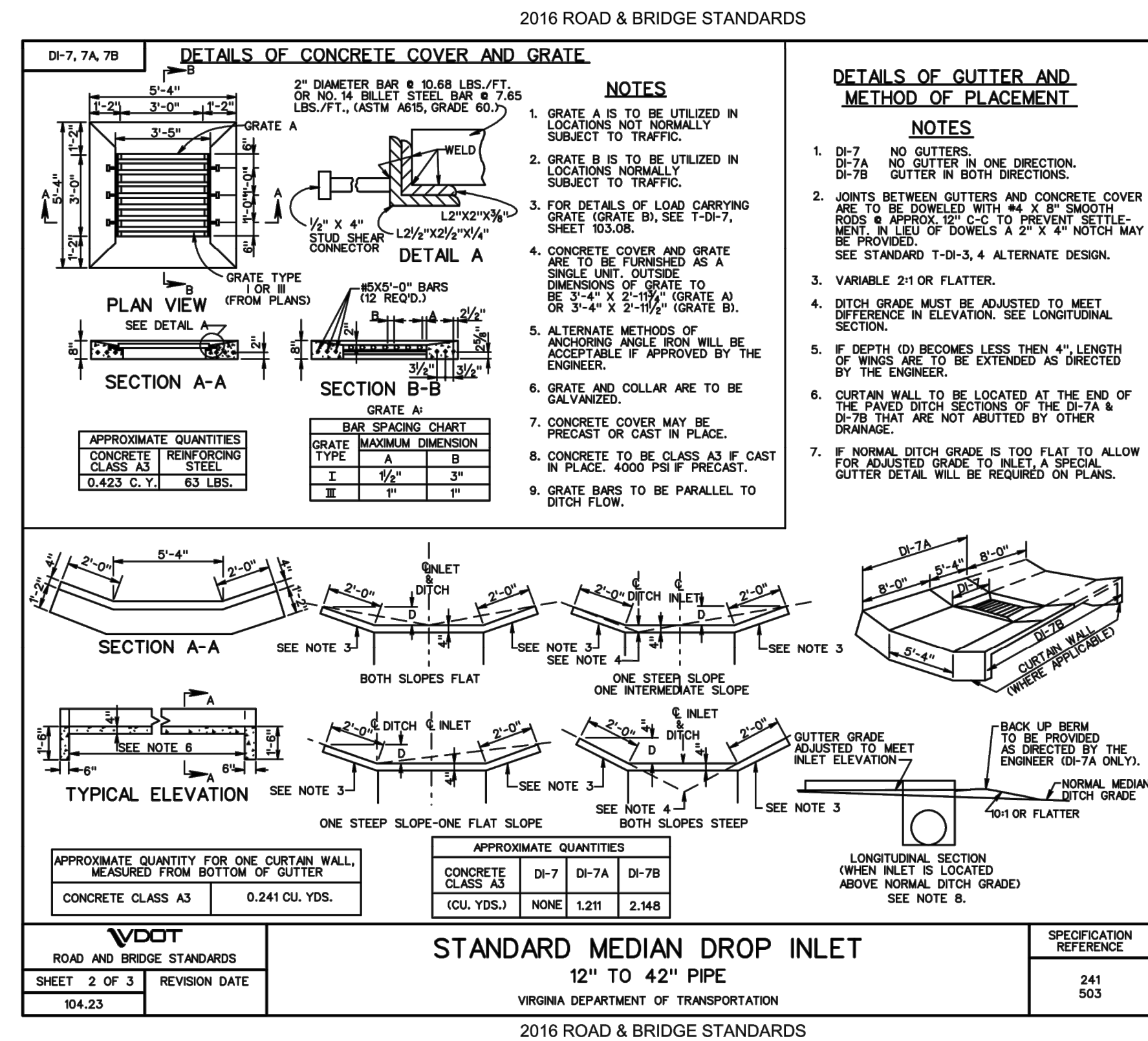
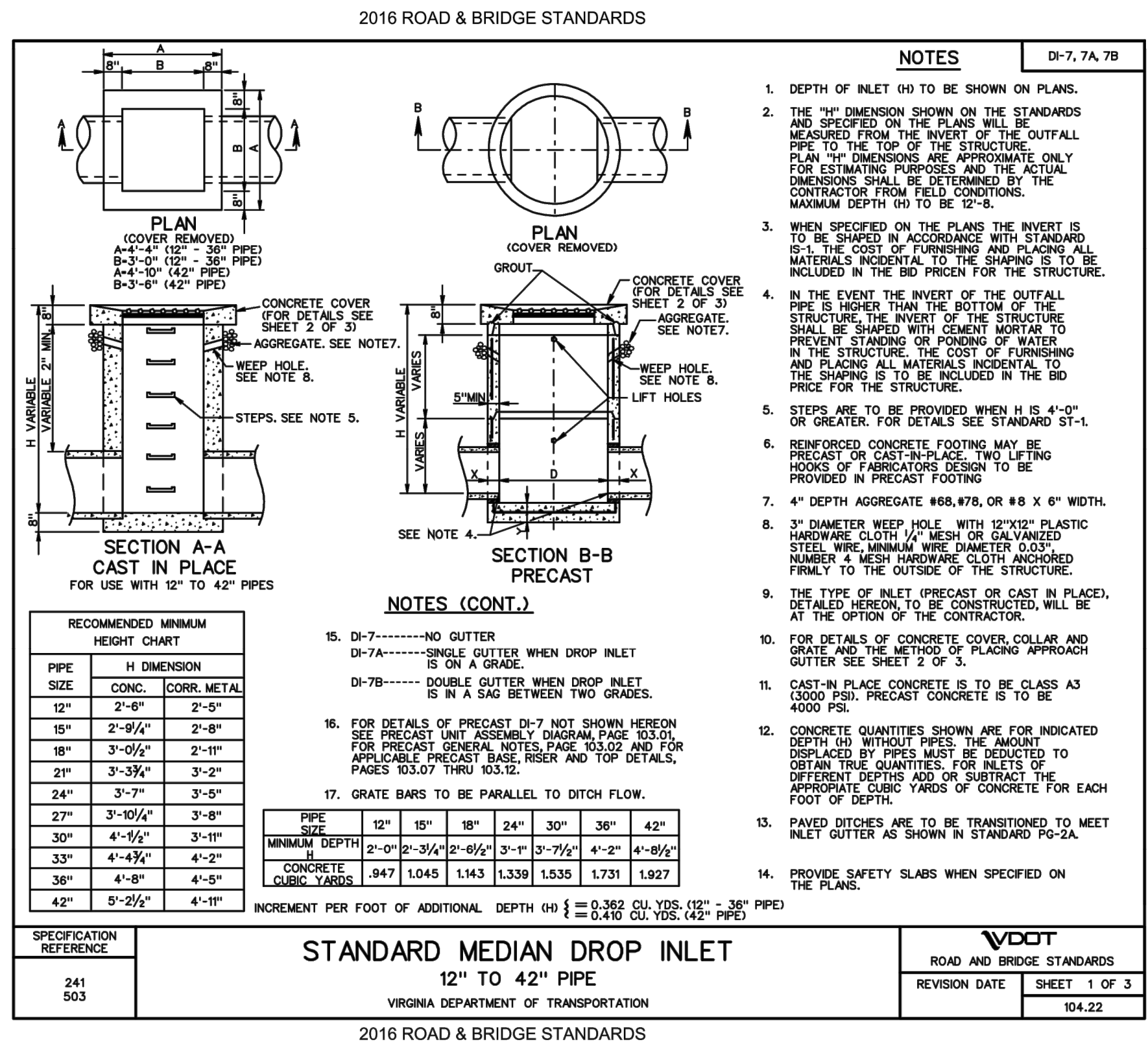
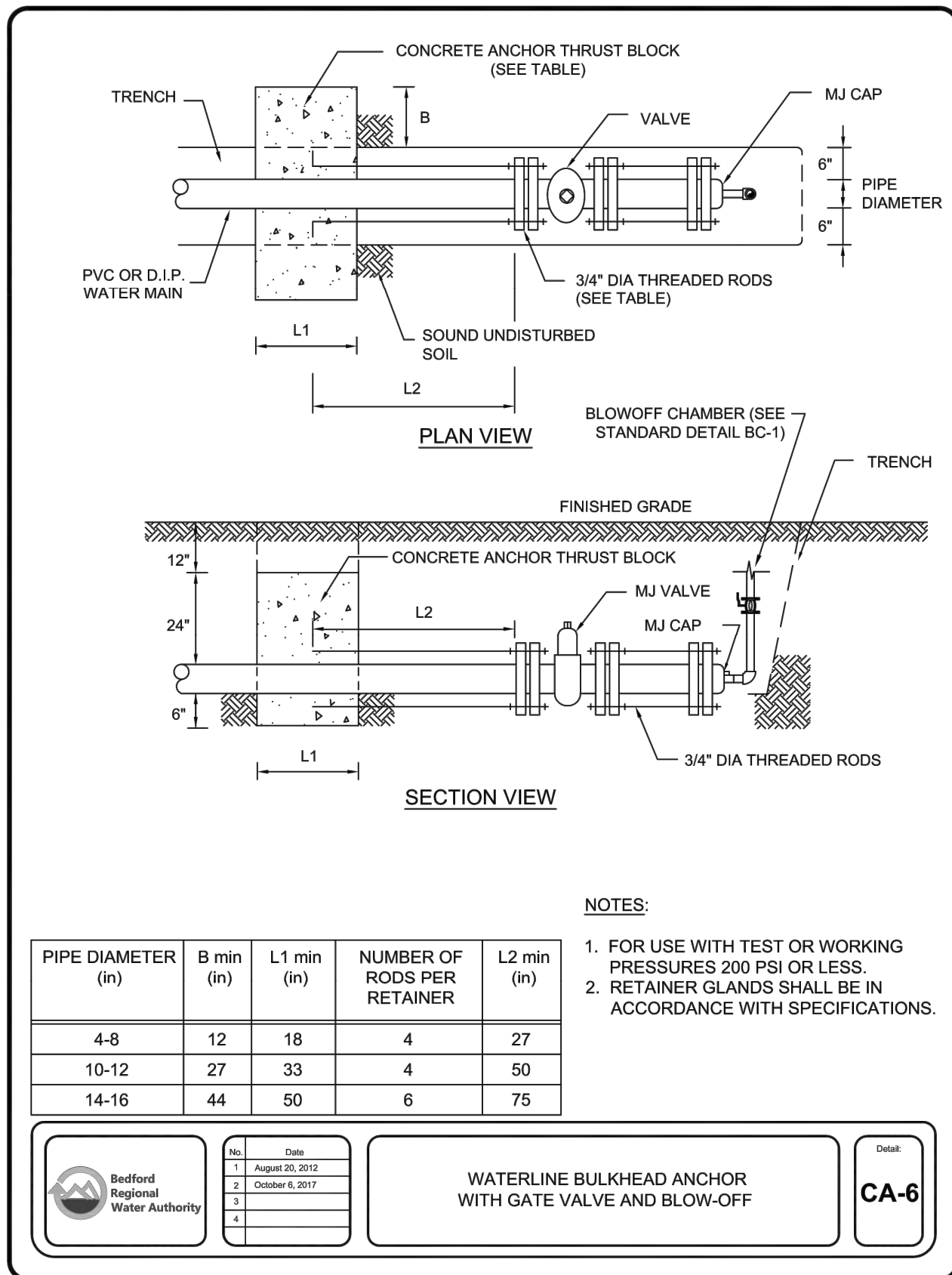
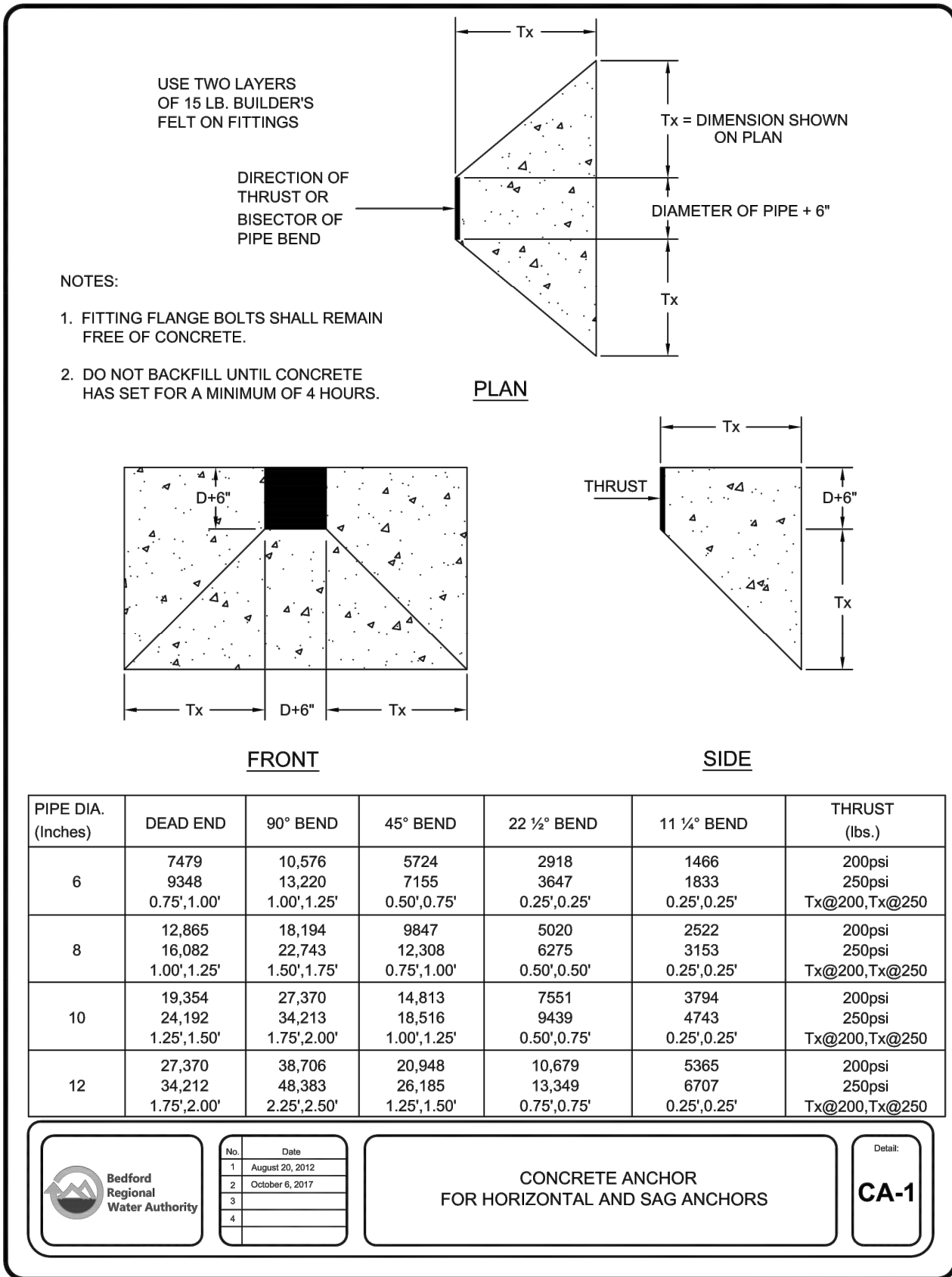
- ALL PIPE AND FITTINGS SHALL BE LEAD FREE BRASS, STAINLESS STEEL, OR EPOXY COATED DUCTILE IRON. GALVANIZED, PVC, AND BLACK IRON PIPE WILL NOT BE ALLOWED.
- FILTER FABRIC TO BE INSTALLED BETWEEN BOTTOM OF PIPE AND STONE BEDDING. FABRIC TO EXTEND VERTICALLY A MINIMUM OF 6" FROM BOTTOM OF VAULT (FULL CIRCUMFERENCE).



