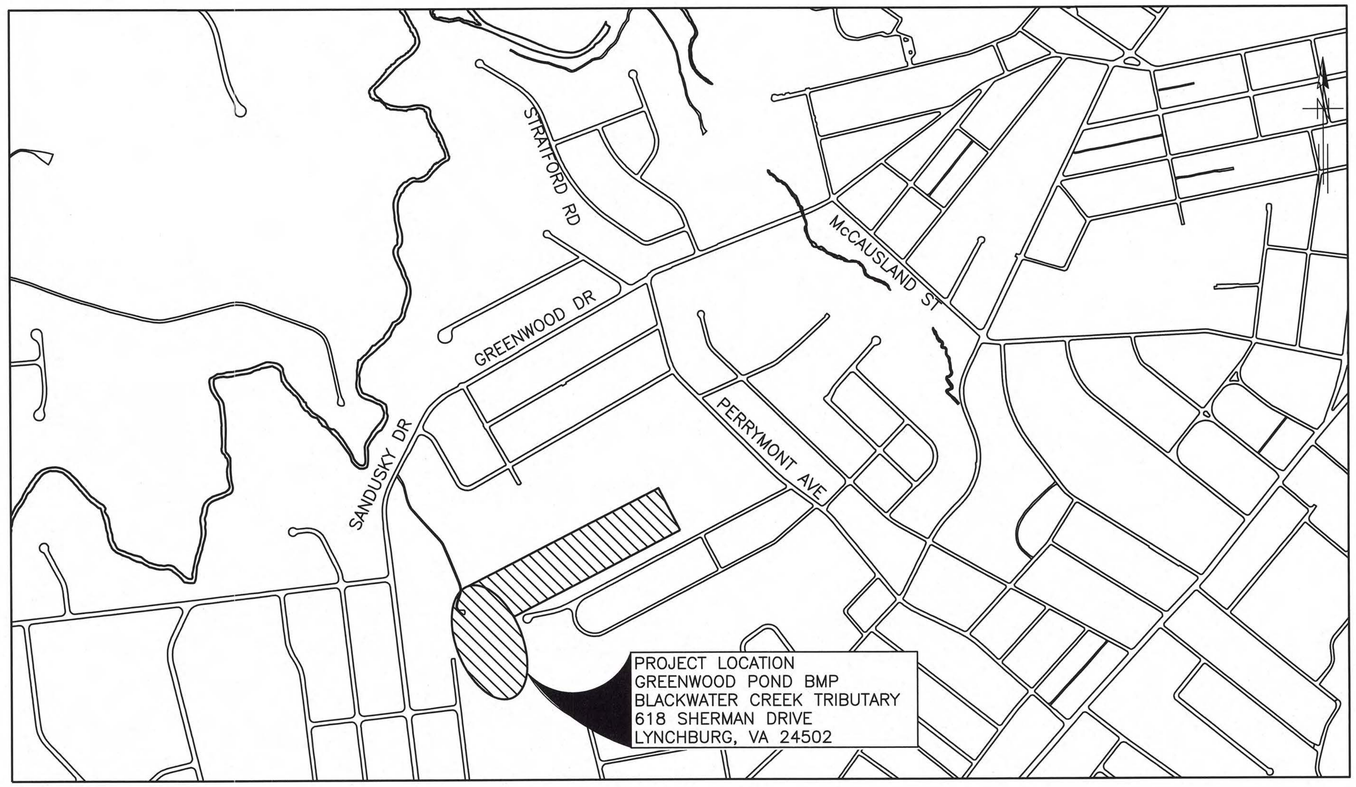
CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES

GREENWOOD POND BMP RETROFIT AND BLACKWATER CREEK TRIBUTARY STREAM RESTORATION



VICINITY MAP

SCALE: 1" = 500'

COMMONWEALTH OF VIRGINIA
LIN LIANG
Lic. No. 041522
10/03/16
PROFESSIONAL ENGINEER

"I HEREBY CERTIFY THAT, TO THE BEST OF MY ABILITY, THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE LATEST CITY OF LYNCHBURG MANUAL OF SPECIFICATIONS AND STANDARD DETAILS AND CITY CODE."

SIGNATURE: _____ REGISTRATION NUMBER: 041522

PRINTED NAME: LIN LIANG DATE: 10/3/2016

TITLE: Associate

"I/WE HEREBY CERTIFY THAT ALL SITE CONSTRUCTION, DRAINAGE AND GRADING WILL BE DONE PURSUANT TO THIS PLAN AND THAT THE APPLICABLE STORMWATER MANAGEMENT CONDITIONS AND REQUIREMENTS OF THE CITY OF LYNCHBURG, THE COMMONWEALTH OF VIRGINIA AND THE FEDERAL GOVERNMENT AND ITS AGENCIES ARE HEREBY MADE PART OF THIS PLAN."

SIGNATURE: _____

PRINTED NAME: _____ DATE: _____

TITLE: _____

CITY ENGINEER: _____ DATE: _____

TRC: _____ DATE: _____

E&S: _____ DATE: _____

CONTACT THE CITY REVIEWER, THE CITY CONSTRUCTION COORDINATOR AND CALL 811 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITY.

GREELEY AND HANSEN

9020 STONY POINT PARKWAY, SUITE 475
RICHMOND, VIRGINIA 23235

OCTOBER 2016

S:\CLIENT\0775_LYNCHBURG\STORM MASTER PLAN 07759\TO 7 SLAF BMP DESIGN\GREENWOOD\21 CADD\21.05 WORKING DWGS\LY9070G00-DSS 2016/10/03 10:06 AM COOPER, BRANDON

DRAWING INDEX

SHEET NUMBER	DRAWING NUMBER	DESCRIPTION
GENERAL		
1	--	COVER
2	AG1	DRAWING INDEX, GENERAL NOTES, AND OVERALL SEQUENCE OF CONSTRUCTION
BLACKWATER CREEK TRIBUTARY STREAM RESTORATION		
3	BC1	EXISTING CONDITIONS PLAN
4	BC2	SITE ACCESS PLAN
5	BC3	GRADING PLAN AND PROFILE
6	BC4	GRADING PLAN AND PROFILE
7	BC5	SEQUENCE OF CONSTRUCTION, MATERIALS, SPECIFICATION ETC.
8	BC6	CONSTRUCTION DETAILS
9	BC7	EROSION AND SEDIMENT CONTROL PLAN
10	BC8	EROSION AND SEDIMENT CONTROL PLAN
11	BC9	EROSION AND SEDIMENT CONTROL NARRATIVE
12	BC10	EROSION AND SEDIMENT CONTROL DETAILS
13	BC11	GEOMETRY PLAN
14	BC12	FLOODPLAIN ANALYSIS
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16	BC14	FLOODPLAIN ANALYSIS SECTIONS
17	BC15	FLOODPLAIN ANALYSIS SECTIONS
18	BC16	DESIGN NARRATIVE
19	BC17	HISTORIC AERIALS
20	BC18	WATERSHED DATA, FEMA DFIRM, AND PARTICLE SIZE DATA
21	BC19	SHEAR STRESS ANALYSIS
22	BL1	PLANTING PLAN
23	BL2	PLANTING PLAN
24	BL3	PLANTING NOTES AND DETAILS
25	BL4	PLANTING SCHEDULE
26	BL5	PLANTING SCHEDULE
GREENWOOD POND BMP RETROFIT		
27	CC1	GENERAL NOTES AND EROSION AND SEDIMENT CONTROL DETAILS AND TABLES
28	CC2	EROSION AND SEDIMENT CONTROL PLAN AND MS-19 CHECKLIST
29	CC3	DRAINAGE AREA PLAN AND STORMWATER CALCULATIONS
30	CC4	NEW SITE PLAN AND PILOT CHANNEL PROFILE
31	CC5	SEQUENCE OF CONSTRUCTION AND DETAILS
32	CC6	CROSS VANE DETAILS
33	CC7	SPILLWAY AND PILOT CHANNEL DETAILS
34	CL1	PLANTING PLAN
35	CL2	DETAILS AND PLANT SCHEDULE

GENERAL NOTES

1. THIS COMBINED PROJECT CONSISTS OF THE RESTORATION OF APPROXIMATELY 850 LF OF HUTTERS CREEK (A TRIBUTARY TO BLACKWATER CREEK) AND THE RETROFIT/CONVERSION OF AN EXISTING STORMWATER MANAGEMENT POND TO A CONSTRUCTED WETLAND.
2. THIS COMBINED PROJECT IS AUTHORIZED BY A PERMIT FROM THE U.S. ARMY CORPS OF ENGINEERS (PERMIT NO. NAO-2015-01256), WHICH INCLUDES A NATIONWIDE PERMIT #27 FOR THE STREAM RESTORATION PROJECT AND A NATIONWIDE PERMIT #43 FOR THE STORMWATER MANAGEMENT POND CONVERSION. THE CONTRACTOR SHALL AT ALL TIMES STRICTLY ADHERE TO THE CONDITIONS OF THE PERMIT.
3. STREAM RESTORATION PROJECT DRAWINGS ARE PROVIDED IN THE "B" SERIES OF DRAWINGS AND STORMWATER POND RETROFIT PROJECT DRAWINGS ARE PROVIDED IN THE "C" SERIES OF DRAWINGS.
4. WITHIN A SERIES OF DRAWINGS, CIVIL DRAWINGS ARE DESIGNATED BY A "C" AND LANDSCAPING DRAWINGS ARE DESIGNATED BY AN "L" (E.G. "BC" DENOTES THE STREAM RESTORATION SERIES CIVIL DRAWING SET, "CL" INDICATES THE STORMWATER MANAGEMENT POND RETROFIT SERIES LANDSCAPING DRAWING SET).
5. EACH SERIES (B & C) HAVE AN INDEPENDENT EROSION AND SEDIMENT CONTROL PLANS, SEQUENCES OF CONSTRUCTION, NOTES, AND OTHER ITEMS. THE CONTRACTOR SHALL ADHERE TO THE PLANS, CONSTRUCTION SEQUENCE, NOTES, AND ANY OTHER ITEMS FROM THE DRAWING SERIES ASSOCIATED WITH THE WORK BEING PERFORMED.

SEQUENCE OF CONSTRUCTION:

1. IN GENERAL, THE CONTRACTOR SHALL SEQUENCE WORK FROM UPSTREAM TO DOWNSTREAM AND FOLLOW THE SEQUENCE OF CONSTRUCTION LAID OUT IN THE STREAM RESTORATION DRAWINGS AND STORMWATER POND RETROFIT DRAWINGS, UNLESS AN ALTERNATIVE SEQUENCE IS APPROVED BY THE CITY'S REPRESENTATIVE.
2. THE CONTRACTOR SHALL PERFORM THE STREAM RESTORATION PROJECT PRIOR TO COMMENCING WORK ON THE STORMWATER POND RETROFIT.
3. THE ONLY WORK ASSOCIATED WITH THE STORMWATER POND RETROFIT THAT WILL BE PERMITTED PRIOR TO THE COMPLETION OF THE STREAM RESTORATION PROJECT IS THE CONSTRUCTION OF THE NEW ACCESS ROAD, SEDIMENT FOREBAY AND EARTHEN EMBANKMENT FOR THE PURPOSES OF ACCESSING THE STREAM RESTORATION PROJECT SITE.
4. THE CONTRACTOR SHALL INSTALL INLET PROTECTION AT THE EXISTING RISER STRUCTURE IN THE STORMWATER MANAGEMENT POND PRIOR TO ANY WORK ON THE STREAM RESTORATION PROJECT.
5. THE CONTRACTOR SHALL DIVERT FLOW AWAY FROM THE WORK AREA. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR BE PERMITTED TO WORK IN WET CONDITIONS.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL FINAL SITE STABILIZATION HAS BEEN ACHIEVED AND THE WORK HAS BEEN REVIEWED AND ACCEPTED BY THE CITY.

GREELEY AND HANSEN
9020 STONY POINT PARKWAY, SUITE 475
RICHMOND, VIRGINIA 23235

DESIGNED BDC
DRAWN DSS
CHECKED LL

APPROVED

NO.	DATE	APPD	REVISION

SCALE

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

GENERAL

DRAWING INDEX, GENERAL NOTES, AND OVERALL SEQUENCE OF CONSTRUCTION

FILE NAME LY9070G01
DWG AG1
SHEET 2 OF 35
DATE OCTOBER 2016 REV 0

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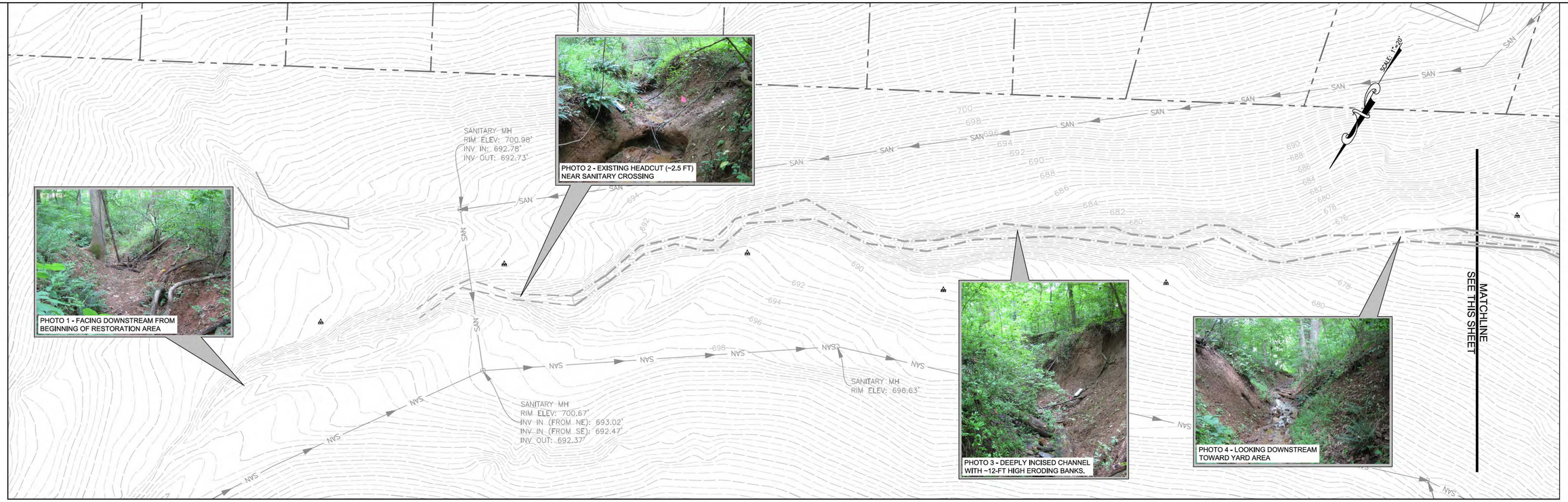
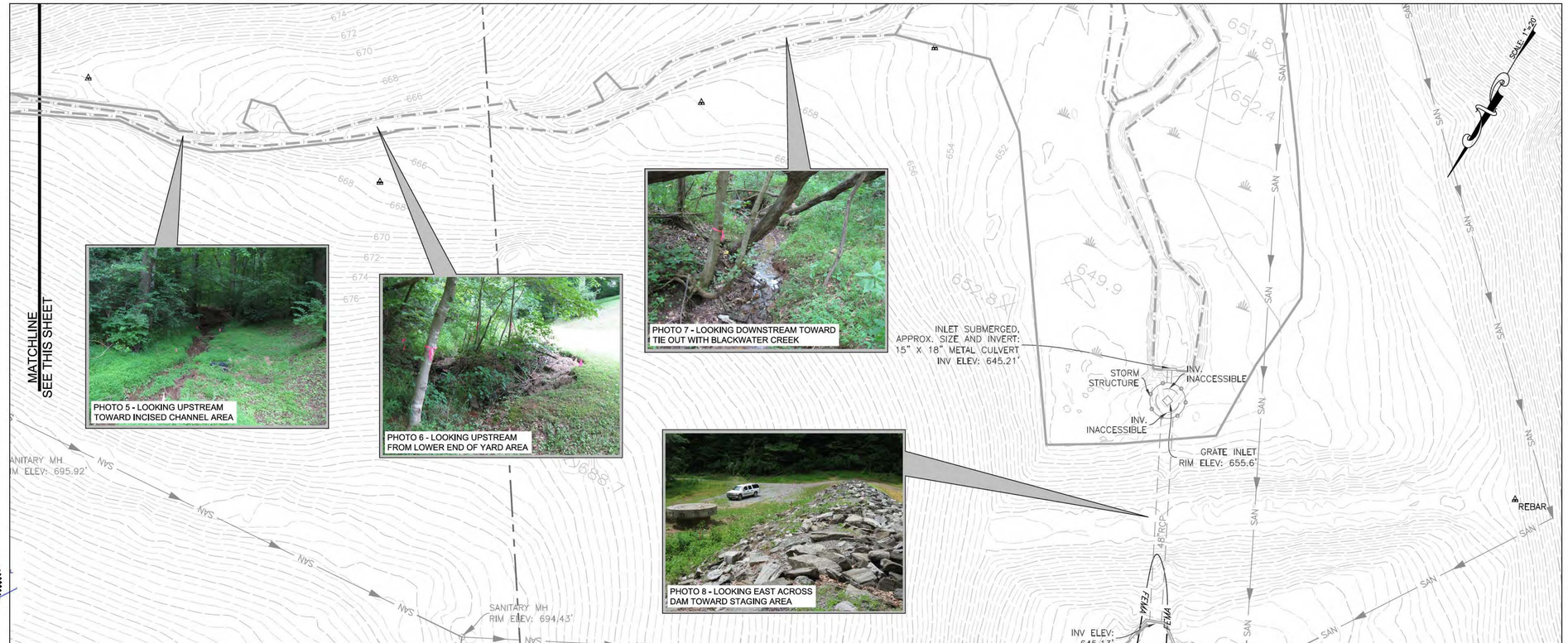