PRESSURE TRANSDUCER AND VAULT

N.T.S.

NO.	DATE	BY	REVISIONS



N:\46626-003\CA01\46626003C1-16.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

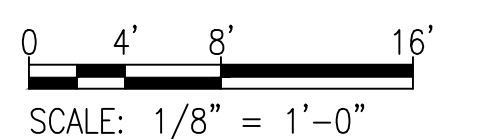
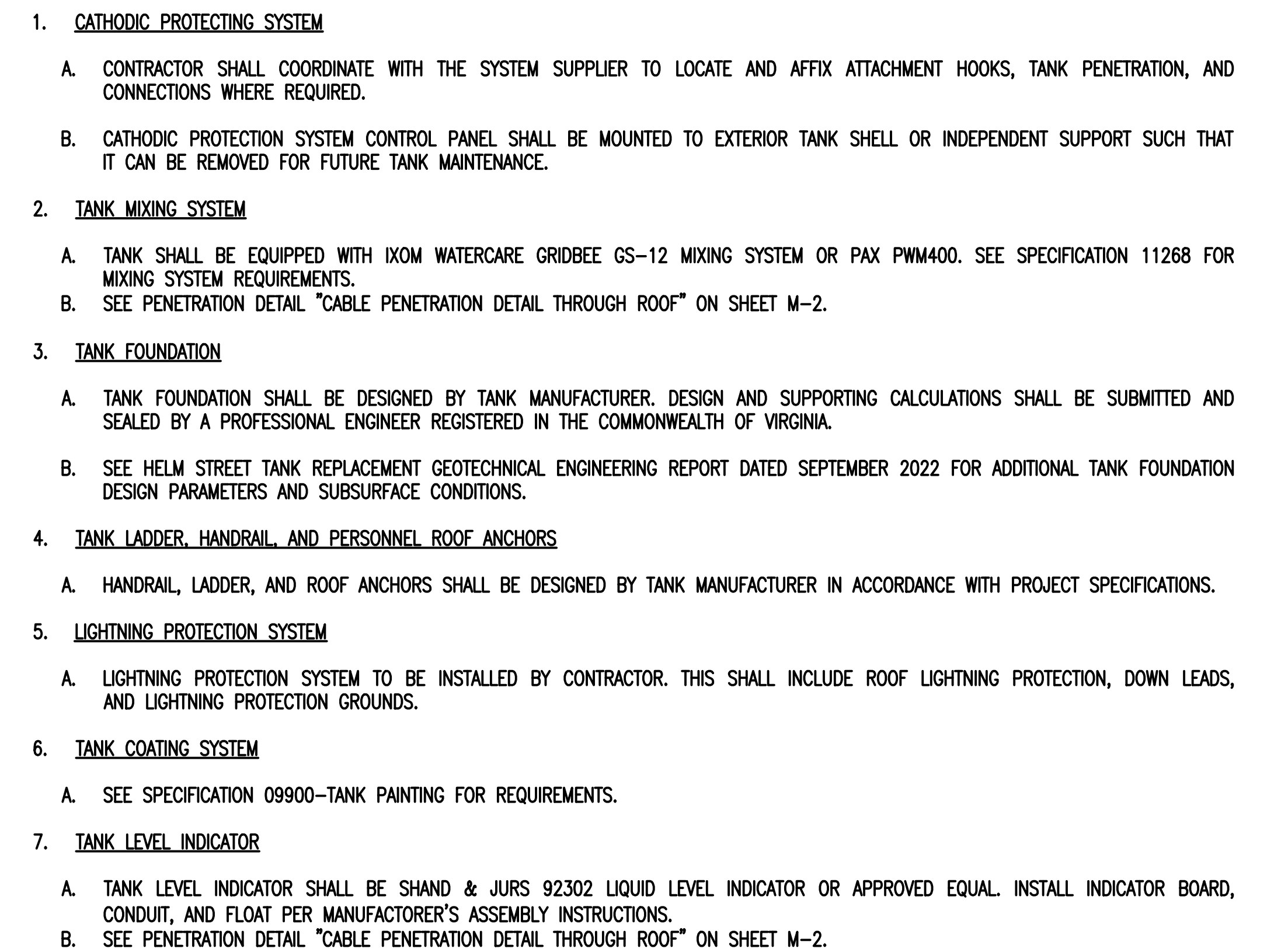
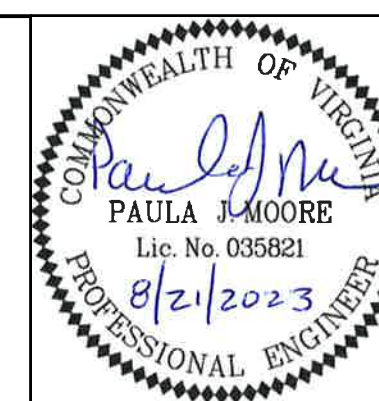
18