LEGEND

- PARCEL BOUNDARY
- EXISTING EASEMENTS
- EXISTING INFRASTRUCTURE
- EXISTING CONTOURS
- INTERMITTENT STREAM (R4)
- PERENNIAL STREAM (R3)
- SANITARY SEWER
- JURISDICTIONAL WETLANDS



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COMMONWEALTH OF VIRGINIA
FRANK R. GRAZIANO
Lic. No. 032099
10/3/2016
PROFESSIONAL ENGINEER

GREELEY AND HANSEN
9020 STONY POINT PARKWAY, SUITE 475
RICHMOND, VIRGINIA 23235

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DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL
EXISTING CONDITIONS

FILE NAME EXISTING CONDITIONS PLAN
DWG BC1
SHEET 3 OF 35
DATE OCTOBER 2016 REV 0

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ALABAMA AVE

SCALE 1"=40'

ACCESS FROM NEW EARTHEN EMBANKMENT, TO BE CONSTRUCTED AS PART OF POND RETROFIT PLAN. SEE SHEET CC4 FOR ADDITIONAL INFORMATION.

STREAM RESTORATION LOD

STAGING/ STOCKPILE AREA

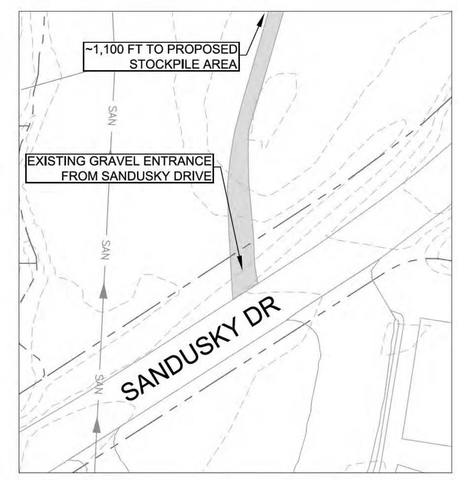
10'-WIDE ACCESS PATH TO FOLLOW EXISTING CHANNEL. EXACT PATH LOCATION TO BE FIELD-ADJUSTED TO AVOID HIGH VALUE TREES.

ALTERNATE ACCESS PATH, SUBJECT TO GEOTECHNICAL EVALUATION OF EMBANKMENT

STAGING/ STOCKPILE AREA

ADDITIONAL STAGING/ STOCKPILE AREA MAY BE PROPOSED DOWNSTREAM OF EXISTING POND EMBANKMENT

SITE ACCESS VIA EXISTING GRAVEL ACCESS ROAD FROM SANDUSKY DRIVE.



COMMONWEALTH OF VIRGINIA
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NO.	DATE	APPD	REVISION

SCALE
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SCALE: 1"=40'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

SITE ACCESS PLAN

FILE NAME EXISTING CONDITIONS PLAN
DWG BC2
SHEET 4 OF 35
DATE OCTOBER 2016 REV 0

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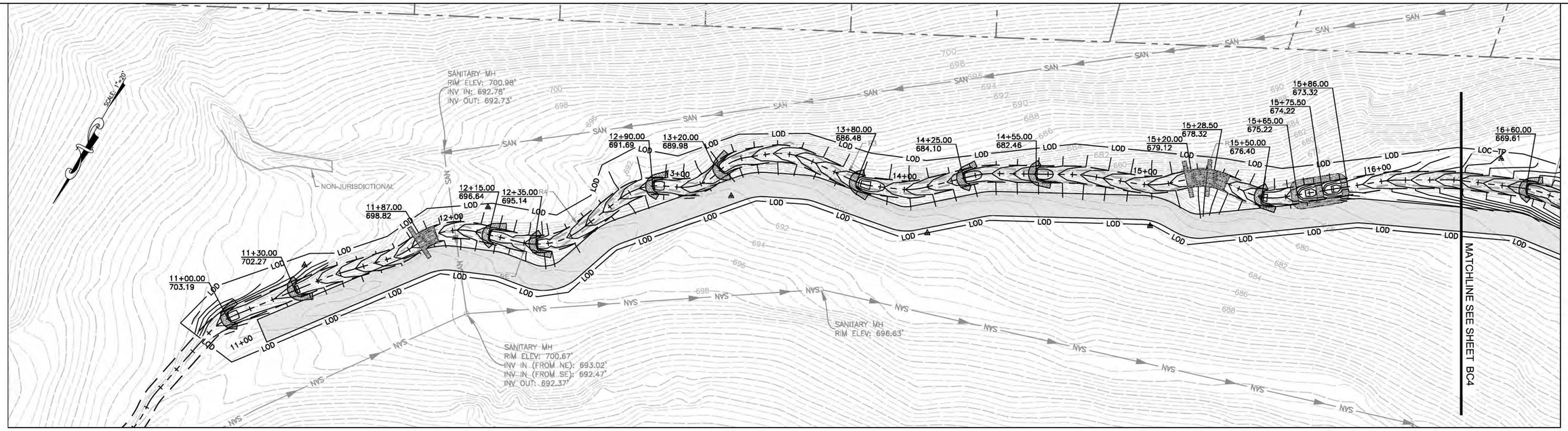
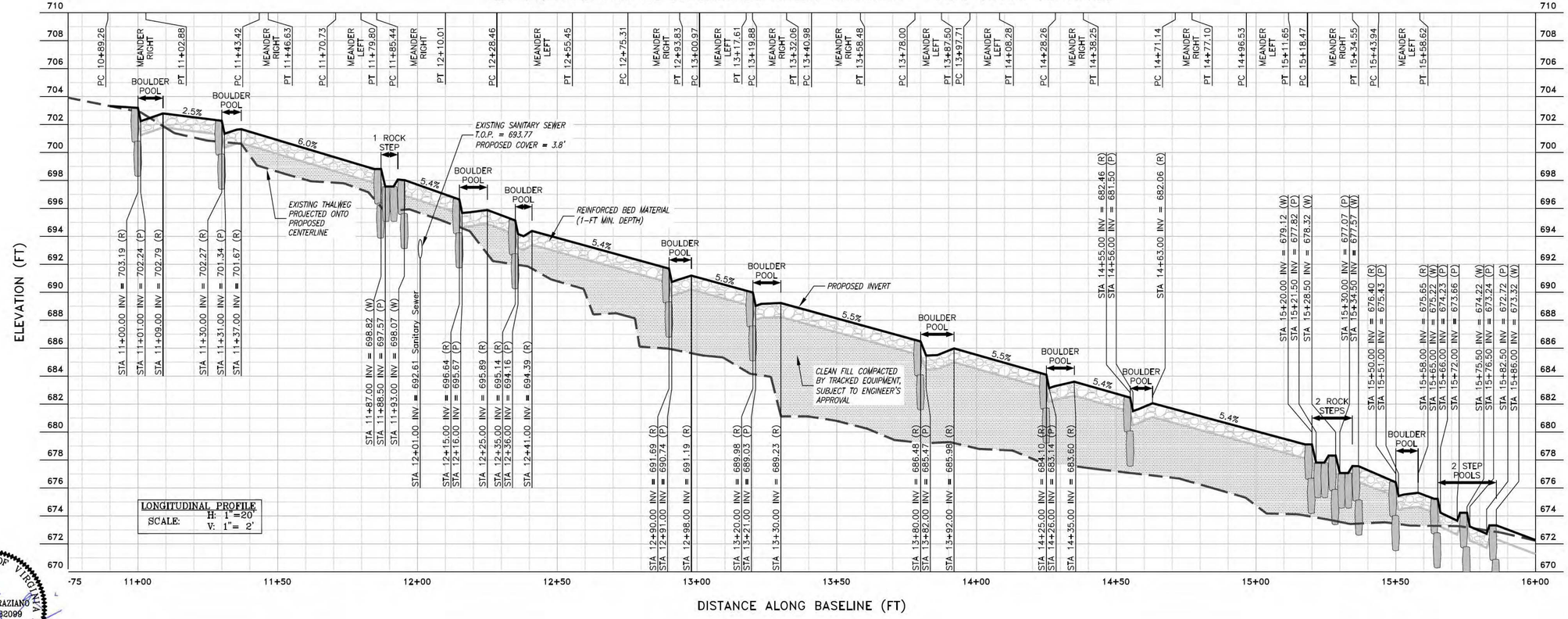


SEE NEXT SHEET FOR
GRADING PLAN LEGEND

LONGITUDINAL PROFILE BLACKWATER CREEK TRIBUTARY – STA: 10+75 TO 16+00



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10/3/2016
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GREELEY AND HANSEN
9020 STONY POINT PARKWAY, SUITE 475
RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

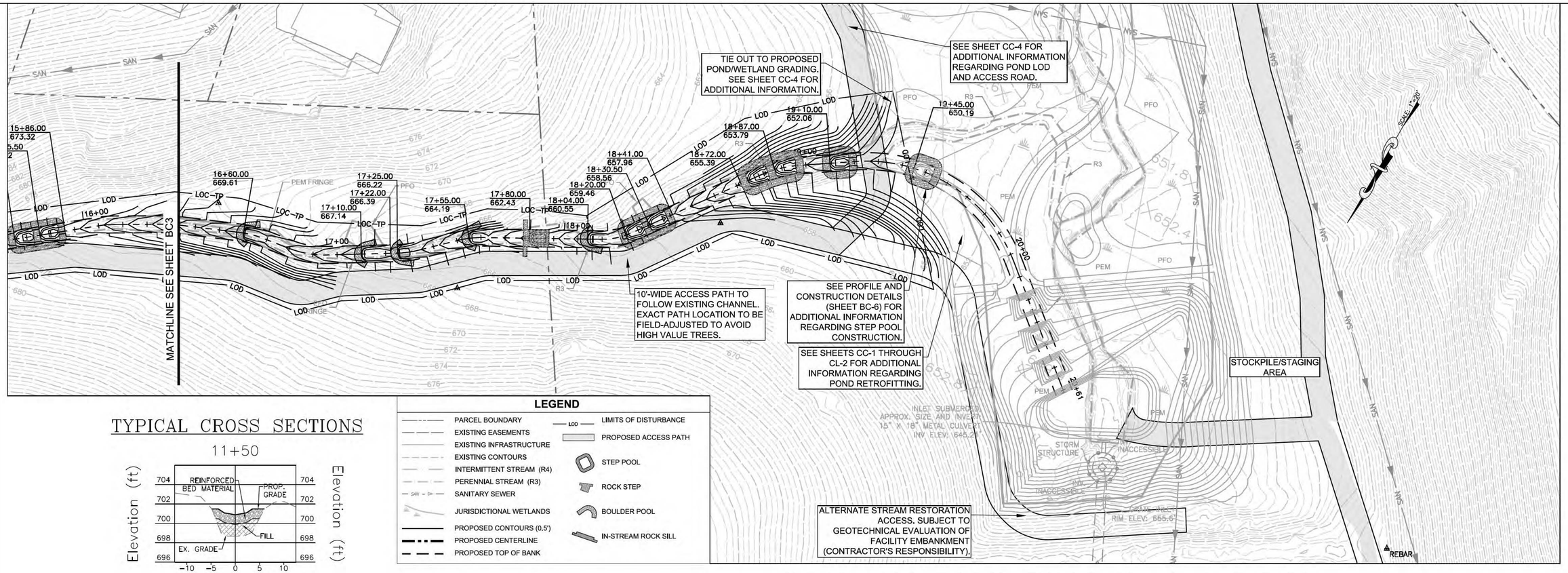
SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

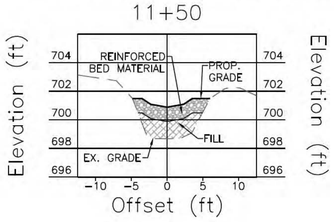
CIVIL

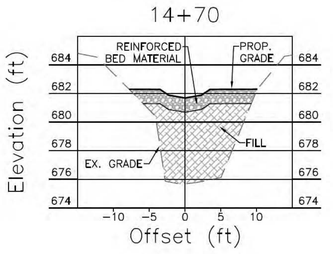
GRADING PLAN AND PROFILE

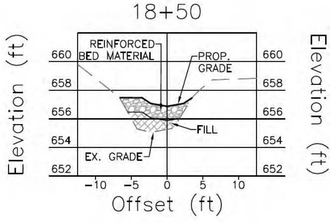
FILE NAME GRADING PLAN & PROFILE
DWG BC3
SHEET 5 OF 35
DATE OCTOBER 2016 REV 0



TYPICAL CROSS SECTIONS



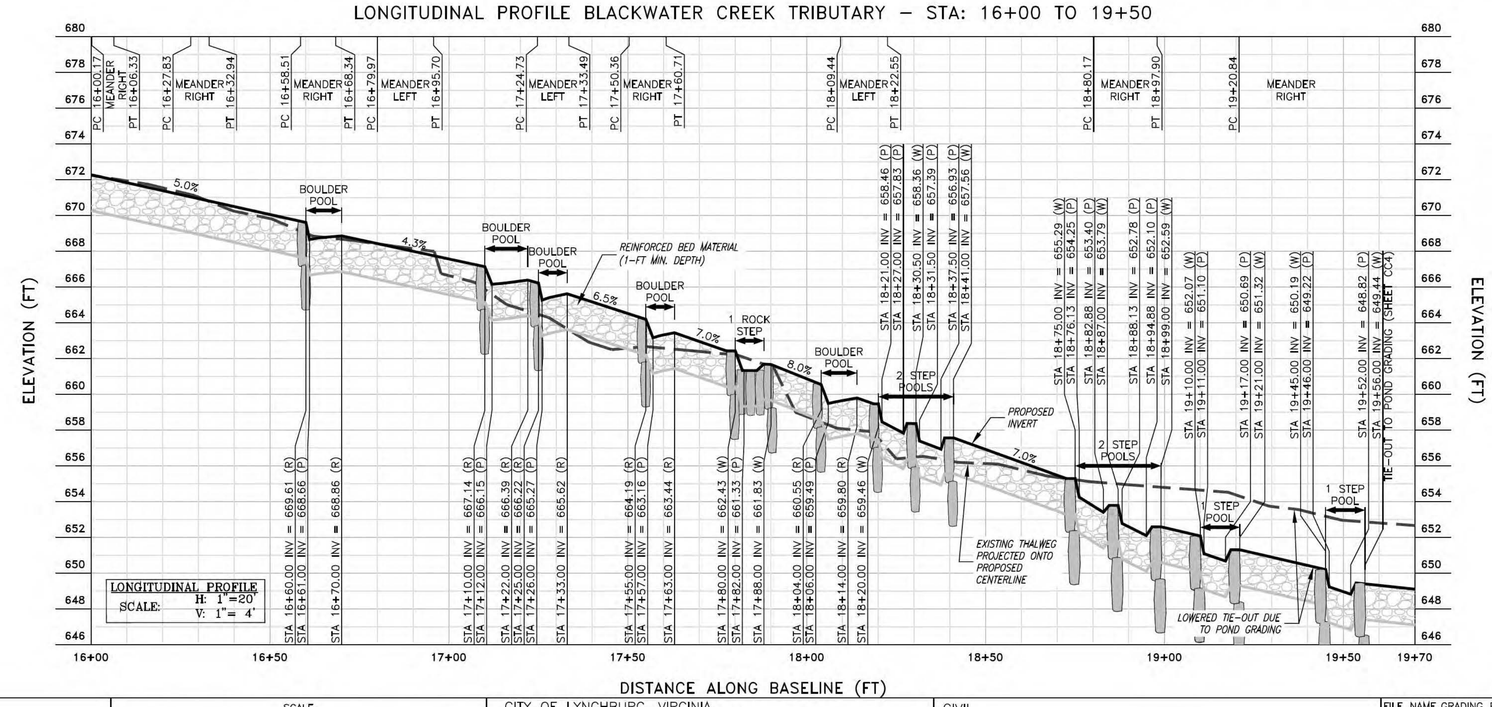




LEGEND

- PARCEL BOUNDARY
- EXISTING EASEMENTS
- EXISTING INFRASTRUCTURE
- EXISTING CONTOURS
- INTERMITTENT STREAM (R4)
- PERENNIAL STREAM (R3)
- SANITARY SEWER
- JURISDICTIONAL WETLANDS
- PROPOSED CONTOURS (0.5')
- PROPOSED CENTERLINE
- PROPOSED TOP OF BANK
- LIMITS OF DISTURBANCE
- PROPOSED ACCESS PATH
- STEP POOL
- ROCK STEP
- BOULDER POOL
- IN-STREAM ROCK SILL

LONGITUDINAL PROFILE BLACKWATER CREEK TRIBUTARY – STA: 16+00 TO 19+50



COMMONWEALTH OF VIRGINIA
FRANK R. GRAZIANO
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10/3/2016
PROFESSIONAL ENGINEER

GREELEY AND HANSEN 9020 STONY POINT PARKWAY, SUITE 475 RICHMOND, VIRGINIA 23235	DESIGNED NAS DRAWN NAS CHECKED FRG	APPROVED	NO. DATE APPD REVISION
SCALE 20 10 0 20 40 60 SCALE: 1"=20'	CITY OF LYNCHBURG, VIRGINIA DEPARTMENT OF WATER RESOURCES GREENWOOD POND BMP RETROFIT AND BLACKWATER CREEK TRIBUTARY STREAM RESTORATION	CIVIL GRADING PLAN AND PROFILE (CONT'D)	FILE NAME GRADING PLAN & PROFILE DWG BC4 SHEET 6 OF 35 DATE OCTOBER 2016 REV 0

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GRADING NOTES

1. PROPOSED CONTOURS ARE INTENDED TO DEPICT OVERALL GRADING CONCEPT. DUE TO IRREGULARITY OF ROCK SHAPES, CONTOURS DEPICTING POOL GRADING WITHIN STRUCTURES ARE APPROXIMATE. SPECIFICATIONS FOR GRADING IN VICINITY OF STRUCTURES ARE PROVIDED IN TYPICAL SECTIONS AND CONSTRUCTION DETAILS. THE SPECIFICATIONS IN THE CONSTRUCTION DETAILS TAKE PRECEDENCE OVER THE CONTOURS DEPICTED ON THE GRADING PLAN.
2. TREE PROTECTION FENCING SHALL BE PLACED AROUND HIGH VALUE TREES PRIOR TO CONSTRUCTION ACTIVITIES, AT THE DIRECTION OF CITY STAFF.
3. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL MARK THE LIMITS OF DISTURBANCE (LOD) WITH FLAGGING AND WALK THE LOD WITH WETLAND STUDIES AND SOLUTIONS, INC. (WSSI) AND CITY STAFF TO ASSESS TREE REMOVAL. DURING THIS PRE-CONSTRUCTION SITE WALK THE LOD SHALL BE ADJUSTED TO MINIMIZE TREE IMPACTS WHILE MAINTAINING ADEQUATE ACCESS AND WORK AREA.
4. REFER TO THE GEOMETRY PLAN FOR TRAVERSE LOCATIONS AND ELEVATIONS.
5. ALL STREAM BEDS REQUIRE 1.0 FT OF REINFORCED BED MATERIAL. FOR CLARITY IN PLANVIEW, IT IS NOT SHOWN IN STREAM BEDS WHERE GRADING IS DEPICTED.
6. CONTRACTOR SHALL SALVAGE SAND AND GRAVEL MATERIAL FROM THE EXISTING STREAM BED MATERIAL AS CONSTRUCTION PROGRESSES DOWNSTREAM, TOP DRESSING REINFORCED BED MATERIAL AS SHOWN ON THE TYPICAL RIFFLE CROSS SECTION.
7. ALL FILL MATERIAL SHALL BE APPROVED BY THE PROJECT ENGINEER ENGINEER. IN THE EVENT THAT SUITABLE FILL MATERIAL IS NOT AVAILABLE ON-SITE, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO IMPORT SUITABLE FILL MATERIAL.
8. ALL PLACED FILL MATERIAL AND REINFORCED BED MATERIAL SHALL BE COMPACTED (TRACKED IN) WITH THE TRACK HOE OR TAMPED WITH THE BUCKET TO A REASONABLE COMPACTION, AS DETERMINED BY THE SITE ENGINEER/CITY INSPECTOR. AVOID OVER COMPACTION THAT MAY PREVENT ROOTING.
9. SIX (6) INCHES OF TOPSOIL SHALL BE PLACED ON ALL GRADED AREAS WITHIN THE LOD, EXCEPT FOR WHERE REINFORCED BED MATERIAL IS INSTALLED.
10. IN-STREAM STRUCTURES SHALL ADHERE TO SPECIFIED TOLERANCES, AS GIVEN ON THIS SHEET.

SEQUENCE OF CONSTRUCTION

1. PRIOR TO THE START OF ANY EARTH DISTURBANCE AN ON-SITE PRE-CONSTRUCTION MEETING SHALL BE HELD TO ENSURE THAT ALL AFFECTED PARTIES (DESIGN ENGINEER, CONTRACTOR, CITY STAFF, OWNER, AND PROJECT MANAGER) FULLY UNDERSTAND THE CONSTRUCTION SEQUENCING. THE CONTRACTOR SHALL MARK THE LOD WITH FLAGGING PRIOR TO THIS MEETING. ORANGE SAFETY FENCE SHALL BE USED TO DEFINE PROJECT BOUNDARIES, AT THE DISCRETION OF CITY STAFF.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING MISS UTILITY AT 1-800-552-7001 FOR THE LOCATION OF ALL PUBLIC AND PRIVATE UTILITY LINES, PIPES, CABLES, AND ASSOCIATED FEATURES PRIOR TO ANY CONSTRUCTION WORK; ALL UTILITIES SHALL BE CLEARLY IDENTIFIED PRIOR TO CONSTRUCTION.
3. PRIOR TO ANY EARTH DISTURBING ACTIVITIES ALL NECESSARY EROSION AND SEDIMENT CONTROL MEASURES AND DEVICES SHALL BE INSTALLED AS SPECIFIED ON THE EROSION & SEDIMENT CONTROL PLAN SHEETS, AND INSPECTED AND APPROVED BY THE CITY INSPECTOR. NOTE: ENTRANCE AND ACCESS AROUND THE EXISTING STORMWATER POND TO BE CONSTRUCTED PER *GREENWOOD POND BMP RETROFIT PLANS*.
4. NO IN-STREAM WORK SHALL BEGIN UNTIL THE SPECIFIED STABILIZATION SEED MIXES AND NATURAL FIBER EROSION CONTROL MATTING ARE ON SITE.
5. PRIOR TO ANY EARTH DISTURBING ACTIVITIES THE TEMPORARY CONSTRUCTION ACCESS ROAD SHALL BE INSTALLED AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN SHEETS AND DETAILS SHEETS OR AS GIVEN ON THE POND GRADING SHEET (CC4).
6. THE LOD SHALL BE REVIEWED ON-SITE WITH THE CONTRACTOR, DESIGN ENGINEER, AND OWNER OR OWNER'S REPRESENTATIVE(S). A DETERMINATION SHALL BE MADE AT THAT TIME REGARDING WHICH TREES WILL BE REMOVED BASED ON THE APPROVED GRADING AND STREAM RESTORATION ACTIVITIES.
7. ADJUSTMENTS MAY BE MADE TO FLAGGING MARKING THE LOD TO ADEQUATELY PROTECT TREES TO BE PRESERVED AND FACILITATE THE SAFE REMOVAL OF TREES TO BE REMOVED. TREE PROTECTION FENCING SHALL BE INSTALLED/ADJUSTED IN CONJUNCTION WITH ANY CHANGES TO THE LOD PRIOR TO THE COMMENCEMENT OF ANY OTHER CONSTRUCTION ACTIVITIES.
8. TREES TO BE REMOVED THAT ARE LOCATED ON THE LOD OR IMMEDIATELY ADJACENT TO THE LOD WITHIN THE PROTECTED AREA SHALL BE REMOVED USING CHAIN SAWS TO MINIMIZE ROOT ZONE DISTURBANCE OR TREES TO BE PRESERVED.
9. STAKE OUT THE NEW STREAM ALIGNMENT AS SHOWN ON THE GEOMETRY PLAN SHEETS. PC AND PT POINTS SHALL BE STAKED ALONG THE CENTERLINE AND AT 25-FOOT OFFSETS, IDENTIFIED BY CORRESPONDING CENTERLINE STATION, ON EACH SIDE OF THE PROPOSED CHANNEL. THE CENTER OF EACH CURVE SHALL BE STAKED AND MARKED WITH THE CORRESPONDING RADIUS OF CURVATURE. VERTICAL CONTROL SHALL BE CLEARLY MARKED AT SEVERAL LOCATIONS ALONG THE PROPOSED CHANNEL.
10. CONSTRUCTION SHALL PROCEED FROM UPSTREAM TO DOWNSTREAM, UNLESS AN ALTERNATIVE SEQUENCE IS APPROVED BY THE FIELD ENGINEER.
11. NO WORK SHALL BE STARTED THAT CANNOT BE COMPLETED AND STABILIZED IN ONE DAY (INCLUDING CLEARING). NATURAL FIBER MATTING AND SEEDING SHALL BE INSTALLED PROGRESSIVELY, IMMEDIATELY FOLLOWING ACHIEVEMENT OF FINAL GRADES. **(NOTE: SEED MUST BE SOWN IMMEDIATELY PRIOR TO MATTING PLACEMENT.)** MATTING SHALL BE STAKED USING BIODEGRADABLE STAKES.
12. EXCAVATE A PORTION OF THE STREAM CHANNEL TO THE SUBGRADE, PLACE REINFORCED BED MATERIAL/STRUCTURE ROC, AS SPECIFIED AND STABILIZE THE AREA AT THE END OF THE DAY OR UPON THREAT OF MEASURABLE RAINFALL(>0.1 INCH).
13. PLACE REINFORCED BED MATERIAL IN THE CHANNEL BOTTOM (SEE THIS SHEET FOR MIXTURE SPECIFICATIONS - THE CONTRACTOR SHALL ENSURE A WELL GRADED MIXTURE PRIOR TO ANY IN-STREAM PLACEMENT. ON-SITE MIXING MAY BE NECESSARY). SALVAGED STREAM BED MATERIAL SHALL BE PLACED ON TOP OF REINFORCED BED MATERIAL AS SHOWN ON THE TYPICAL CROSS SECTION PRESENTED ON THIS SHEET.
14. GRADE THE REMAINING PORTION OF THE CHANNEL AS SHOWN ON THE PLAN. TIE OUT SLOPES SHALL NOT EXCEED 2.5:1.
15. UPON COMPLETION OF WORK, ALL E&S MEASURES ARE TO REMAIN IN PLACE UNTIL FINAL SITE STABILIZATION IS ACHIEVED, WITH THE EXCEPTION OF THE SANDBAG DIKES AND THE PUMP AROUND DIVERSION.

STREAM PROJECT CONSTRUCTION TOLERANCES

RIFFLE:
DEPTH: ±0.2 FT (TOTAL DEPTH AS WELL AS ACTUAL ELEVATION)
WIDTH: ±5% OF DESIGN WIDTH (INCLUDES BOTH TOP WIDTH AND WIDTH AT BASE OF THE TIE-OUT SLOPE.

STEP POOLS/ROCK STEPS:
DESIGN DROP: ±0.1 FT FROM DESIGN
POOL LENGTH/POOL WIDTH: 1.2-1.4
HORIZONTAL LOCATION (ALONG THALWEG): ±1.5 FT FROM DESIGN
LATERAL LOCATION: ±0.5 FT FROM DESIGN

CROSS VANES:
ARM SLOPE : ±2% FROM DESIGN SLOPE (AS LONG AS SLOPE IS BETWEEN 2-7%)
DEFLECTION ANGLE: ±3° FROM DESIGN ANGLE (AS LONG AS BETWEEN 20-30°)
INVERT: ±0.1 FT (ACTUAL ELEVATION)
POOL DEPTH: ±6 IN. (POOL LENGTHS MAY BE "OVER-DUG" UP TO 5 FT)
HORIZONTAL HEAD OF STRUCTURE LOCATION ALONG THALWEG: ±1.5 FT FROM DESIGN LOCATION
LATERAL LOCATION: ±0.5 FT FROM DESIGN LOCATION

NOTE: THE ABOVE TOLERANCES CAN BE ADJUSTED AS NECESSARY TO REFLECT FIELD CONDITIONS, WITH THE PRIOR WRITTEN APPROVAL OF THE DESIGN ENGINEER AND/OR HIS DESIGNATED REPRESENTATIVE IF THE ENGINEER DOES NOT BELIEVE THAT THE DESIGN INTEGRITY AND STABILITY OF THE WORK WILL BE AFFECTED. HOWEVER, ALL POINTS WITHIN A GIVEN STRUCTURE (STEP POOL, ROCK STEP, OR CROSS VANE) MUST BE SHIFTED EQUALLY TO MAINTAIN DIMENSIONAL INTEGRITY. ANY SUCH CHANGE MUST BE NOTED ON THE AS-BUILT DRAWING, INCLUDING THE JUSTIFICATION FOR THE CHANGE.