OF

30

DRAWING

C-16

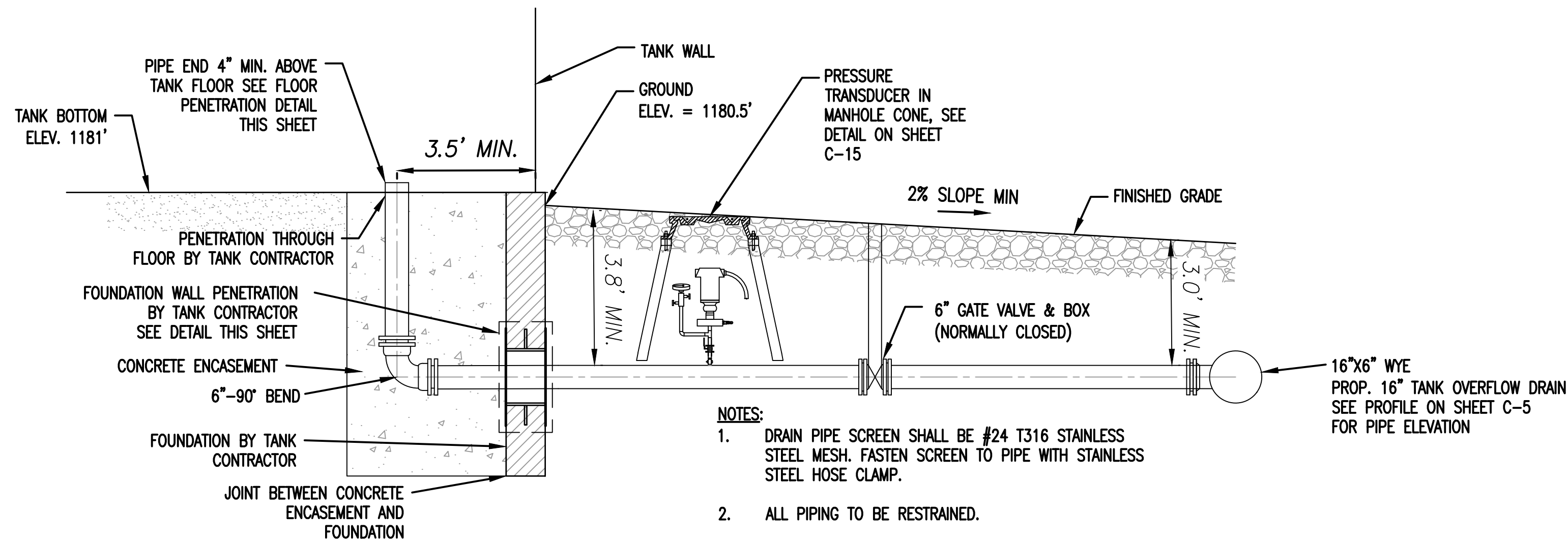
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SCALE:
HORIZ.: $1/8"=1'$
VERT.: N/A

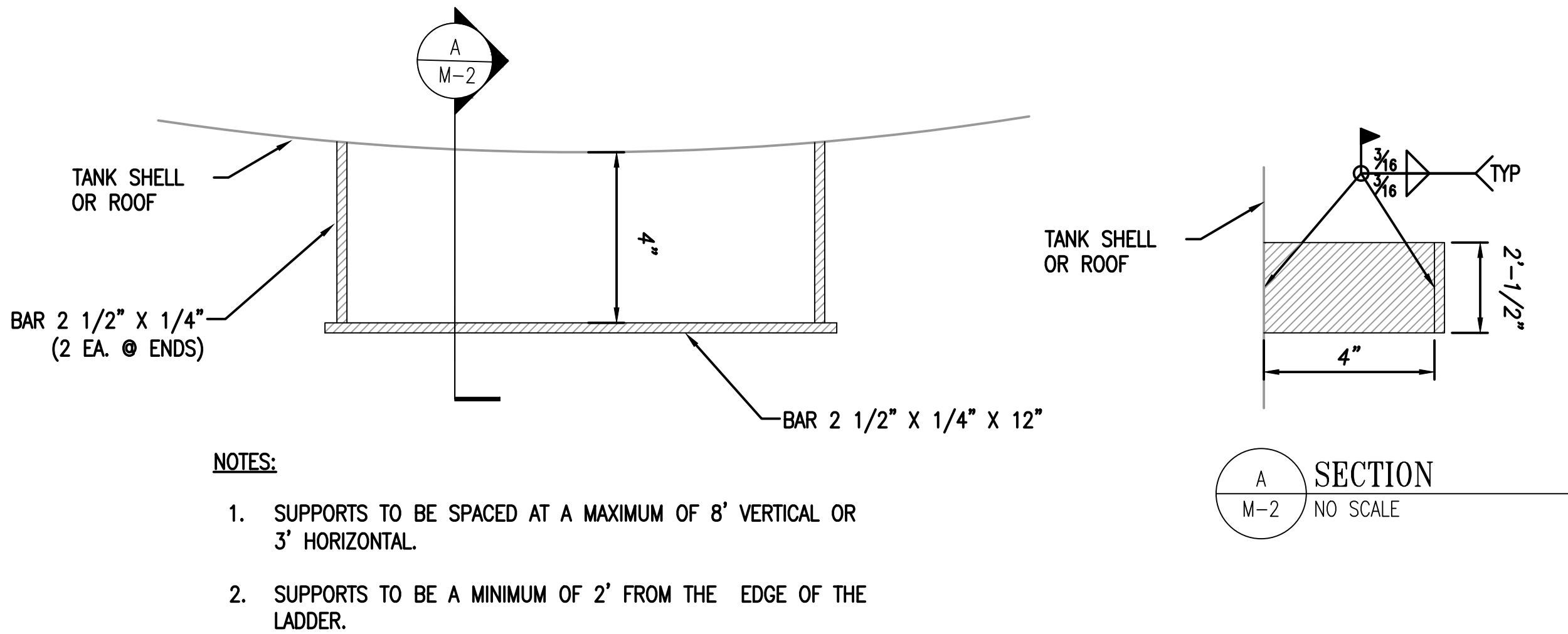
DATE: AUGUST 2023
DESIGNED: MSS
DRAWN: MSS
CHECKED: PJM
PROJECT NO.: 46626-003

HELM STREET TANK REPLACEMENT GROUND STORAGE TANK NOTES AND DETAILS

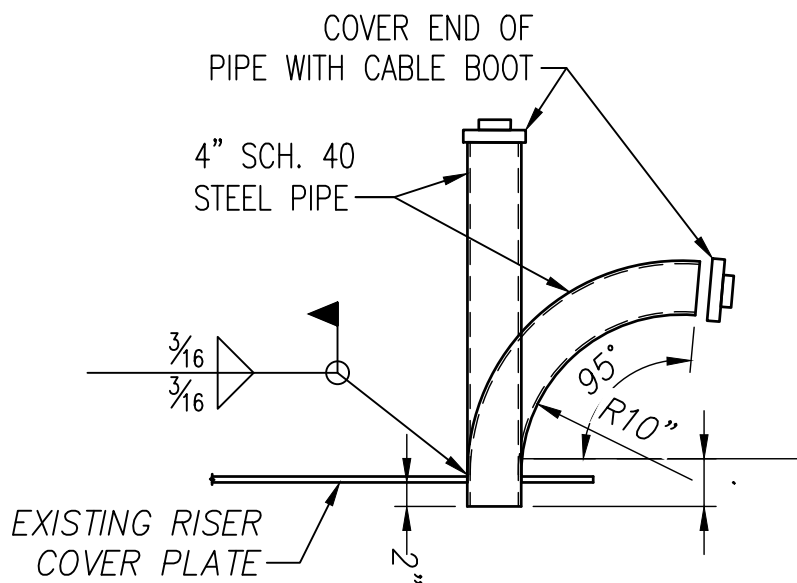
SHEET <u>19</u> OF 30	DRAWING M-1
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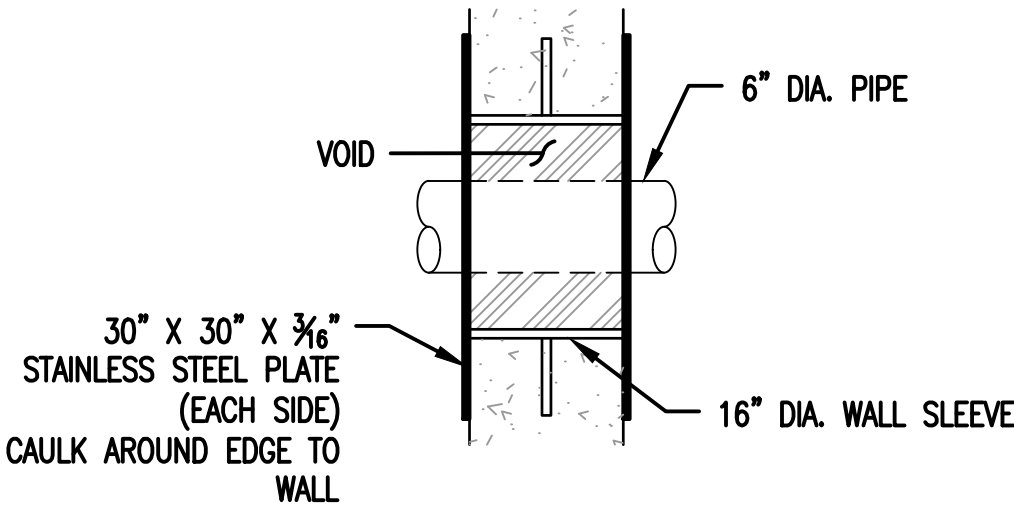
6" TANK DRAIN DETAIL
N.T.S.