"REINFORCED BED"[1] MIXTURE SPECIFICATIONS

THE REINFORCED BED MIXTURE SPECIFIED BELOW MUST BE APPROVED BY THE PROJECT ENGINEER PRIOR TO BEING PLACED IN THE STREAM CHANNEL.

MATERIAL	SIZE (D_{50})	PORTION	PERCENT (%)
ROCK[2]	6.7 in (277 mm)	2 BUCKETS	35 - 40%
BANK RUN[3] GRAVEL	0.08 - 2.5 in (2 - 64 mm)	2 BUCKETS	35 - 40%
COARSE SAND[4]	0.04 - 0.08 in (1 - 2 mm)	0.75 BUCKET	12 - 17%
TOPSOIL[5]	LOAM OR SILT LOAM WITH 3-5% ORGANIC CONTENT	0.5 BUCKET	7 - 12%

[1] THE REINFORCED BED SHALL BE A MINIMUM OF **1.0'** IN DEPTH. PORTIONS OF THE STREAM WITH SLOPES GREATER THAN 2.0% SHALL HAVE A MINIMUM REINFORCED BED MATERIAL THICKNESS OF 1.5X THE ROCK FRACTION D_{50}. SEE LONGITUDINAL PROFILE FOR LOCATIONS AND THICKNESS.

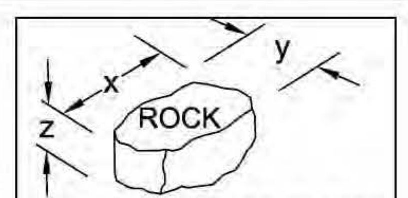
[2] THE ROCK PORTION OF THE MIXTURE SHALL CONSIST OF RIVER COBBLE (MIN. ALLOWABLE D_{50} = 8 INCHES) OF COLOR WHITE, TAN, YELLOW, OR BROWN. THE VOIDS WILL BE FILLED WITH A MIXTURE OF SAND, GRAVEL, AND TOPSOIL. THIS COMPOSITION WILL RESULT IN A VERY RESISTANT, ARMORED SUBSTRATE THAT WILL BE CAPABLE OF WITHSTANDING MUCH GREATER SHEAR STRESS THAN THE COMPUTATION OF THE REQUIRED D_{50} WOULD SUGGEST. CLASS A1 RIPRAP SHALL BE AN ACCEPTABLE ALTERNATE, SUBJECT TO CITY APPROVAL, AS LONG AS IT MEETS THE SPECIFIED SIZE REQUIREMENTS.

[3] BANK RUN GRAVEL MAY INCLUDE UP TO 5% CLAY, SILT, AND/OR SAND, AND UP TO 25% COBBLE (D_{50} = 3" TO 8"). GRAVEL MUST HAVE NATURAL COLOR (WHITE, TAN, YELLOW, OR BROWN).

[4] THE SAND PORTION OF THE MIXTURE SHALL CONSIST OF A WELL MIXED SAND PREDOMINANTLY 1.0 MILLIMETERS TO 2.0 MILLIMETERS IN SIZE, SUBJECT TO ENGINEER APPROVAL (I.E. WASHED CONCRETE SAND IS NOT REQUIRED). SAND MUST BE WHITE, TAN, YELLOW, OR BROWN IN COLOR.

[5] THE TOPSOIL PORTION OF THE MIXTURE SHALL CONSIST OF 50% SIFTED, UNWASHED COARSE SAND (WITH FINES ALLOWED), 25% COMPOSTED LEAF/BARK MULCH, 25% MINERAL SILT OR FINER MATERIAL (STONE DUST FROM ROCK CRUSHING OPERATIONS OR ANY SILT/CLAY).

STRUCTURE NOTES



3 PRIMARY DIMENSIONS OF ROCK:
x = LONGEST DIMENSION
y = INTERMEDIATE DIMENSION
z = SHORTEST DIMENSION

1. HEADER AND FOOTER ROCKS SHALL HAVE AN INTERMEDIATE DIMENSION OF AT LEAST **24 INCHES.**
2. IF THE STREAM IS NARROW, THE VANE HEADER ROCKS MAY BE CONFIGURED TO TAKE THE PLACE OF THE CENTER HEADER ROCK AS LONG AS ALL DIMENSIONS OF THE STRUCTURE ARE MAINTAINED.
3. THE SILL ROCKS SHALL HAVE AN INTERMEDIATE DIMENSION OF AT LEAST **12 INCHES.** REFER TO TYPICAL CROSS-SECTION DETAILS FOR PLACEMENT OF COIR FABRIC ALONG THE STREAM.
4. TOP OF FRONT HEADER ROCK (S) SHALL BE PLACED AT PROPOSED STREAMBED INVERT.
5. BACKFILL BETWEEN VANES AND BANKS WITH SUBSTRATE MATERIAL USED IN CHANNEL.
6. STRUCTURE SHALL BE UNDERLAIN WITH WOVEN OR NON-WOVEN POLYPROPYLENE GEOTEXTILE. FABRIC SHALL HAVE PUNCTURE RESISTANCE GREATER THAN 100 LBS, APPARENT OPENING SIZE GREATER THAN U.S. 70 SIEVE, AND 30 LBS. OF TENSILE STRENGTH AT 20% (MAXIMUM) ELONGATION.
7. ALL FOOTER ROCKS SHALL BE A MINIMUM OF **18 INCHES** BELOW STREAM INVERT. SMALLER ROCKS MAY BE USED, AS APPROVED BY THE FIELD ENGINEER, BUT THIS MAY REQUIRE MORE THAN 2 ROWS OF ROCKS.

MONITORING AND MAINTENANCE

FIRST YEAR: *(CONTRACTOR OBLIGATION)*

1. CONSTRUCTION AND POST-CONSTRUCTION ACTIVITIES SHALL ADHERE TO ALL REQUIREMENTS AS OUTLINED IN FEDERAL, STATE, AND LOCAL PERMITS.
2. THE CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY. THIS SURVEY SHALL INCLUDE, AT A MINIMIMUM, A LONGITUDINAL PROFILE OF THE STREAM CHANNEL, TOP OF BANK SHOTS (LOCATION AND ELEVATION) AT 50-FT (MAX.) SPACING TO CONFIRM DESIGN CHANNEL DEPTH, AND LOCATION OF EVERY STRUCTURE (3-POINTS MIN. INCLUDING INVERT, AND END OF ARMS). GROUND-LEVEL PHOTOGRAPHS SHALL BE PROVIDED (LOOKING UPSTREAM AND DOWNSTREAM) AT EACH STRUCTURE.
3. THE CONTRACTOR SHALL PROVIDE A ONE YEAR WARRANTY PERIOD ON ALL SPECIFIED VEGETATION. DURING THIS PERIOD ANY BARE SOIL SHALL BE RESEEDED TO PROVIDE FULL VEGETATIVE COVER (FOR AREAS NOT STABILIZED WITH REINFORCED BED MATERIAL).
4. DURING THE WARRANTY PERIOD DEFFICIENT/DEAD PLANTING STOCK SHALL BE REPLACED BY THE CONTRACTOR, SUBJECT TO TIME OF YEAR RESTRICTIONS, AS OUTLINED IN THE PLANTING PLAN.

SUBSEQUENT YEARS: *(CITY OBLIGATION)*

1. DURING VEGETATIVE ESTABLISHMENT (FIRST TWO GROWING SEASONS) CITY STAFF SHALL MONITOR THE SITE AT LEAST ONCE PER YEAR (PREFERABLY EARLY SPRING AND PRIOR TO LEAF DROP) FOR INVASIVE SPECIES, PROVIDING MECHANICAL OR CHEMICAL CONTROL, AS APPROPRIATE.
2. FOR A MINIMUM OF THREE YEARS, OR AS SPECIFIED IN APPLICABLE PERMITS, CITY STAFF SHALL PERFORM ANNUAL VISUAL INSPECTIONS (TO PHOTO DOCUMENT SITE CONDITIONS), NOTING EROSION AREAS. ANY NECESSARY CORRECTIVE ACTIONS SHALL BE IMMEDIATELY UNDERTAKEN WITH THE CONSULTATION OF THE DESIGN ENGINEER.
3. FOLLOWING FULL VEGETATIVE ESTABLISHMENT, INSPECTION FREQUENCY MAY BE REDUCED IF NO STABILITY CONCERNS HAVE BEEN DOCUMENTED.

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RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE N/A

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT AND BLACKWATER CREEK TRIBUTARY STREAM RESTORATION

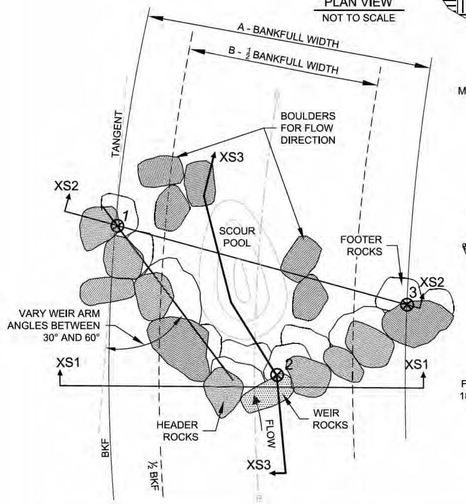
CIVIL
SEQUENCE OF CONSTRUCTION

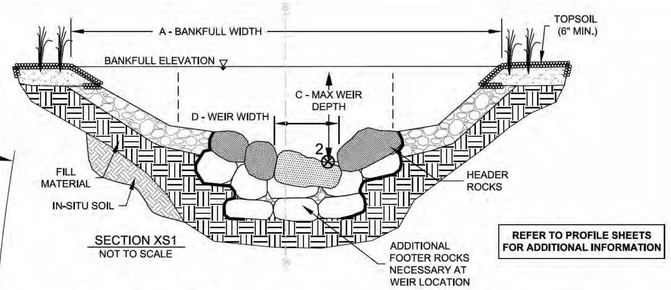
FILE NAME CONSTRUCTION DETAILS
DWG BC5
SHEET 7 OF 35
DATE OCTOBER 2016 REV 0

L:\22000S\22600\22636.03\CADD\04-ENGR\08-FINAL\CONSTRUCTION DETAILS 2016/10/03 5:05 PM TOMLINSON, KATE

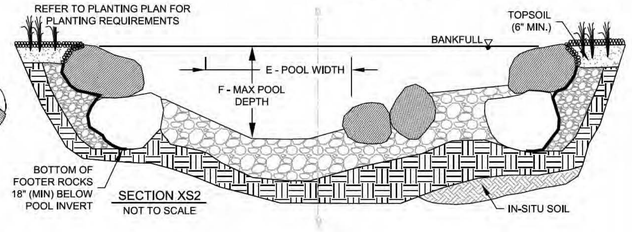
BOULDER POOL

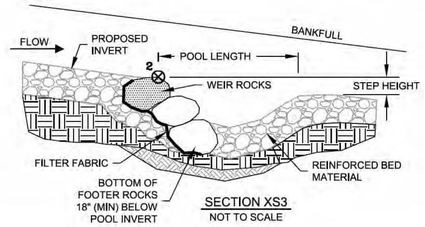
NOT TO SCALE





REFER TO PROFILE SHEETS FOR ADDITIONAL INFORMATION



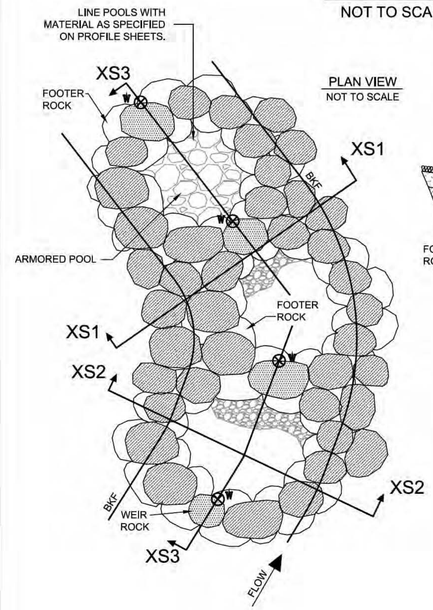


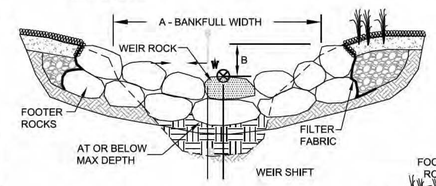
BOULDER POOL								
FEATURE LOCATION			DIMENSIONS					
REACH ID	PER BASELINE STATION		PARAMETER (FT)					MAX WEIR SHIFT
	FROM	TO	A	B	C	D	E	F	
BLACKWATER TRIB	SEE PROFILE (VAR. LOCATIONS)		7.0	3.5	1.0	2-3	3-5	1.4-1.8	2.0

STEP POOL

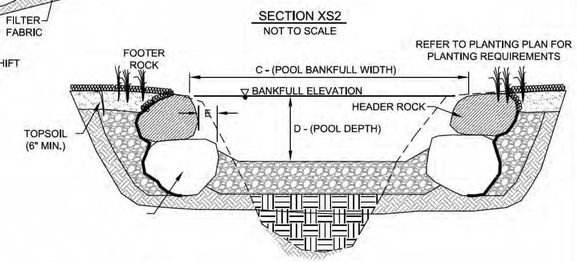
NOT TO SCALE

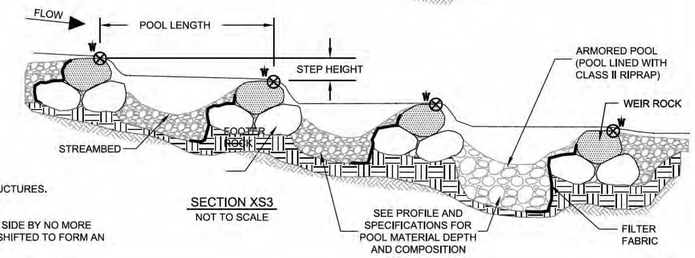
STEP POOL									
FEATURE LOCATION			STEP POOL DIMENSIONS						
REACH ID	PER BASELINE STATION		PARAMETER (FT)					NUMBER OF POOLS	MAX WEIR SHIFT
	FROM	TO	A	B	C	D	E		
BLACKWATER TRIB	15+65.00	15+86.00	7.0	0.6	7.0	1.5	1.0	2	0.5
	18+20.00	18+41.00	7.0	0.6	7.0	1.5	1.0	2	0.5
	18+75.00	18+99.00	7.0	0.6	7.0	1.5	1.0	2	0.5
	19+10.00	19+21.00	7.0	0.6	7.0	1.5	1.0	1	0.5
	19+45.00	19+56.00	7.0	0.6	7.0	1.5	1.0	1	0.5





REFER TO PROFILE SHEETS FOR ADDITIONAL INFORMATION



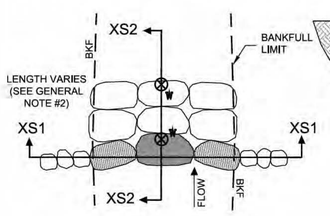


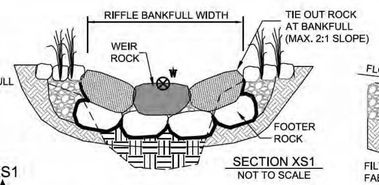
STEP POOL NOTES:

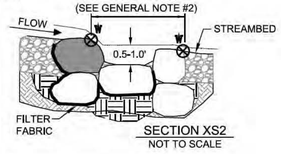
1. REFER TO "STRUCTURE NOTES" FOR ADDITIONAL INFORMATION CONCERNING ALL STRUCTURES.
2. SEE GRADING PLAN AND/OR PROFILE FOR WEIR POINT LOCATIONS AND ELEVATIONS.
3. ALL WEIR POINTS ARE LOCATED ON THE DOWNSTREAM EDGE OF THE WEIR ROCK.
4. THE WEIR HEADER ROCK MAY BE CENTERED ON THE BASELINE OR SHIFTED TO EITHER SIDE BY NO MORE THAN THE MAX WEIR SHIFT SPECIFIED IN THIS DETAIL. CENTER WEIR ROCKS SHOULD BE SHIFTED TO FORM AN IRREGULAR FLOW PATTERN FROM POOL TO POOL.

ROCK STEP

NOT TO SCALE





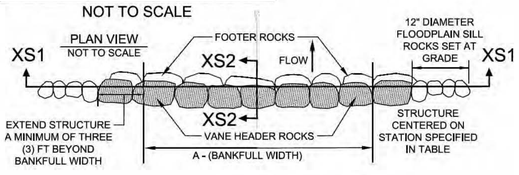


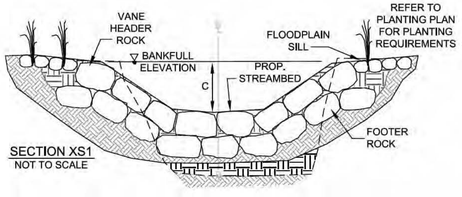
ROCK STEP NOTES:

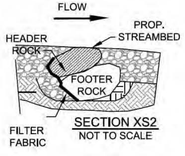
1. REFER TO "STRUCTURE NOTES" FOR ADDITIONAL INFORMATION CONCERNING ALL STRUCTURES.
2. SEE GRADING PLAN AND/OR PROFILE FOR WEIR POINT LOCATIONS AND ELEVATIONS.
3. ALL WEIR POINTS ARE LOCATED ON THE DOWNSTREAM EDGE OF THE WEIR ROCK.

IN-STREAM ROCK SILL

NOT TO SCALE







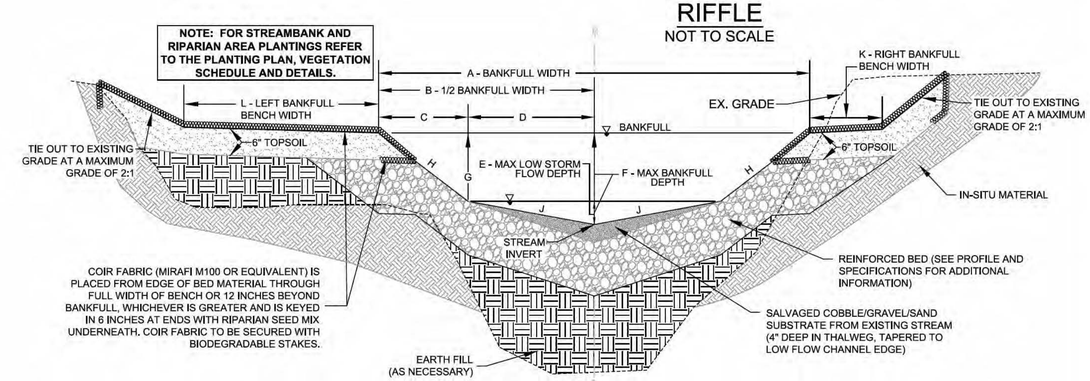
IN-STREAM ROCK SILL NOTES:

1. HEADER AND FOOTER ROCKS SHALL BE THE INTERMEDIATE ROCK SIZE SPECIFIED IN NOTE #1 OF TYPICAL STRUCTURE NOTES.
2. ROCK SILL IS TO BE INSTALLED WITH TOP OF HEADER ROCKS FLUSH WITH THE PROPOSED RIFFLE GRADE. SEE RIFFLE DETAIL FOR DETAILED SECTION DIMENSIONS.
3. REFER TO PROFILE AND "REINFORCED BED" MIXTURE SPECIFICATIONS FOR THICKNESS OF REINFORCED BED AND MATERIAL SPECIFICATIONS.

RIFFLE

NOT TO SCALE

NOTE: FOR STREAMBANK AND RIPARIAN AREA PLANTINGS REFER TO THE PLANTING PLAN, VEGETATION SCHEDULE AND DETAILS.



ORIENTATION LOOKING DOWNSTREAM

SECTION LOCATION			RIFFLE CROSS-SECTION DIMENSIONS[2]											
REACH ID	PER BASELINE STATION[1]		CROSS SECTION PARAMETER (FT)											
	FROM	TO	A	B	C	D	E	F	G	H	J[3]	K	L	NOTES
BLACKWATER TRIB	SEE PROFILE (VAR. LOCATIONS)		7.0	3.5	1.2	2.3	0.2	0.6	0.4	3.0 : 1	11.5 : 1	*	*	*VARIES - SEE GRADING PLAN

RIFFLE NOTES:

[1] REFER TO THE GRADING PLAN AND LONGITUDINAL PROFILE SHEETS FOR PLACEMENT OF ROCK STRUCTURES WITHIN THE RIFFLE SECTIONS SPECIFIED ABOVE.

[2] THE "STREAM CROSS SECTION SUMMARY" IS PROVIDED ON THE GRADING AND LONGITUDINAL PROFILE SHEETS. THIS SUMMARY SPECIFIES THE TYPE OF CROSS-SECTIONS AND STRUCTURES THAT SHALL BE CONSTRUCTED ALONG THE PROFILE.

[3] J IS THE SLOPE OF THE SALVAGED SUBSTRATE.

[4] TYPICAL VALUES GIVEN IN TABLE ABOVE. VARIABLES MAY BE ADJUSTED TO MINIMIZE DISTURBANCE TO TREES, **BUT** THE SPECIFIED SUM OF K AND L MUST BE MET OR EXCEEDED. IF BENCH WIDTHS ARE NOT SPECIFIED OVERBANK AREAS SHOULD BE GRADED WITH A 2% CROSS SLOPE EXTENDING AS FAR AS POSSIBLE WHILE STILL ALLOWING 3:1 (MAX.) TIE OUT SLOPES.

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RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE N/A

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

CONSTRUCTION DETAILS

FILE NAME CONSTRUCTION DETAILS
DWG BC6
SHEET 8 OF 35
DATE OCTOBER 2016 REV 0

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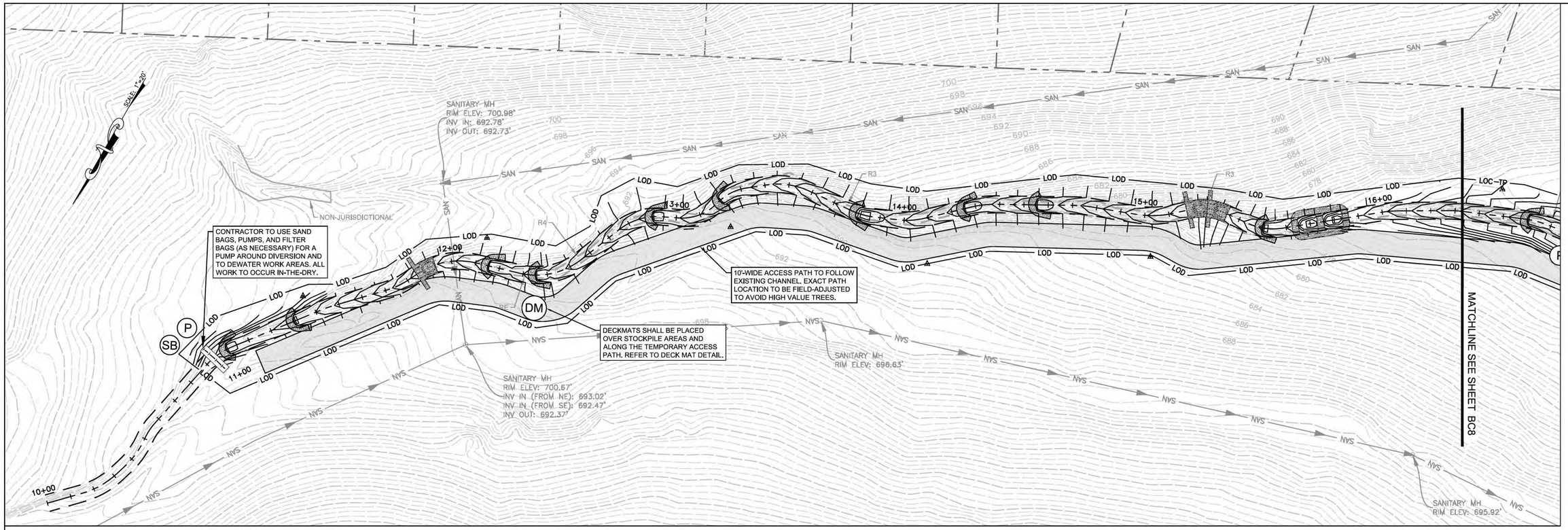

EROSION/SEDIMENT CONTROL LEGEND

NO.	TITLE	KEY	SYMBOL	UNITS	QUANTITY
MGWC 1.2	PUMP AROUND DIVERSION	P	P	EA	1
MGWC 1.2	SANDBAG DIKE	SB	SB	EA	2
3.05	SILT FENCE WITH WIRE SUPPORT (SUPER SILT FENCE)	SSF	SSF	LF	75
3.38	TREE PROTECTION FENCE	TP	LOD-TP	LF	200 + AS NEEDED
N/A	FILTER BAG	FB	FB	EA	2
3.05	SILT FENCE	SF	SF	LF	AS NEEDED
N/A	DECK MATS (10-FT WIDTH)	DM	DM	LF	1,200*
3.24	TEMPORARY VEHICULAR STREAM CROSSING	SC	SC	EA	1
3.20	ROCK CHECK DAM	CD		EA	2

*INCLUDES ACCESS FROM EXISTING GRAVEL ROAD TO UPSTREAM END OF STREAM RESTORATION.

CONTRACTOR SHALL WORK FROM UPSTREAM TO DOWNSTREAM.

TREE PROTECTION FENCING SHALL BE PLACED AROUND THE PERIMETER OF THE SITE (LOD) AS DEPICTED ON THIS PLAN. SEE E&S DETAILS.

RESTORE ACCESS/ STAGING/ STOCKPILE AREAS TO PRE-CONSTRUCTION CONDITIONS.

CONTRACTOR SHALL NOT REMOVE STUMPS AND GRUB AREAS UNTIL NECESSITATED BY GRADING ACTIVITIES. DISTURBED AREAS SHALL BE STABILIZED AT THE END OF EACH DAY.

SEE THE EROSION AND SEDIMENT CONTROL NARRATIVE FOR MORE INFORMATION.

DECK MATS SHALL BE PLACED IN STOCKPILE AREAS AND ON ALL ACTIVE CUT-INS.

TEMPORARY ACCESS PATH SHALL BE RESTORED TO EXISTING CONDITIONS UNLESS OTHERWISE SPECIFIED.

CONTRACTOR TO ADJUST LOD AND ACCESS ROAD PATH TO AVOID LARGE DIAMETER HIGH, VALUE TREES, AS DIRECTED BY CITY STAFF.

LEGEND

- PARCEL BOUNDARY
- EXISTING EASEMENTS
- EXISTING INFRASTRUCTURE
- EXISTING CONTOURS
- INTERMITTENT STREAM (R4)
- PERENNIAL STREAM (R3)
- SANITARY SEWER
- JURISDICTIONAL WETLANDS
- PROPOSED CONTOURS (0.5')
- PROPOSED CENTERLINE
- PROPOSED TOP OF BANK
- LOD — LIMITS OF DISTURBANCE
- PROPOSED ACCESS PATH
- STEP POOL
- ROCK STEP
- BOULDER POOL
- IN-STREAM ROCK SILL

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RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

EROSION AND SEDIMENT CONTROL PLAN

FILE NAME E&S PLAN
DWG BC7
SHEET 9 OF 35
DATE OCTOBER 2016
REV 0

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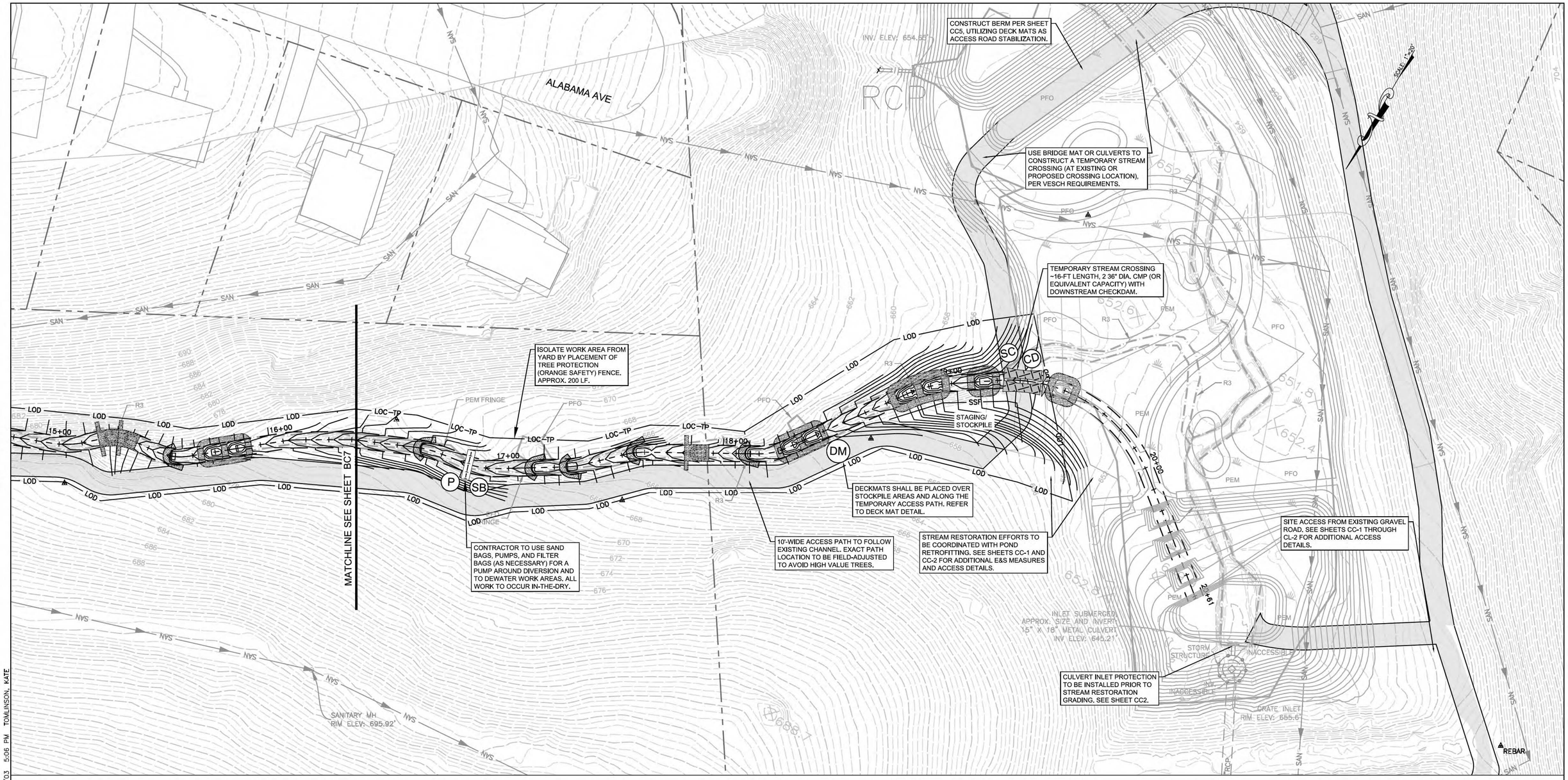

SEE PREVIOUS SHEET FOR E&S NOTES AND LEGEND.