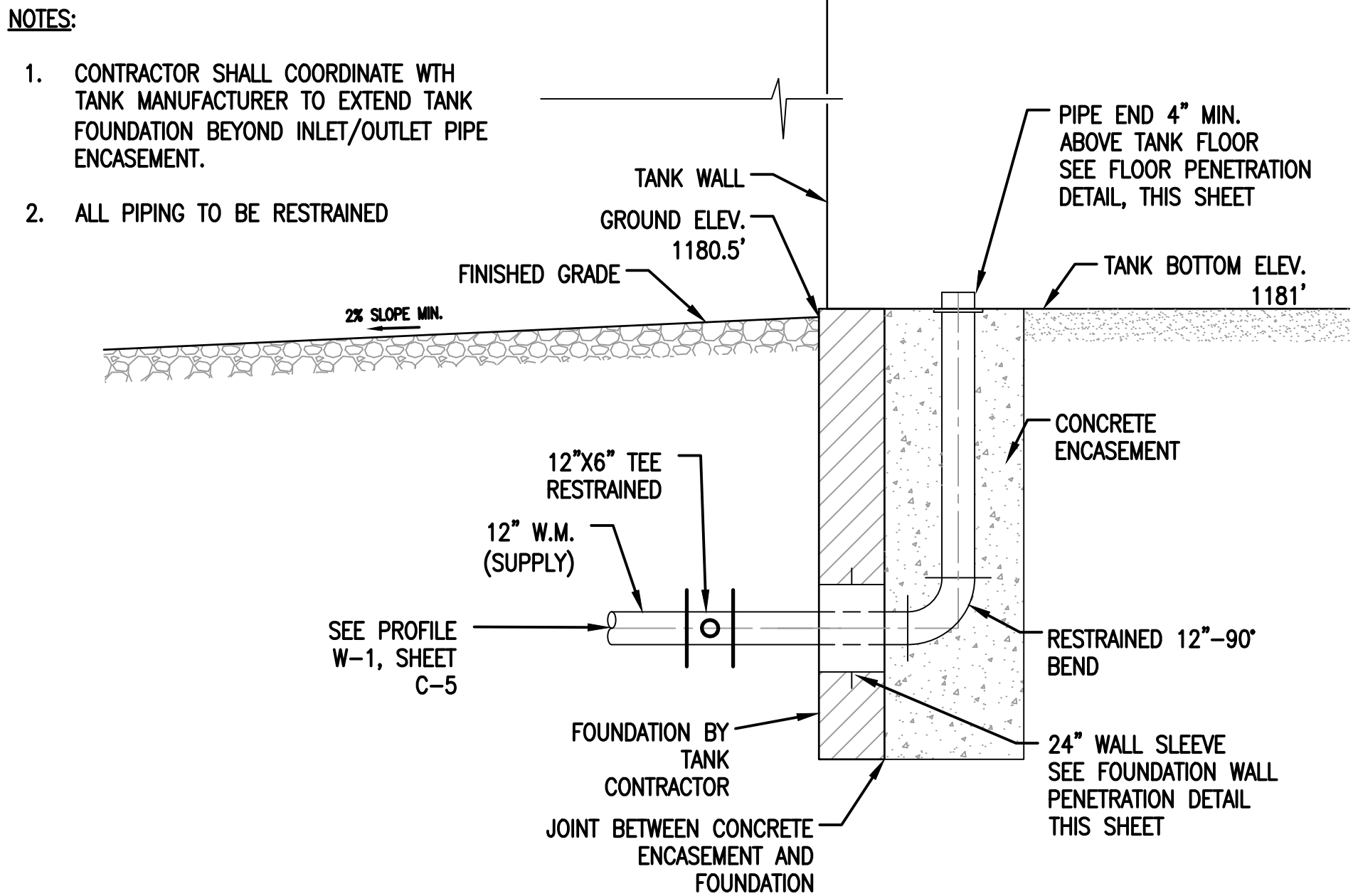
SHELL/ROOF CONDUIT AND CABLE SUPPORT DETAIL
N.T.S.



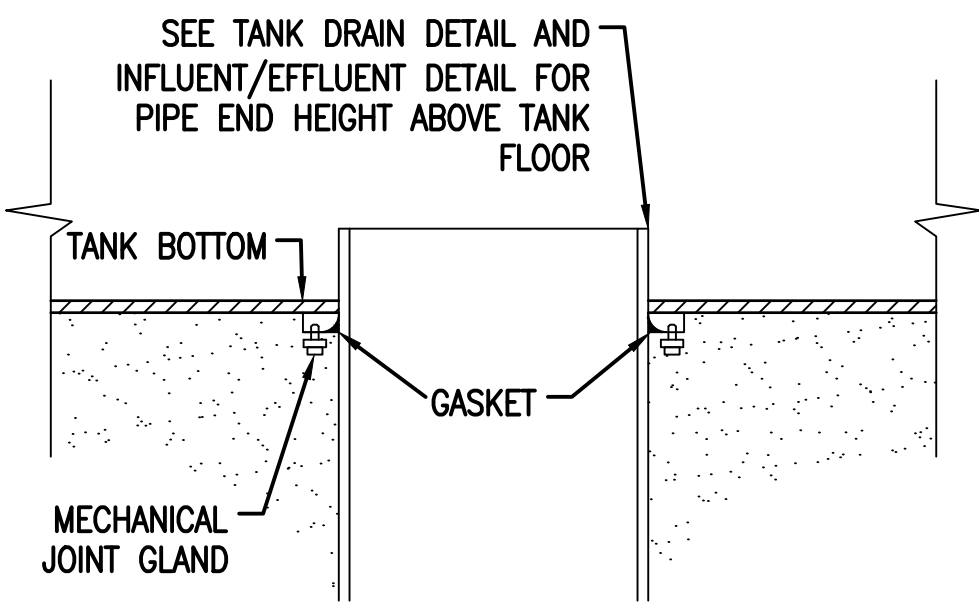
CABLE PENETRATION THROUGH ROOF
N.T.S.



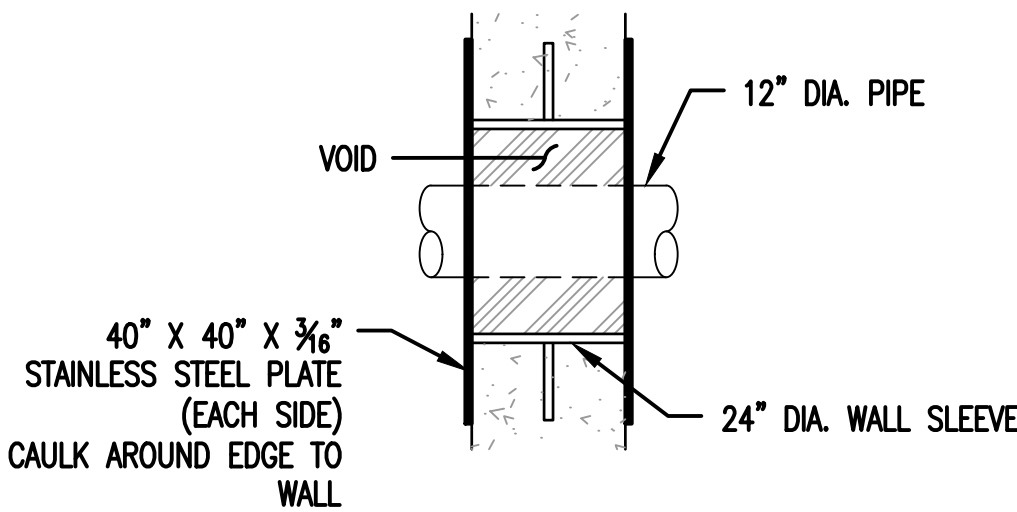
FOUNDATION WALL PENETRATION (6" DRAIN LINE)
N.T.S.



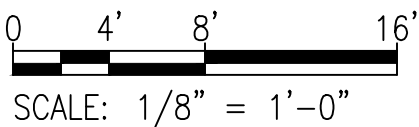
TANK INFLUENT/EFFLUENT PIPING DETAIL
N.T.S.



FLOOR PENETRATION DETAIL
N.T.S.



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



N:\46626-003\CAD\46626003M-02.DWG

NO.	DATE	BY	REVISIONS



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

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 REGULATIONS. 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

- AC AMPERES
- AFF ALTERNATING CURRENT
- AFG ABOVE FINISHED FLOOR
- AHU ABOVE FINISHED GRADE
- AIC AIR HANDLING UNIT
- AL AMPERES INTERRUPTING CAPACITY,
- ANNUN -SYM, RMS, AMPS-
- ANNUN ALUMINUM
- AS ANNUNCIATOR
- ATC AMMETER SWITCH
- ATS AUTOMATIC TEMPERATURE CONTROL
- AUTO AUTOMATIC TRANSFER SWITCH
- AUX AUTOMATIC
- 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
- CKT CABLE RUN NUMBER AS INDICATED.
- COMB CIRCUIT
- CLG COMBINATION
- CP CEILING
- CPT CONTROL PANEL
- CT CONTROL POWER TRANSFORMER
- CU CURRENT TRANSFORMER
- CX COPPER
- CCTV CONNECT TO EXISTING
- DAS CLOSED CIRCUIT TELEVISION
- DC DATA ACQUISITION SYSTEM
- O/D DIRECT CURRENT
- DISC OUT/DOOR
- DN DISCONNECT
- DP DOWN
- DPC DISTRIBUTED PANEL
- DWG DISTRIBUTED PROCESS CONTROLLER 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
- EWI ELECTRICAL WATER HEATER
- EX 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
- NC 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
- RCS 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-SWGR 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

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
- GROUND CONDUCTOR
- HANDHOLE
- UNDERGROUND DUCTBANK
- 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
- GROUNDING CONDUCTOR (BCSD)
- RACEWAY WITH SEALING FITTING