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RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

EROSION AND SEDIMENT CONTROL PLAN (CONT'D)

FILE NAME E&S PLAN
DWG BC8
SHEET 10 OF 35
DATE OCTOBER 2016 REV 0

L:\220005\22600\22636.03\CADD\04-ENGR\08-FINAL\E&S PLAN 2016/10/03 5:06 PM TOMLINSON, KATE

EROSION AND SEDIMENT CONTROL NARRATIVE

A. PROJECT DESCRIPTION

THIS PROJECT INVOLVES THE RESTORATION OF APPROXIMATELY 850 LINEAR FEET OF HUTTERS CREEK IN LYNCHBURG, VIRGINIA. THE DESIGN REACH BEGINS IN THE WOODED AREA SOUTHEAST OF PERRYMONT PARK AND FLOWS SOUTHWEST PRIOR TO JOINING AN UNNAMED TRIBUTARY TO BLACKWATER CREEK AT THE EXISTING STORMWATER MANAGEMENT FACILITY. THE ENTIRETY OF THE PROJECT LIES ON PUBLICLY-OWNED PROPERTY WITH LITTLE IMPACT(NOISE ONLY) TO ADJACENT RESIDENTIAL AREAS. THE PROPOSED DESIGN SEEKS TO REESTABLISH RIPARIAN BUFFER AREAS AND REDUCE CHANNEL EROSION THROUGH PLANTINGS AND STREAM RESTORATION USING NATURAL CHANNEL STREAM DESIGN PRINCIPLES.

B. EXISTING SITE CONDITIONS

HUTTERS CREEK FLOWS SOUTHWEST FROM THE REAR PORTION OF THE PERRYMONT ELEMENTARY SCHOOL SITE. AT THE UPSTREAM END, NEAR THE SCHOOL, THE CHANNEL IS LITTLE MORE THAN A VEGETATED SWALE. AS THE CONTRIBUTING DRAINAGE AREA INCREASES THE FLOW BEGINS TO ERODE EXISTING SOILS, FORMING A SHALLOW (LESS THAN ONE FOOT DEEP) CHANNEL.THE RESTORATION BEGINS WHERE EROSION BECOMES SEVERE AND THE CHANNEL TRANSITIONS QUICKLY FROM LESS THAN ONE FOOT TO MORE THAN SIX FEET DEEP. BED AND BANK EROSION IS SEVERE THROUGHOUT THE PROJECT AREA. THE RESTORATION AREA ENDS AT AN EXISTING STORMWATER MANAGEMENT FACILITY, WITH THE CHANNEL DEPTH FADING TO APPROXIMATELY ONE FOOT AS THE CHANNEL ENTERS THE FOOTPRINT OF THE STORMWATER POND. CHANNEL BED MATERIALS ARE GENERALLY CHARACTERIZED BY FINE-GRAINED, COHESIVE SOILS, WITH SOME SAND AND SMALL GRAVEL IN THE LOWER PORTION OF THE PROJECT AREA.

C. ADJACENT AREAS

THE SUBJECT SITE IS BOUNDED BY PRIVATE RESIDENTIAL PROPERTY TO THE NORTHEAST, BUT LIES COMPLETELY WITHIN PUBLIC PARK PROPERTY.

D. OFF-SITE AREAS

NO OFF-SITE DISTURBANCE IS PROPOSED.

E. CRITICAL AREAS

THIS PROJECT IS LOCATED ENTIRELY WITHIN A DRAINAGE CHANNEL; HOWEVER, THE DESIGN PRESENTED HEREIN PROPOSES TO STABILIZE THE CHANNEL USING NATURAL CHANNEL DESIGN PRINCIPLES, THUS IMPROVING THE WATER QUALITY OF THE DOWNSTREAM RECEIVING WATERS WHILE ALSO PROTECTING AND IMPROVING THE EXISTING SANITARY CROSSING (LOCATED NEAR THE UPSTREAM END) TO PREVENT FUTURE FAILURE.

F. SOILS

THE SOIL LOCATED ON THE PROJECT SITE IS A CULLEN LOAM (CU E2). THE SERIES IS A WELL-DRAINED NON-HYDRIC SOIL WITH ACIDIC, CLAYEY SUBSOIL. THIS SOIL HAS VERY HIGH EROSION POTENTIAL.

G. EROSION AND SEDIMENT CONTROL MEASURES

1. BEFORE ANY WORK IN THE STREAM AREA COMMENCES, AN ON-SITE PRE-CONSTRUCTION MEETING SHALL BE HELD TO ENSURE THAT ALL AFFECTED PARTIES (DESIGN ENGINEER, CONTRACTOR, STATE OFFICIALS, OWNER, AND PROJECT MANAGER) FULLY UNDERSTAND THE CONSTRUCTION SEQUENCING.
2. MATERIALS AND METHODS USED IN CONSTRUCTION AND MAINTENANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES REQUIRED SHALL CONFORM TO THE CONSTRUCTION STANDARDS AND SPECIFICATIONS IN CHAPTER 3 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH), THIRD EDITION, 1992, AS WELL AS ANY OTHER APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY ADDITIONAL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES THAT MAY BE REQUIRED BY THETOWN INSPECTOR, OR COMMENSURATE WITH THEIR SEQUENCE OF CONSTRUCTION, TO PREVENT EROSION AND SEDIMENT CONTROL RELATED DAMAGE TO PROPERTY OF OTHERS, ADJACENT AND/OR DOWNSTREAM WATERWAYS, OR TO THE PROJECT, DURING CONSTRUCTION AND PRIOR TO PERMANENT STABILIZATION OF ALL DISTURBED AREAS.
4. PRIOR TO ANY OTHER CONSTRUCTION ACTIVITIES, PERIMETER EROSION CONTROL MEASURES ARE TO BE INSTALLED (I.E. TREE PROTECTION FENCE AND STONE CONSTRUCTION ENTRANCE) AROUND THE LIMITS OF CLEARING.
5. WORK WITHIN THE STREAM AREA SHALL NOT COMMENCE UNTIL AFTER PERIMETER EROSION CONTROL MEASURES ARE APPROVED BY THE OWNER'S INSPECTOR.
6. FOR ANY CLEARING OR GRADING ON THE SITE, THE LIMITS OF CLEARING AND GRADING (LOC) SHALL BE MARKED WITH FLAGGING.
7. THE LOC SHALL BE REVIEWED ON-SITE WITH THE CONTRACTOR AND THE OWNER OR OWNER'S REPRESENTATIVE(S), AND A FINAL DETERMINATION MADE REGARDING WHICH TREES WILL BE REMOVED BASED ON THE APPROVED GRADING AND STREAM RESTORATION ACTIVITIES.
8. ADJUSTMENTS WILL BE MADE TO FLAGGING MARKING THE LOC TO ADEQUATELY PROTECT TREES TO BE PRESERVED AND ALLOW REMOVAL OF TREES TO BE REMOVED. TREE PORTECTION FENCING SHALL BE ERECTED ALONG THESE ADJUSTED LIMITS OF CLEARING AND GRADING PRIOR TO THE COMMENCEMENT OF ANY OTHER CONSTRUCTION ACTIVITIES.
9. TREES TO BE REMOVED THAT ARE LOCATED ON THE LOC OR IMMEDIATELY ADJACENT TO THE LOC WITHIN THE PROTECTED AREA SHALL BE REMOVED USING CHAIN SAWS TO MINIMIZE ROOT ZONE DISTURBANCE OR TREES TO BE PRESERVED.
10. THE CONTRACTOR SHALL AVOID WETLAND AREAS WHEN POSSIBLE DURING CONSTRUCTION. ALL ACCESS AND STOCKPILE AREAS TO BE RETURNED TO PRE-CONSTRUCTION CONDITIONS AT THE COMPLETION OF CONSTRUCTION.
11. STOCKPILE AREAS HAVE BEEN DESIGNATED PRIMARILY FOR STOCKPILING SOIL AND ROCK. SILT FENCE SHALL BE PLACED ALONG THE DOWNSTREAM SIDE OF ANY STOCKPILE OF SOIL THAT WILL REMAIN STOCKPILED AT THE END OF ANY WORK DAY. ADDITIONAL AREAS MAY BE UTILIZED AS STOCKPILE AREAS IF APPROVED BY THE ENGINEER AND SITE INSPECTOR.
12. STABILIZATION MEASURES SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
13. **ONLY DISTURB AS MUCH AREA AS CAN BE STABILIZED IN ONE DAY.**
14. **STABILIZE ALL DISTURBED AREAS, INCLUDING ACCESS AREAS AT THE END OF EACH DAY.**
15. ALL STREAM WORK SHALL BE CONDUCTED IN THE DRY, AND NO WORK SHALL BE PERFORMED IN THE RAIN. IF THERE IS A THREAT OF RAIN, WORK IS TO STOP AND WORK AREA SHALL BE STABILIZED.
16. A "PUMP AROUND" SYSTEM SHALL BE USED TO DIVERT THE STREAM DURING CONSTRUCTION. SANDBAG DIKES SHALL BE INSTALLED WITHIN THE STREAM AROUND THE AREA TO BE DISTURBED THAT DAY (LARGER REACHES ARE ALLOWED IF APPROVED BY THE SITE ENGINEER); ONE AT THE UPSTREAM LIMIT OF DISTURBANCE AND ONE AT THE DOWNSTREAM LIMIT OF DISTURBANCE. AN ADEQUATELY SIZED PUMP SYSTEM SHALL BE USED TO PUMP BASEFLOW AROUND THE AREA OF CONSTRUCTION AND BACK INTO THE STREAM AT A POINT DOWNSTREAM OF THE SECOND SANDBAG DIKE. WORK SHALL NOT PROCEED DURING RAIN EVENTS. IF SEDIMENT LAIDEN WATER ACCUMULATES AT THE DOWNSTREAM SANDBAG DIKE, SUCH WATER SHALL BE PUMPED INTO A FILTER BAG PRIOR TO BEING RELEASED BACK INTO THE STREAM, PER VESCH HANDBOOK GUIDELINES.
17. ACCESS ACROSS AND IN THE STREAM SHALL BE ALLOWED WITHIN THE STREAM REACH PROTECTED BY THE "PUMP AROUND" SYSTEM AS DESCRIBED ABOVE.
18. SITE WORK ACTIVITIES SHALL BE COMPLETED, IF POSSIBLE, AT LEAST EIGHT WEEKS EARLIER THAN THE RECOMMENDED PLANTING WINDOW (I.E. AUGUST 30). DURING THIS TIME, THE EROSION CONTROL COVER CROP SHALL BE PERMITTED TO MATURE.
19. 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 INSPECTOR. TRAPPED SEDIMENT AND THE DISTURBED SOIL AREA RESULTING FROM THE DEPOSITION OF TEMPORARY MEASURES SHALL BE PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION AND SEDIMENTATION.

H. PERMANENT STABILIZATION

1. PLANTING OF ALL SPECIFIED CONTAINERIZED STREAMSIDE AND RIPARIAN VEGETATION SHALL BE LIMITED TO THE PERIOD BETWEEN NOVEMBER 30 AND MARCH 30, UNLESS APPROVED BY WSSI WITH SPECIAL WARRANTY CONDITIONS. NO PLANTING SHALL OCCUR WHEN THE SOIL IS FROZEN.
2. PLANT ALL SPECIFIED PLANT MATERIAL ON THE NEW STREAM BANKS AND RIPARIAN AREAS - SUBJECT TO TIME OF YEAR RESTRICTIONS IN PLANTING SPECIFICATIONS, CUTTING HOLES AS REQUIRED IN THE EROSION CONTROL FABRIC. SEE VEGETATION NOTES AND THE SCHEDULE FOR SPECIFICATIONS REGARDING PLANTS AND PLANTING MATERIAL. PLANTING CONTRACTOR SHALL USE SAME ACCESS POINTS TO MINIMIZE DISTURBANCE.
3. FOR ALL PLANTING TYPES, QUANTITIES, SPECIFICATIONS AND DETAILS PLEASE REFER TO THE PLANTING PLAN.

I. GENERAL LAND CONSERVATION NOTES

1. PERMANENT OR TEMPORARY STABILIZATION MUST BE APPLIED TO DENUDED AREAS WITHIN 7 DAYS AFTER FINAL GRADE IS REACHED OR WITHIN 7 DAYS TO DENUDED AREAS TO REMAIN DORMANT FOR LONGER THAN 14 DAYS.
2. ANY DISTURBED AREA NOT COVERED BY GENERAL CONSERVATION NOTE 1 AND NOT PAVED, SODDED OR BUILT UPON BY NOVEMBER 1, OR DISTURBED AFTER THAT DATE, SHALL BE MULCHED IMMEDIATELY WITH HAY OR STRAW MULCH AT THE RATE OF 2 TONS/ACRE (4483 KG/HA) AND OVERSEEDED BY APRIL 15.
3. AT THE COMPLETION OF THE PROJECT CONSTRUCTION AND PRIOR TO BOND RELEASE ALL TEMPORARY SEDIMENT CONTROLS SHALL BE REMOVED AND ALL DENUDED AREAS SHALL BE STABILIZED.

J. MAINTENANCE PROGRAM.

THE CONTRACTOR SHALL INSPECT ALL EROSION AND SEDIMENT CONTROL MEASURES IMMEDIATELY (WITHIN 24 HOURS) AFTER EACH RUNOFF PRODUCING RAINFALL EVENT, AT LEAST DAILY DURING PROLONGED RAINFALL, AND AT LEAST ONCE EVERY FOURTEEN DAYS. DAMAGED OR DEFICIENT MEASURES SHALL BE REPAIRED BY THE CLOSE OF EACH DAY AND ANY ADDITIONAL MEASURES REQUIRED SHALL BE IMMEDIATELY INSTALLED. FURTHER, THE CONTRACTOR SHALL MAKE A DAILY REVIEW OF AREAS OF CONSTRUCTION ACTIVITY TO INSURE THAT EROSION AND SEDIMENT CONTROL DEVICES ARE PROPERLY LOCATED FOR EFFECTIVENESS. WHERE DEFICIENCIES EXIST, ADDITIONAL MEASURES SHALL BE PROMPTLY INSTALLED. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR PROVIDING ANY ADDITIONAL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES THAT MAY BE REQUIRED, COMMENSURATE WITH HIS/HER SCHEDULING SEQUENCE OF CONSTRUCTION, TO PREVENT EROSION AND SEDIMENT RELATED DAMAGE TO THE PROPERTY OF OTHERS, TO ADJACENT AND/OR DOWNSTREAM WATERWAYS, OR TO THE PROJECT, DURING CONSTRUCTION AND PRIOR TO PERMANENT STABILIZATION OF ALL DISTURBED AREAS.

THE CONTRACTOR SHALL INSTALL ANY AND ALL EROSION AND SEDIMENT CONTROLS DEEMED NECESSARY TO ACCOUNT FOR SITE AND ACTIVITY SPECIFIC ISSUES DETERMINED BY EITHER THE INSPECTOR OR THE ENGINEER'S REPRESENTATIVE.