PANELBOARDS

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

MISCELLANEOUS

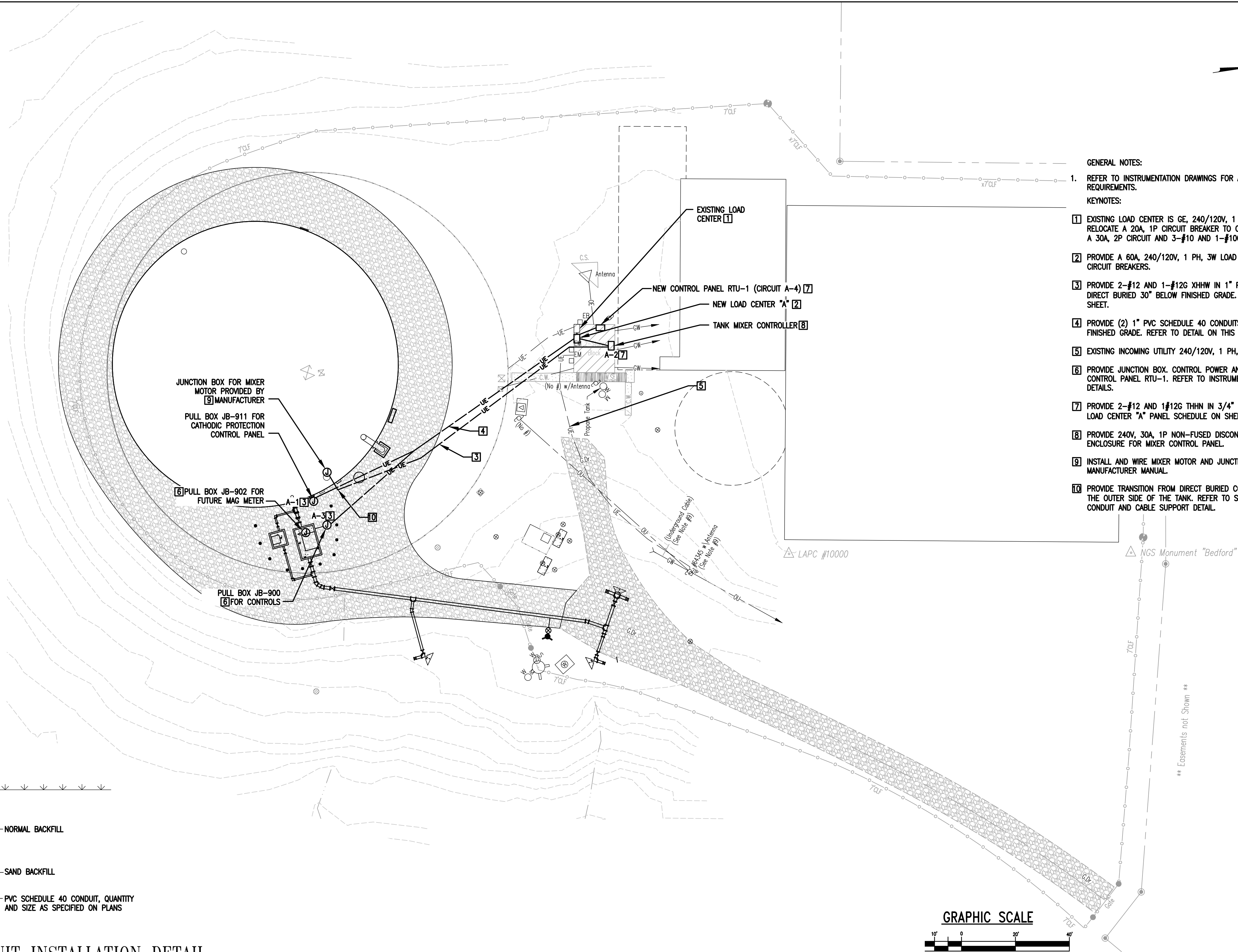
- SPECIFIC NOTE NUMBER
- FEEDER SIZE

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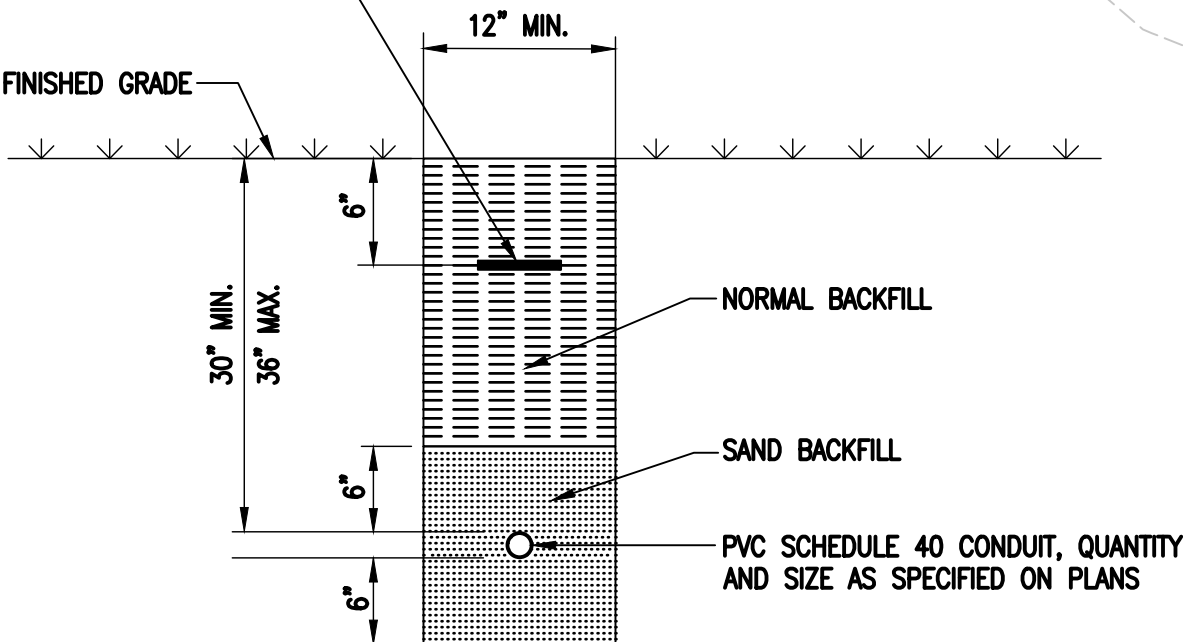


BEDFORD REGIONAL WATER AUTHORITY 1723 FALLING CREEK ROAD, BEDFORD, VA	SHEET 21 OF 30	DRAWING E-1
HELM STREET TANK REPLACEMENT GENERAL NOTES, DEFINITIONS, ABBREVIATIONS AND LEGEND		



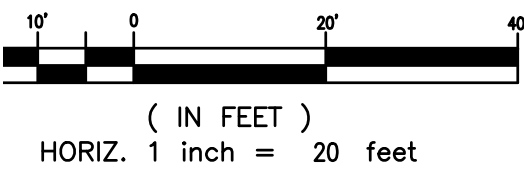
- GENERAL NOTES:
1. REFER TO INSTRUMENTATION DRAWINGS FOR ADDITIONAL CONDUIT REQUIREMENTS.
- KEYNOTES:
- [1] EXISTING LOAD CENTER IS GE, 240/120V, 1 PH, 3W. RELOCATE A 20A, 1P CIRCUIT BREAKER TO CREATE A 2P SPACE TO PROVIDE A 30A, 2P CIRCUIT AND 3-#10 AND 1-#10G THHN IN 3/4" RGS CONDUIT.
 - [2] PROVIDE 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.

6" WIDE PLASTIC ELECTRICAL TAPE AS MANUFACTURED BY THE ALLEN SYSTEM, INC., FOR THE FULL LENGTH OF TRENCH TAPE TO BE IMPRINTED WITH WORD "ELECTRIC" AT INTERVALS NOT TO EXCEED 5'-0".



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

GRAPHIC SCALE



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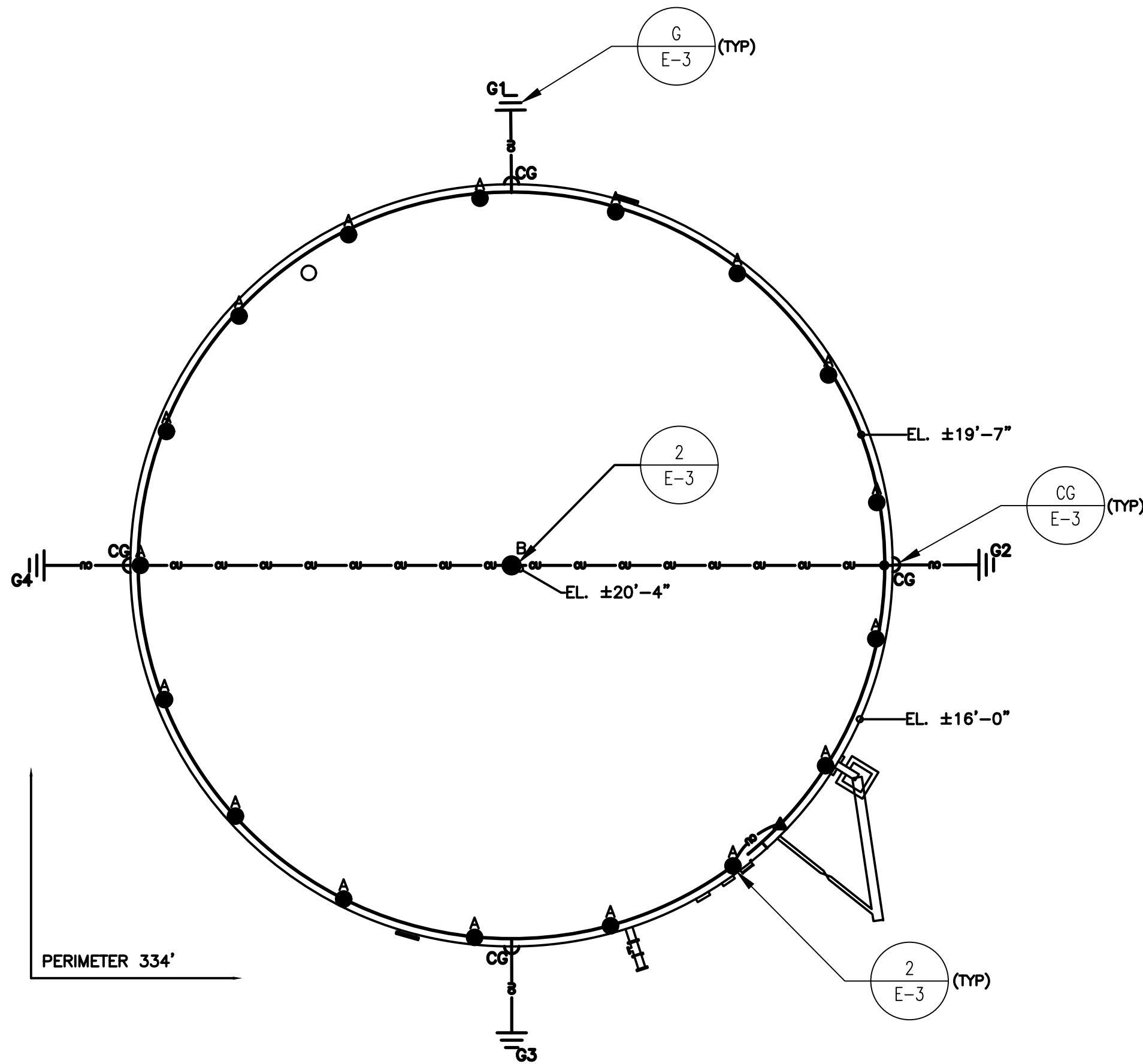
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1700 KRAFT DRIVE, SUITE 1200, BLACKSBURG, VIRGINIA 24060

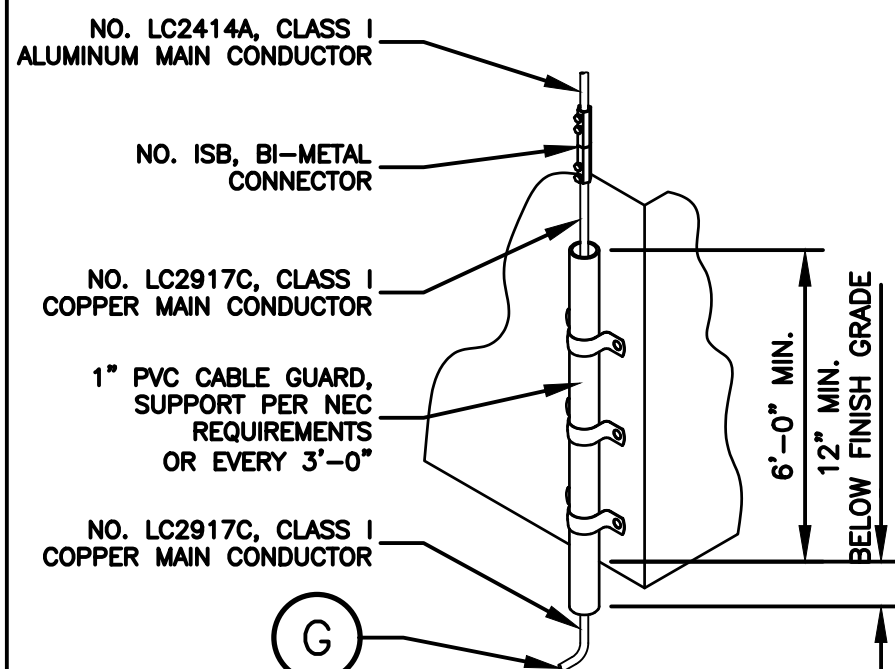


BEDFORD REGIONAL WATER AUTHORITY 1723 FALLING CREEK ROAD, BEDFORD, VA	SHEET <u>22</u>	DRAWING E-2
HELM STREET TANK REPLACEMENT ELECTRICAL SITE PLAN	OF <u>30</u>	



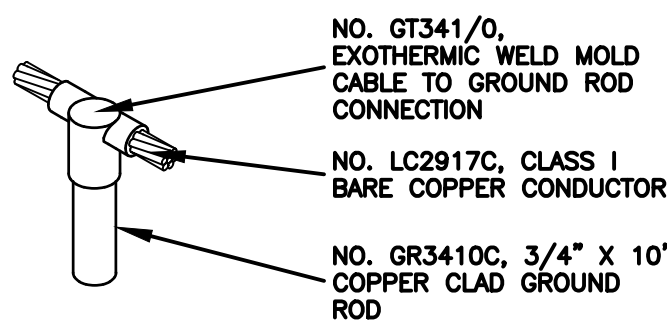
1
E-3
1/6" = 1'-0"

LIGHTNING PROTECTION PLAN



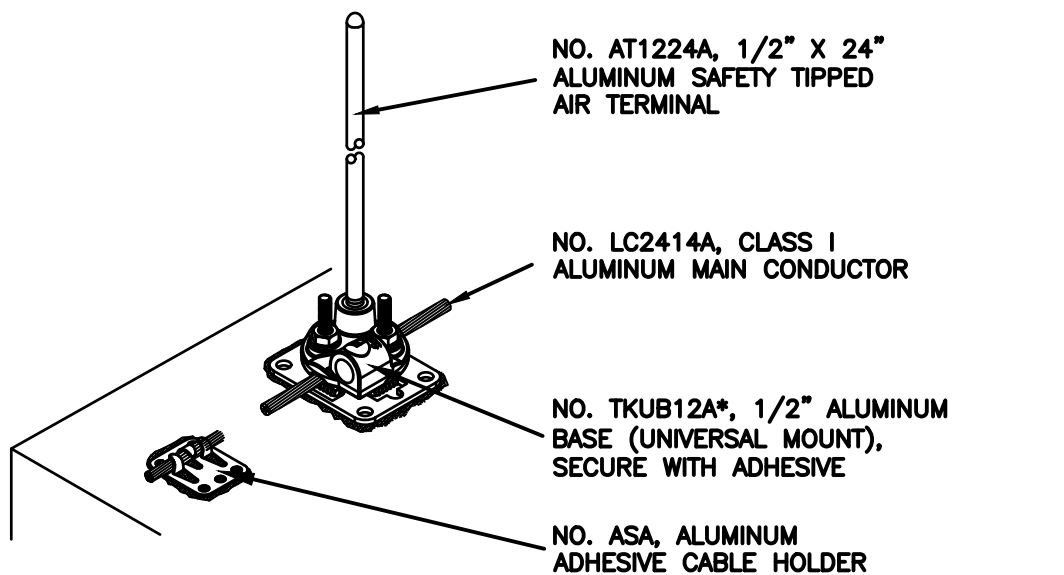
CG
E-3
NOT TO SCALE

PVC CABLE GUARD FOR DOWNLOAD CABLE



G
E-3
NOT TO SCALE

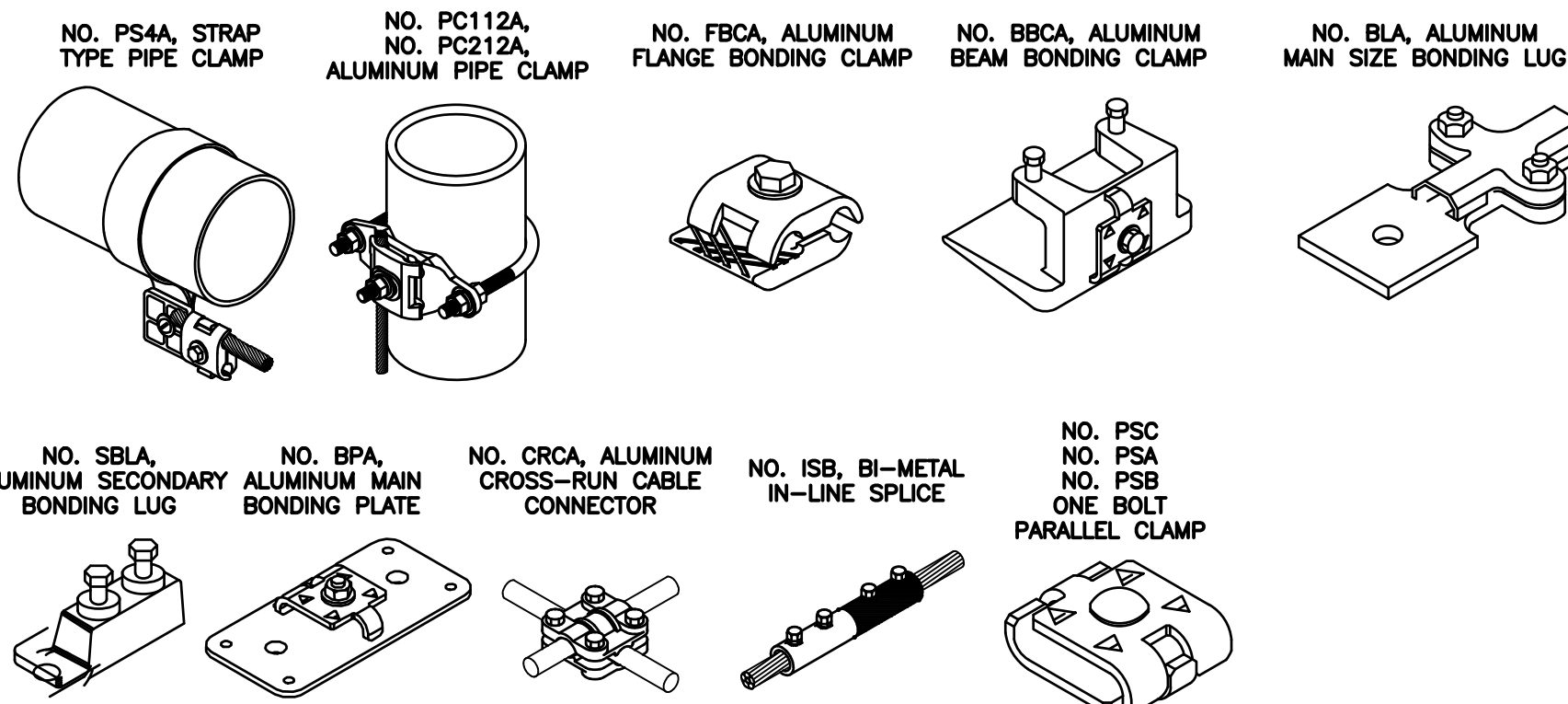
VFCWELD EXOTHERMIC WELD MOLD



* 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
NOT TO SCALE

AIR TERMINAL A AND B DETAIL



3
MISCELLANEOUS

GENERAL CONSTRUCTION NOTES

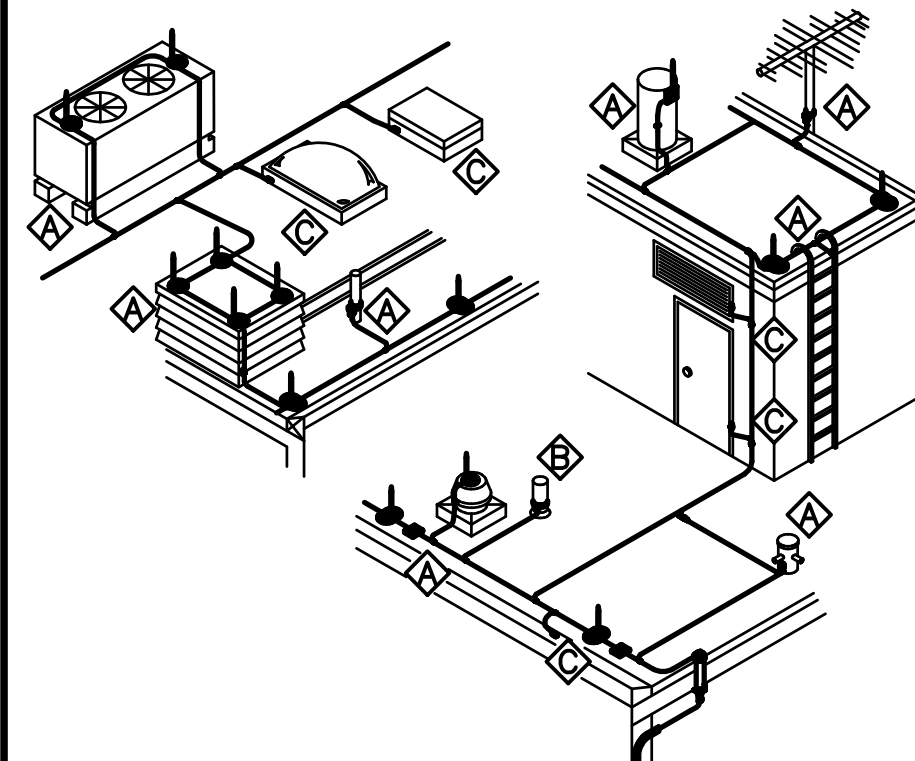
1. THIS DRAWING IS INTENDED FOR USE AS A CONSTRUCTION DOCUMENT. FIELD VERIFY ACTUAL CONDITIONS PRIOR TO CONSTRUCTION. CONTACT VFC, TO CLARIFY ANY DISCREPANCIES.

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.