K. TWO-PHASE E&S CONTROLS

DUE TO THE NATURE OF THIS PROJECT ONLY A PHASE I EROSION AND SEDIMENT CONTROL PLAN IS REQUIRED. NO STORMWATER INFRASTRUCTURE WILL BE CONSTRUCTED (I.E. CURB, GUTTER, INLETS, ETC.), MAKING INCLUSION OF A PHASE II EROSION AND SEDIMENT CONTROL PLAN UNNECESSARY. SITE DISTURBANCE SHALL BE LIMITED TO THE SECTION OF STREAM CHANNEL THAT IS BEING RESTORED THAT DAY, AS WELL AS THE AREA IMMEDIATELY ADJACENT. NO SECTION OF STREAM WILL BE LEFT UNSTABILIZED OVERNIGHT. THIS WORK AREA WILL BE ISOLATED FROM THE ACTIVE STREAM CHANNEL THROUGH THE USE OF A PUMP AROUND DIVERSION. IN ADDITION, THIS DIVERSION WILL NOT BE REMOVED UNTIL THE STREAM CHANNEL IS STABILIZED AND THE ADJACENT AREA IS COVERED WITH STRAW.

MINIMUM STANDARDS NARRATIVE

MS-1 (SOIL STABILIZATION): SOIL SHALL BE STABILIZED PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTIONS H AND I.

MS-2 (SOIL STOCKPILE STABILIZATION): PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 11 (THIS SHEET); SILT FENCE WILL BE PLACED AROUND ANY SOIL THAT WILL BE STOCKPILED FOR LONGER THAN ONE DAY.

MS-3 (PERMANENT STABILIZATION): PERMANENT STABILIZATION SHALL BE APPLIED PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 11 (THIS SHEET). SPECIFICS REGARDING THE PLANTINGS ARE PROVIDED ON THE PLANTING PLAN, VEGETATION SCHEDULE, AND PLANTING NOTES & DETAILS SHEETS.

MS-4 (SEDIMENT BASINS & TRAPS): NOT APPLICABLE, NO SEDIMENT BASINS OR TRAPS ARE PROPOSED TO BE CONSTRUCTED AS PART OF THIS PROJECT.

MS-5 (STABILIZATION OF EARTHEN STRUCTURES): PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 12 (THIS SHEET); ALL EARTHEN STRUCTURES SHALL BE STABILIZED IMMEDIATELY AFTER INSTALLATION.

MS-6 (SEDIMENT TRAPS & SEDIMENT BASINS): NOT APPLICABLE, NO SEDIMENT BASINS OR TRAPS ARE PROPOSED TO BE CONSTRUCTED AS PART OF THIS PROJECT.

MS-7 (CUT/FILL SLOPES DESIGN & CONSTRUCTION): NOT APPLICABLE, NO CUT OR FILL SLOPES ARE ASSOCIATED WITH THIS PROJECT.

MS-8 (CONCENTRATED RUNOFF DOWN SLOPES): NOT APPLICABLE, NO CUT OR FILL SLOPES ARE ASSOCIATED WITH THIS PROJECT.

MS-9 (SLOPE MAINTENANCE): NOT APPLICABLE, NO SLOPES ARE PROPOSED TO BE DISTURBED AS PART OF THIS PROJECT.

MS-10 (STORM SEWER INLET PROTECTION): NOT APPLICABLE, NO STORMWATER INLETS ARE PROPOSED TO BE CONSTRUCTED AS PART OF THIS PROJECT.

MS-11 (STORMWATER CONVEYANCE PROTECTION): NOT APPLICABLE, NO STORMWATER CONVEYANCES ARE PROPOSED TO BE CONSTRUCTED AS PART OF THIS PROJECT.

MS-12 (WORK IN LIVE WATERCOURSE): PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 17 (THIS SHEET); A "PUMP AROUND" SYSTEM WILL BE USED TO ISOLATE THE WORK AREA AND PROTECT DOWNSTREAM RECEIVING WATERS.

MS-13 (CROSSING LIVE WATERCOURSE): PURSUANT TO THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 17 (THIS SHEET); "*ACCESS ACROSS AND IN THE STREAM SHALL BE ALLOWED WITHIN THE STREAM REACH PROTECTED BY THE "PUMP AROUND" SYSTEM DESCRIBED ABOVE*"

MS-14 (REGULATION OF WATERCOURSE CROSSING): THE PROPOSED PROJECT IS BEING REGULATED BY NATIONWIDE PERMIT 27.

MS-15 (STABILIZATION OF WATERCOURSE): THIS MINIMUM STANDARD IS ADDRESSED IN THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTES 13, 14, & 15 (THIS SHEET).

MS-16 (UNDERGROUND UTILITY LINE CONSTRUCTION): NOT APPLICABLE, NO UNDERGROUND UTILITIES ARE PROPOSED TO BE CONSTRUCTED AS PART OF THIS PROJECT.

MS-17 (VEHICULAR SEDIMENT TRAPPING): A STONE CONSTRUCTION ENTRANCE WITH WASH RACK (IF NECESSARY) AND TEMPORARY SEDIMENT TRAP SHALL BE PLACED AT THE ENTRANCE TO THE PROJECT SITE. NOTE: THIS PROJECT USES A SHARED ACCESS ROAD, WHICH IS TO BE CONSTRUCTED PER GREENWOOD POND BMP RETROFIT PLANS (UNDER SEPARATE COVER).

MS-18 (REMOVAL OF TEMPORARY MEASURES): THIS MINIMUM STANDARD IS ADDRESSED IN THE EROSION AND SEDIMENT CONTROL NARRATIVE, SECTION G, NOTE 19 (THIS SHEET).

MS-19 (STORMWATER MANAGEMENT): THE PROPOSED STREAM RESTORATION DESIGN EMPLOYS NATURAL CHANNEL DESIGN TECHNIQUES. THEREFORE PURSUANT TO §10.1-561.A OF THE VIRGINIA LEGISLATIVE CODE; "*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 AS DEFINED IN ANY REGULATIONS PROMULGATED PURSUANT TO THIS SECTION, § 10.1-562, OR 10.1-570.*"

COMMONWEALTH OF VIRGINIA
FRANK R. GRAZIANO
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10/3/2016
PROFESSIONAL ENGINEER

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DESIGNED NAS	APPROVED	NO.	DATE	APPD	REVISION	SCALE N/A
DRAWN NAS						
CHECKED FRG						

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT AND BLACKWATER CREEK TRIBUTARY STREAM RESTORATION

CIVIL
EROSION AND SEDIMENT CONTROL NARRATIVE

FILE NAME E&S PLAN
DWG BC9
SHEET 11 OF 35
DATE OCTOBER 2016 | REV 0

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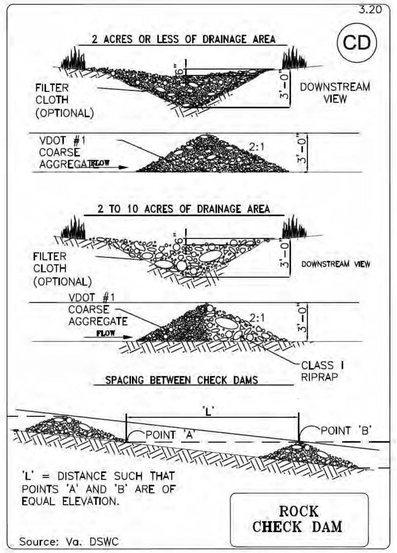
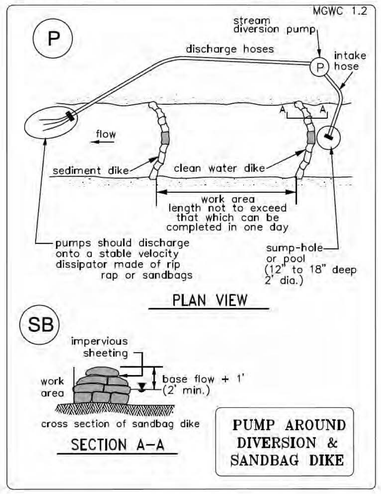
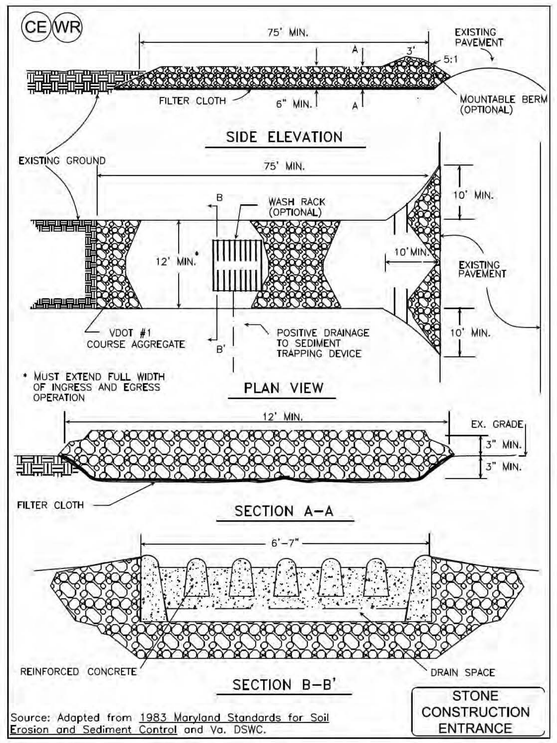
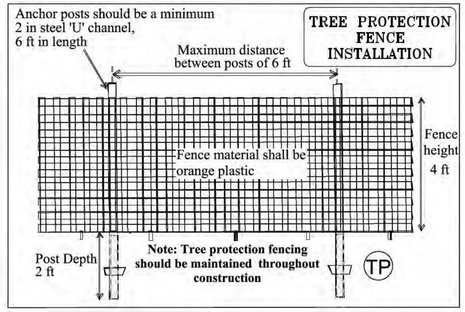
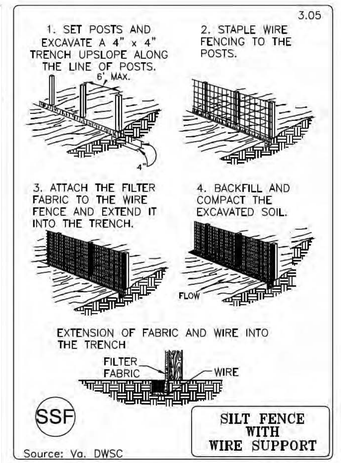
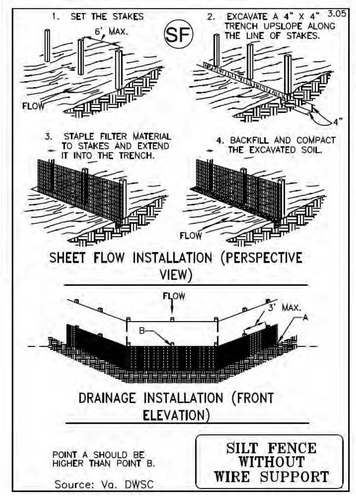


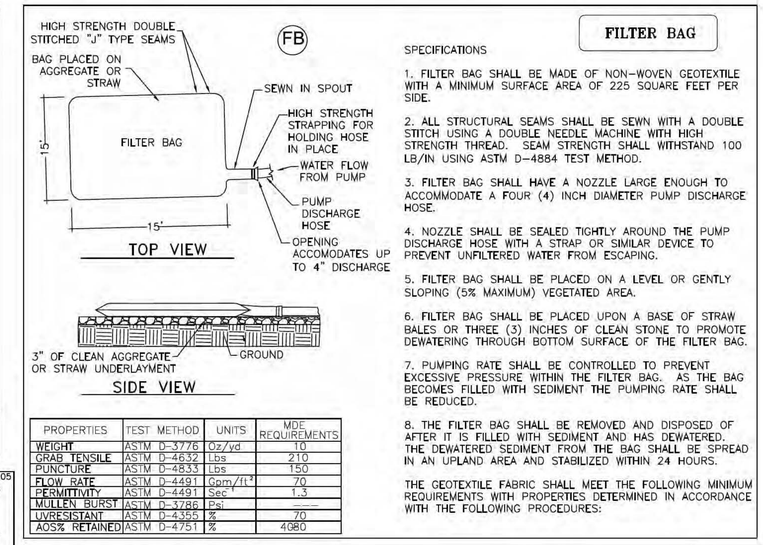












PROPERTIES	TEST METHOD	UNITS	MDE REQUIREMENTS
WEIGHT	ASTM D-3776	Oz/yd	10
GRAB TENSILE	ASTM D-4632	Lbs	210
PUNCTURE	ASTM D-4833	Lbs	150
FLOW RATE	ASTM D-4491	Gpm/ft²	70
PERMITTIVITY	ASTM D-4491	Sec⁻¹	1.3
MULLEN BURST	ASTM D-3786	Psi	——
UVRESISTANT	ASTM D-4355	%	70
AOS% RETAINED	ASTM D-4751	%	4080

FILTER BAG

SPECIFICATIONS

1. FILTER BAG SHALL BE MADE OF NON-WOVEN GEOTEXTILE WITH A MINIMUM SURFACE AREA OF 225 SQUARE FEET PER SIDE.

2. ALL STRUCTURAL SEAMS SHALL BE SEWN WITH A DOUBLE STITCH USING A DOUBLE NEEDLE MACHINE WITH HIGH STRENGTH THREAD. SEAM STRENGTH SHALL WITHSTAND 100 LB/IN USING ASTM D-4884 TEST METHOD.

3. FILTER BAG SHALL HAVE A NOZZLE LARGE ENOUGH TO ACCOMMODATE A FOUR (4) INCH DIAMETER PUMP DISCHARGE HOSE.

4. NOZZLE SHALL BE SEALED TIGHTLY AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE TO PREVENT UNFILTERED WATER FROM ESCAPING.

5. FILTER BAG SHALL BE PLACED ON A LEVEL OR GENTLY SLOPING (5% MAXIMUM) VEGETATED AREA.

6. FILTER BAG SHALL BE PLACED UPON A BASE OF STRAW BALES OR THREE (3) INCHES OF CLEAN STONE TO PROMOTE DEWATERING THROUGH BOTTOM SURFACE OF THE FILTER BAG.

7. PUMPING RATE SHALL BE CONTROLLED TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG. AS THE BAG BECOMES FILLED WITH SEDIMENT THE PUMPING RATE SHALL BE REDUCED.

8. THE FILTER BAG SHALL BE REMOVED AND DISPOSED OF AFTER IT IS FILLED WITH SEDIMENT AND HAS DEWATERED. THE DEWATERED SEDIMENT FROM THE BAG SHALL BE SPREAD IN AN UPLAND AREA AND STABILIZED WITHIN 24 HOURS.