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

HELM STREET TANK REPLACEMENT
LIGHTNING PROTECTION PLAN

SHEET

23

OF

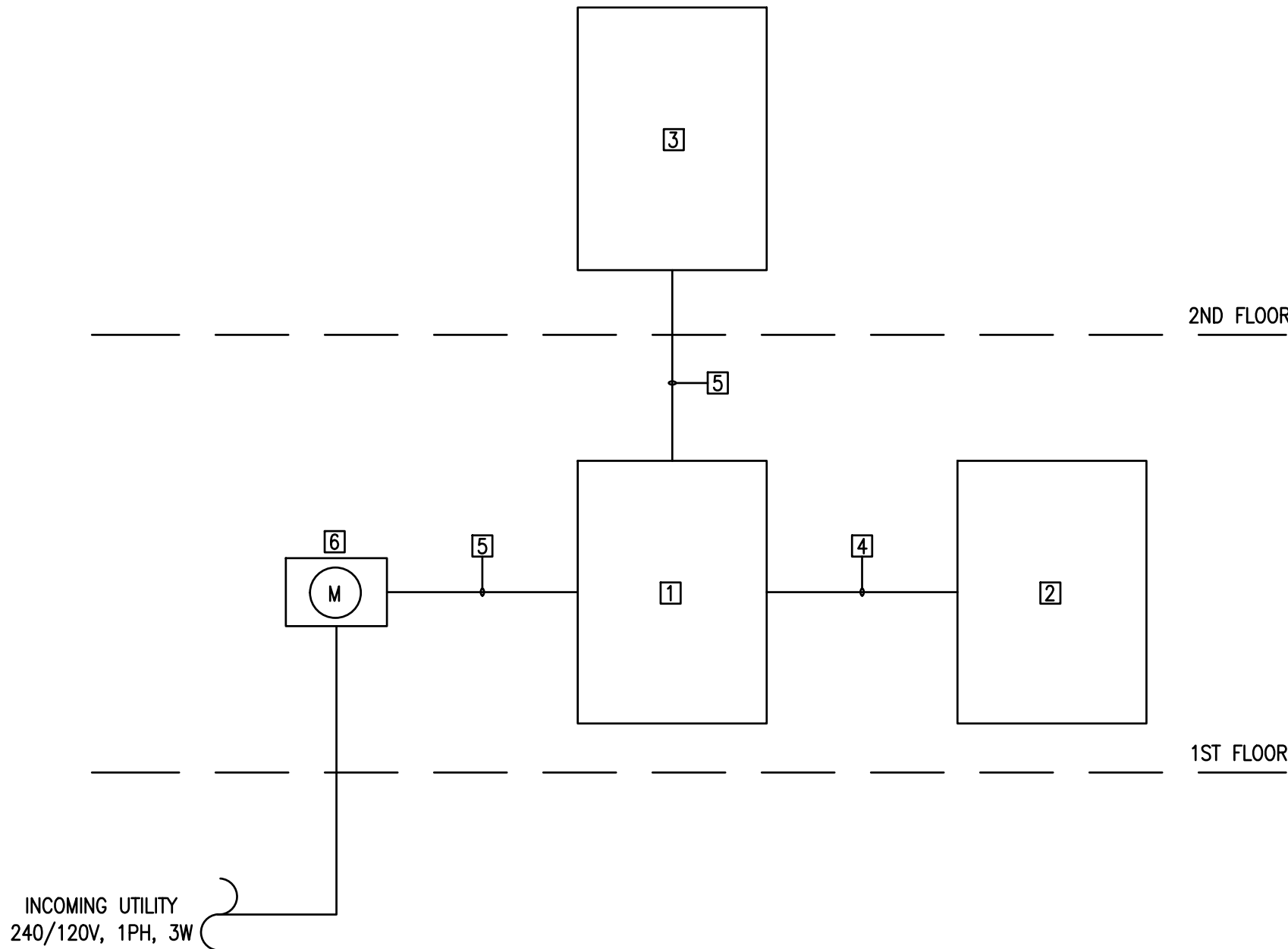
30

DRAWING

E-3

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NO.	DATE	BY	REVISIONS



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			CKT. NO.	CKT. NO.	CIRCUIT BRKR			LOAD SERVED	
	FRAME	TRIP	P			P	TRIP	FRAME		
CATHODIC PROTECTION CONTROL PNL	100	20	1	1	2	1	20	100	TANK MIXER CONTROLLER	
CHLORINE HEAT TAPE	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			CKT. NO.	CKT. NO.	CIRCUIT BRKR			LOAD SERVED	
	FRAME	TRIP	P			P	TRIP	FRAME		
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			CKT. NO.	CKT. NO.	CIRCUIT BRKR			LOAD SERVED	
	FRAME	TRIP	P			P	TRIP	FRAME		
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	
				-	-	-	-	-	-	
EXISTING LOAD	100	20	1	1	-	-	-	-	-	

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:

NOTE: WIRE SIZES LISTED ARE MINIMUM REQUIREMENTS

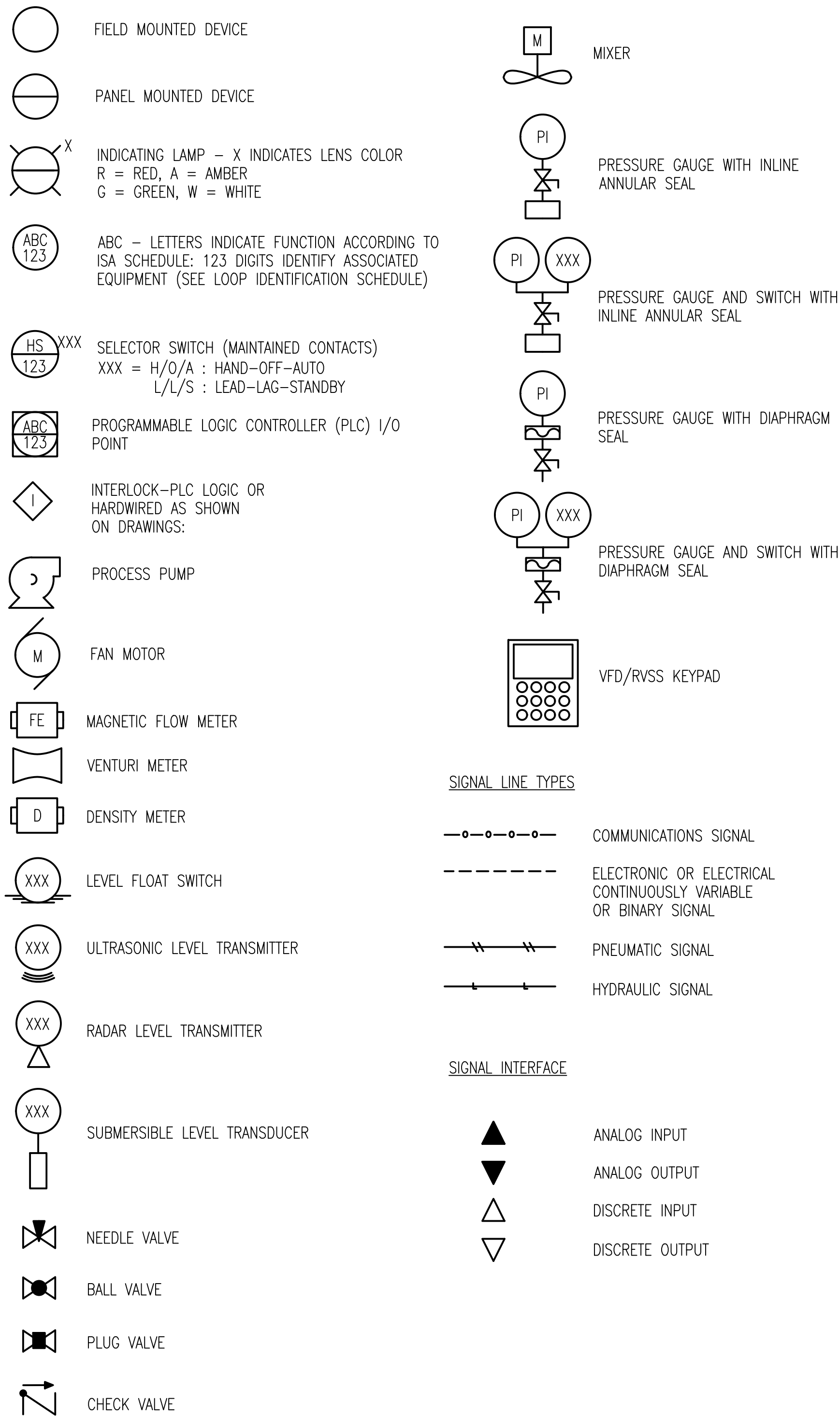
A/C	=	AIR CONDITIONING
AI	=	ANALOG INPUT
AMP	=	AMPERE
AO	=	ANALOG OUTPUT
AUTO	=	AUTOMATIC
AUX	=	AUXILIARY
ATS	=	AUTOMATIC TRANSFER SWITCH
BMS	=	BUILDING MANAGEMENT SYSTEM
COMM	=	COMMUNICATION
CR	=	CONTROL RELAY
DI	=	DISCRETE INPUT
DO	=	DISCRETE OUTPUT
E-NET	=	ETHERNET
E-STOP	=	EMERGENCY STOP
ETM	=	ELAPSE 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
I/AW	=	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 ACQUISITION
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

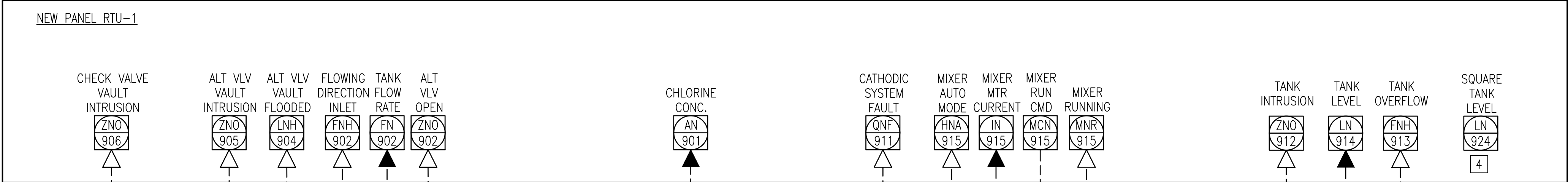
	FIRST LETTER			SUCCEEDING LETTER		
	VARIABLE	MODIFIER		PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS			ALARM		AUTOMATIC
B	BREAKER			USER'S CHOICE		BYPASS
C	COMMUNICATIONS			USER'S CHOICE	CONTROL	CLOSE
D	DENSITY	DIFFERENTIAL			OPEN OR START	
E	VOLTAGE (EMF)			PRIMARY ELEMENT	SENSOR	
F	FLOW RATE	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	

FE	=	FLOW ELEMENT	TSH	=	TEMPERATURE SWITCH HIGH
FI	=	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

N:\46626--003\CADD\46626003J-1 GEN AND ABB.DWG

PROCESS AND INSTRUMENTATION DIAGRAM SYMBOLS



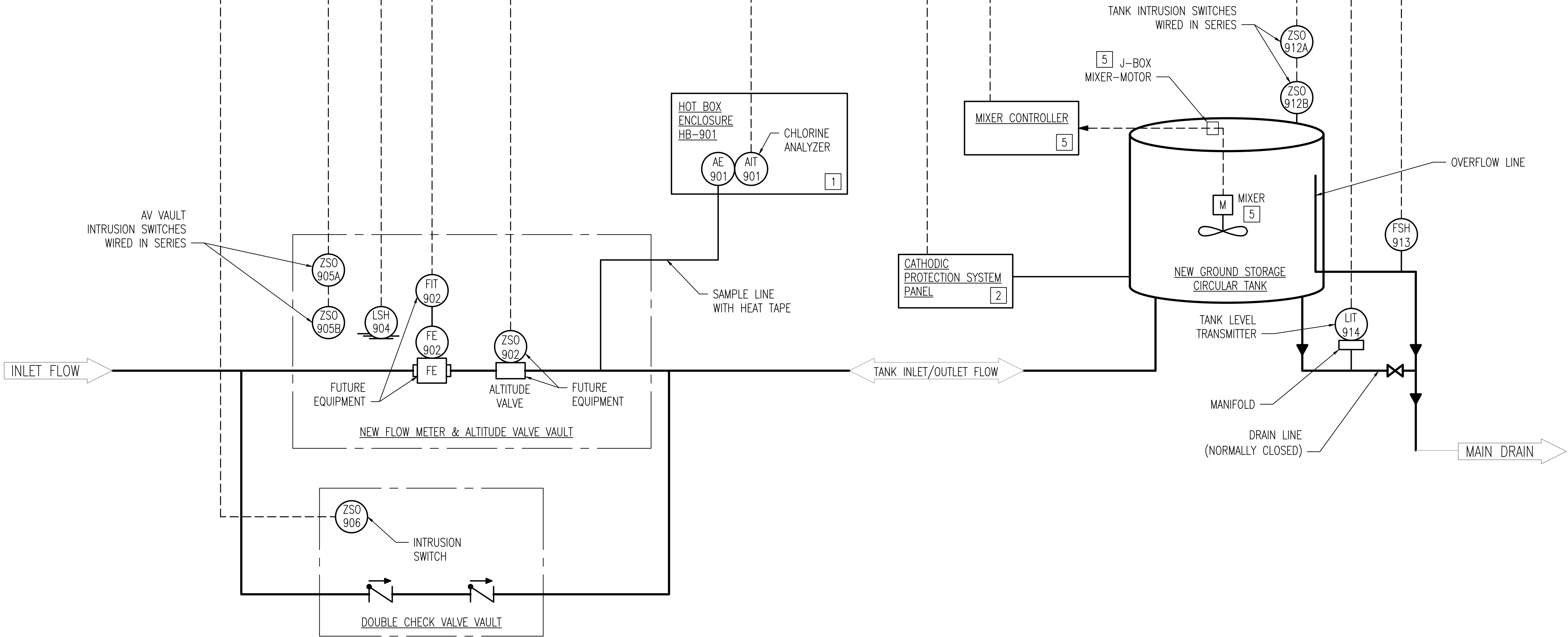


GENERAL NOTES

- SEE I&C SYMBOLS, LEGENDS AND ABBREVIATIONS SHEETS FOR DETAILS.
- 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.
- REFER TO ELECTRICAL & MECHANICAL DRAWINGS FOR ADDITIONAL INSTALLATION, LOCATIONS, AND EQUIPMENT REQUIREMENTS.
- NOT ALL REQUIRED I/O SHOWN FOR CLARITY.
- EXISTING-TO-REMAIN EQUIPMENT SHOWN HALF-TONE. NEW WORK SHOWN BOLD.
- NOT ALL I/O AND DEVICES SHOWN FOR INTERNAL RTU CONTROL LOGIC.
- PROCESS CONNECTION DETAILS NOT SHOWN. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DETAILS.

X SPECIFIC NOTES

- HOT BOX ENCLOSURE AND ACCESSORIES PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
- CATHODIC PROTECTION SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.
- 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.
- 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.
- TANK MIXING SYSTEM PROVIDED BY MANUFACTURER AND INSTALLED BY CONTRACTOR.



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NO.	DATE	BY	REVISIONS



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

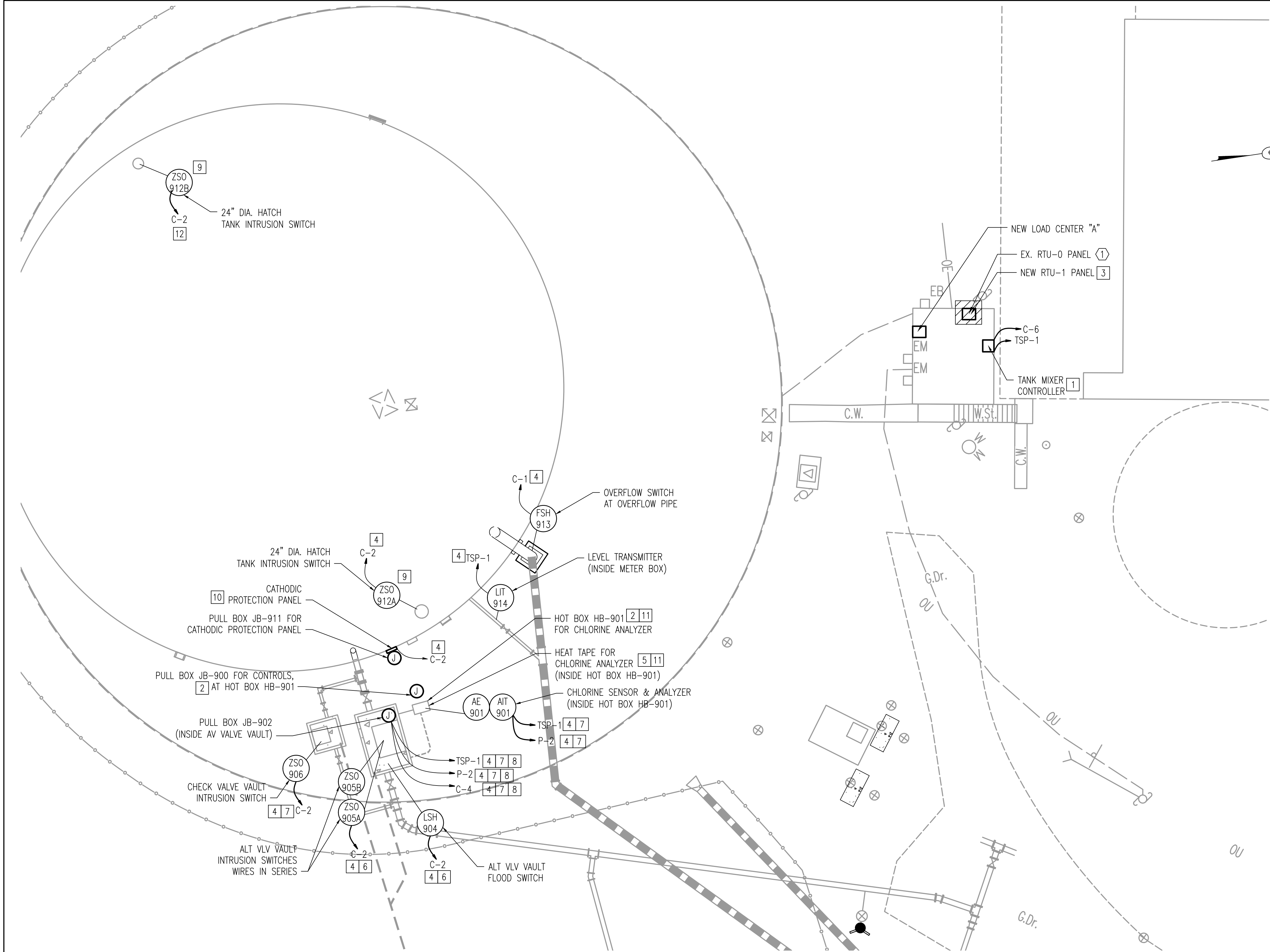
BEDFORD REGIONAL WATER AUTHORITY
1723 FALLING CREEK ROAD, BEDFORD, VA

HELM STREET TANK REPLACEMENT
PROCESS AND INSTRUMENTATION DIAGRAM

SHEET
27
OF
30

DRAWING

I-3



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.

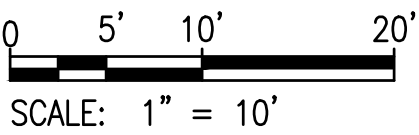
X SPECIFIC NOTES

- 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



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

NO.	DATE	BY	REVISIONS



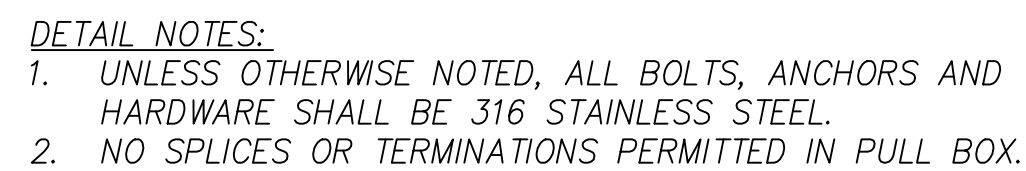
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HORIZ.: N/A
VERT.:
DATE: AUGUST 2023
DESIGNED: HDL
DRAWN: HDL
CHECKED: GAH
PROJECT NO.: 46626-003

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

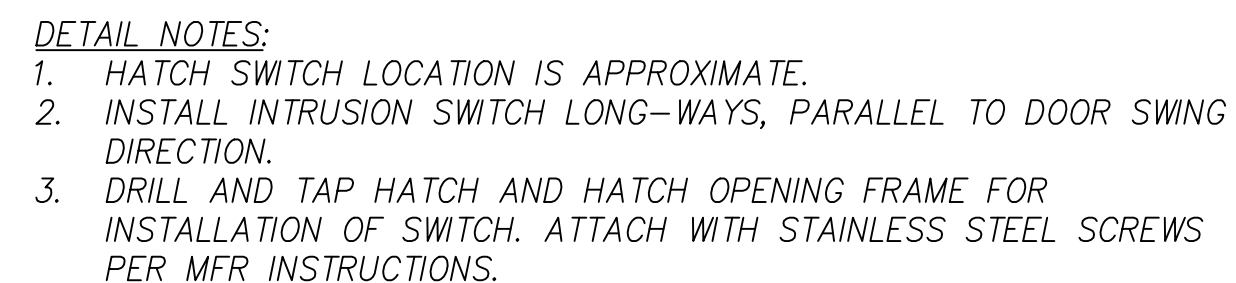
HELM STREET TANK REPLACEMENT
INSTRUMENTATION SITE PLAN

SHEET
29
OF
30

DRAWING
I-5



3 VALVE VAULT FLOOD SWITCH DETAIL
1-6 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

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.

DETAIL NOTES:

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

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.

DRAWING
I-6