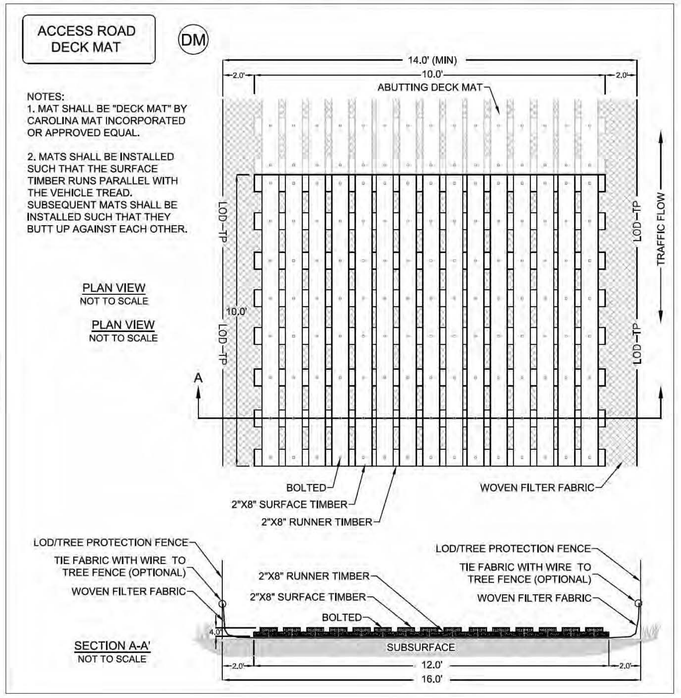
THE GEOTEXTILE FABRIC SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS WITH PROPERTIES DETERMINED IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:

ACCESS ROAD DECK MAT

DM

NOTES:
1. MAT SHALL BE "DECK MAT" BY CAROLINA MAT INCORPORATED OR APPROVED EQUAL.

2. MATS SHALL BE INSTALLED SUCH THAT THE SURFACE TIMBER RUNS PARALLEL WITH THE VEHICLE TREAD. SUBSEQUENT MATS SHALL BE INSTALLED SUCH THAT THEY BUTT UP AGAINST EACH OTHER.



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DESIGNED NAS	APPROVED		
DRAWN NAS			
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NO.	DATE	APPD	REVISION

SCALE: N/A

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

EROSION AND SEDIMENT CONTROL DETAILS

FILE NAME E&S PLAN
DWG BC10
SHEET 12 OF 35
DATE OCTOBER 2016 REV 0

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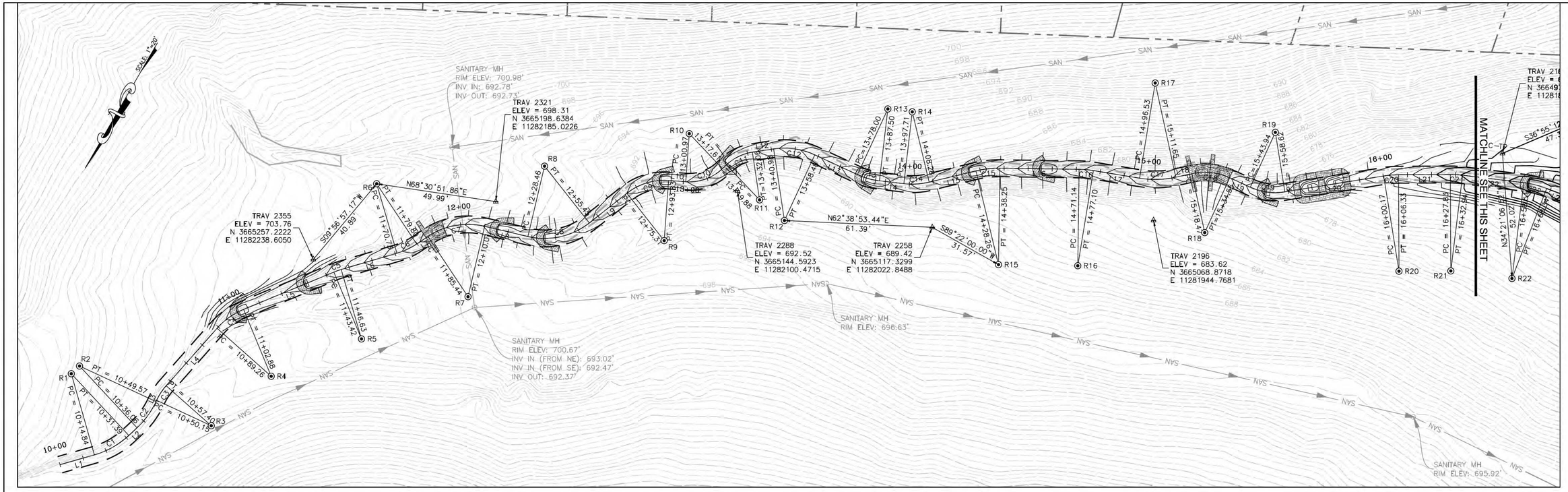

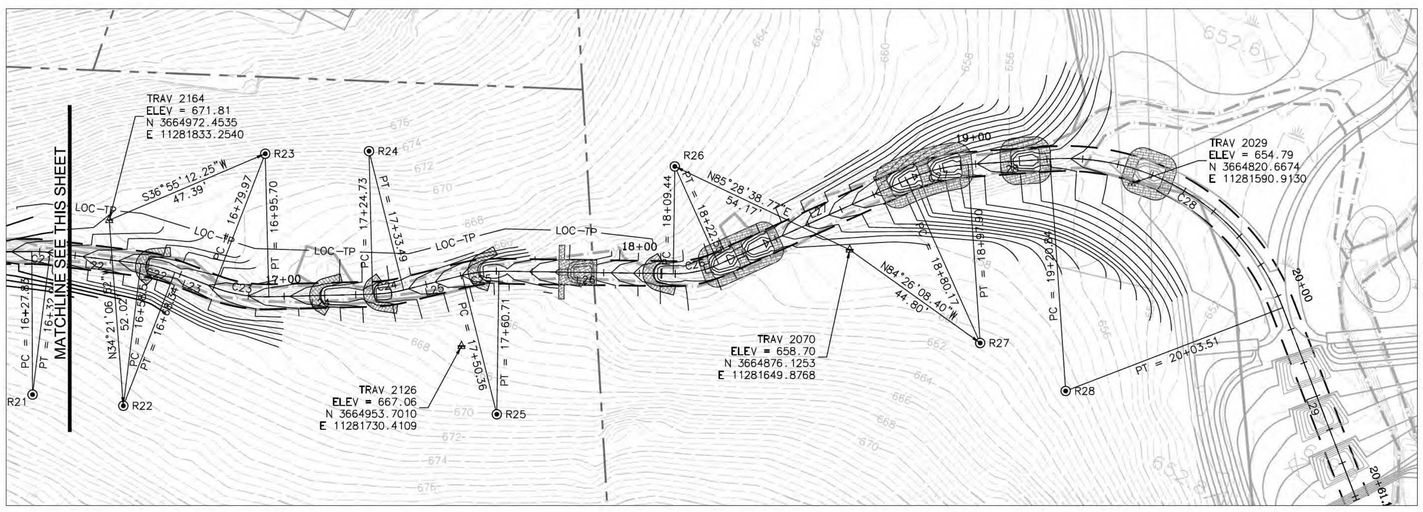

GEOMETRY TABLE						
NO.	LENGTH	RADIUS	BEARING/DELTA	TANGENT	CHORD BEARING	CHORD
L1	14.84'	--	S44°07'16"W	--	--	--
C1	16.55'	35.00'	27°05'40"	8.43'	S30°34'26"W	16.40'
L2	4.67'	--	S17°01'36"W	--	--	--
C2	13.50'	35.00'	22°06'10"	6.84'	S05°58'31"W	13.42'
L3	0.58'	--	S05°04'34"E	--	--	--
C3	7.25'	25.00'	16°37'19"	3.65'	N03°14'05"E	7.23'
L4	31.86'	--	S11°32'45"W	--	--	--
C4	13.62'	30.00'	26°00'51"	6.93'	N24°33'10"E	13.50'
L5	40.54'	--	S37°33'36"W	--	--	--
C5	3.22'	30.00'	06°08'34"	1.61'	N40°37'53"E	3.21'
L6	24.10'	--	S43°42'10"W	--	--	--
C6	9.07'	30.00'	17°19'34"	4.57'	S35°02'23"W	9.04'
L7	5.64'	--	S26°22'36"W	--	--	--
C7	24.56'	30.00'	46°54'45"	13.02'	N49°49'59"E	23.88'
L8	18.45'	--	S73°17'21"W	--	--	--
C8	26.99'	30.00'	51°32'25"	14.48'	S47°31'08"W	26.09'
L9	19.87'	--	S21°44'56"W	--	--	--
C9	18.52'	25.00'	42°26'42"	9.71'	N42°58'17"E	18.10'
L10	7.14'	--	S64°11'38"W	--	--	--
C10	16.64'	20.00'	47°40'39"	8.84'	S40°21'18"W	16.17'
L11	2.27'	--	S16°30'59"W	--	--	--
C11	12.18'	20.00'	34°53'32"	6.29'	N33°57'45"E	11.99'
L12	8.92'	--	S51°24'31"W	--	--	--
C12	17.50'	30.00'	33°25'23"	9.01'	N68°07'13"E	17.25'
L13	19.51'	--	S84°49'54"W	--	--	--
C13	9.51'	30.00'	18°09'25"	4.79'	S75°45'11"W	9.47'
L14	10.20'	--	S66°40'29"W	--	--	--
C14	10.57'	30.00'	20°11'45"	5.34'	S56°34'36"W	10.52'
L15	19.98'	--	S46°28'44"W	--	--	--
C15	9.99'	40.00'	14°18'26"	5.02'	N53°37'57"E	9.96'
L16	32.89'	--	S60°47'09"W	--	--	--
C16	5.97'	40.00'	08°32'41"	2.99'	N65°03'30"E	5.96'
L17	19.43'	--	S69°19'50"W	--	--	--
C17	15.12'	40.00'	21°39'47"	7.65'	S58°29'56"W	15.03'
L18	6.82'	--	S47°40'03"W	--	--	--
C18	16.08'	25.00'	36°51'20"	8.33'	N66°05'43"E	15.81'
L19	9.39'	--	S84°31'23"W	--	--	--
C19	14.68'	25.00'	33°38'45"	7.56'	S67°42'00"W	14.47'
L20	41.54'	--	S50°52'38"W	--	--	--
C20	6.16'	40.00'	08°49'45"	3.09'	N55°17'30"E	6.16'
L21	21.50'	--	S59°42'23"W	--	--	--
C21	5.11'	40.00'	07°19'00"	2.56'	N63°21'53"E	5.10'
L22	25.57'	--	S67°01'23"W	--	--	--
C22	9.83'	40.00'	14°04'26"	4.94'	N74°03'36"E	9.80'
L23	11.64'	--	S81°05'49"W	--	--	--
C23	15.73'	40.00'	22°31'54"	7.97'	S69°49'52"W	15.63'
L24	29.02'	--	S58°33'55"W	--	--	--
C24	8.77'	40.00'	12°33'28"	4.40'	S52°17'11"W	8.75'
L25	16.86'	--	S46°00'27"W	--	--	--
C25	10.35'	40.00'	14°49'54"	5.21'	N53°25'24"E	10.33'
L26	48.73'	--	S60°50'21"W	--	--	--
C26	13.11'	30.00'	25°02'00"	6.66'	S48°19'21"W	13.00'
L27	57.62'	--	S35°48'21"W	--	--	--
C27	17.73'	50.00'	20°18'50"	8.96'	N45°57'46"E	17.63'
L28	22.94'	--	S56°07'11"W	--	--	--
C28	82.68'	65.00'	72°52'37"	47.99'	S87°26'31"E	77.21'
L29	57.59'	--	N51°00'12"W	--	--	--

RADIUS POINT LOCATION TABLE		
NO.	NORTHING	EASTING
R1	3665348.5311	11282301.8829
R2	3665344.0614	11282300.5142
R3	3665338.1730	11282240.8010
R4	3665307.9597	11282229.5256
R5	3665275.8262	11282204.8152
R6	3665216.9488	11282231.5405
R7	3665238.5514	11282175.2808
R8	3665175.7795	11282174.8602
R9	3665177.7061	11282116.4137
R10	3665134.0872	11282129.5787
R11	3665143.2835	11282090.5842
R12	3665145.5344	11282077.3730
R13	3665084.0206	11282063.3440
R14	3665079.9811	11282053.9758
R15	3665116.9810	11281991.2845
R16	3665100.9280	11281962.5777
R17	3665019.2206	11281972.6406
R18	3665062.6822	11281923.8294
R19	3665012.0139	11281919.2513
R20	3665036.2273	11281846.0080
R21	3665025.3825	11281827.4446
R22	3665015.3999	11281803.9010
R23	3664934.5627	11281804.7840
R24	3664919.4265	11281780.0207
R25	3664965.2702	11281712.3256
R26	3664880.3967	11281703.8782
R27	3664880.4694	11281605.2873
R28	3664880.1352	11281577.8819

SURVEY CONTROL (TRAVERSE INFORMATION) GIVEN ON THIS PLAN SHALL BE USED IN CONSTRUCTING PLANFORM GEOMETRY AND FOR PROPER STRUCTURE PLACEMENT.

THE PROPOSED CHANNEL IS DESIGNED TO FOLLOW AND LIE WITHIN THE EXISTING CHANNEL TOP OF BANKS.

COMMONWEALTH OF VIRGINIA
FRANK R. GRAZIANO
Lic. No. 032099
10/3/2016
PROFESSIONAL ENGINEER

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RICHMOND, VIRGINIA 23235

DESIGNED NAS
DRAWN NAS
CHECKED FRG
APPROVED

NO.	DATE	APPD	REVISION

SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

GEOMETRY PLAN

FILE NAME GEOMETRY PLAN
DWG BC11
SHEET 13 OF 35
DATE OCTOBER 2016 REV 0

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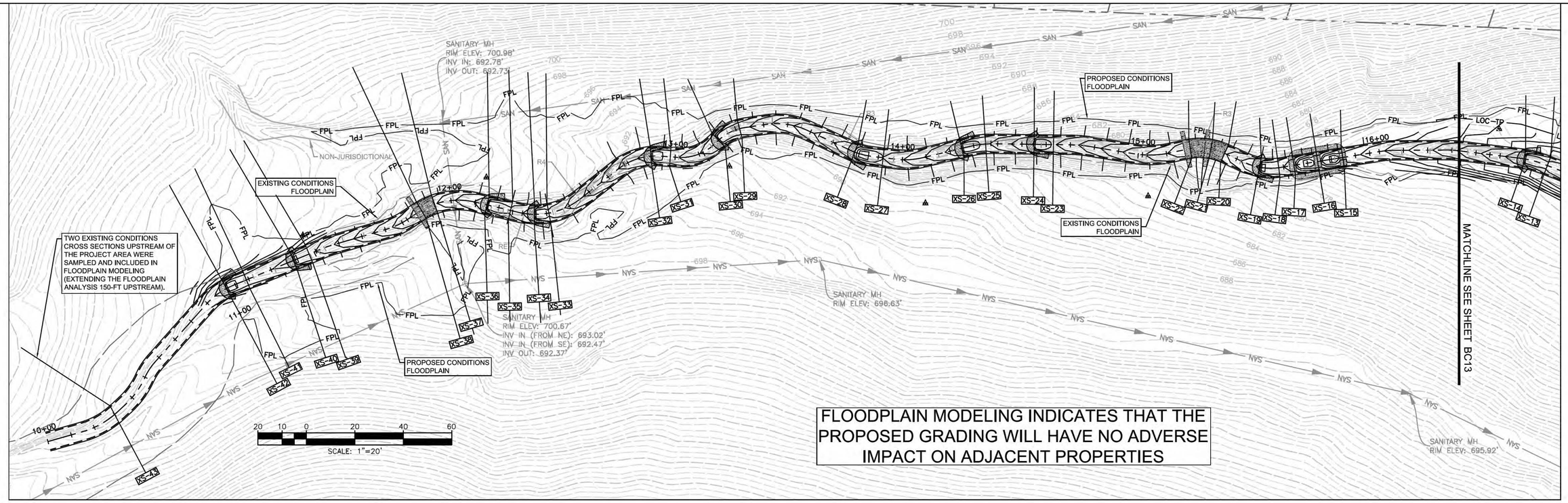

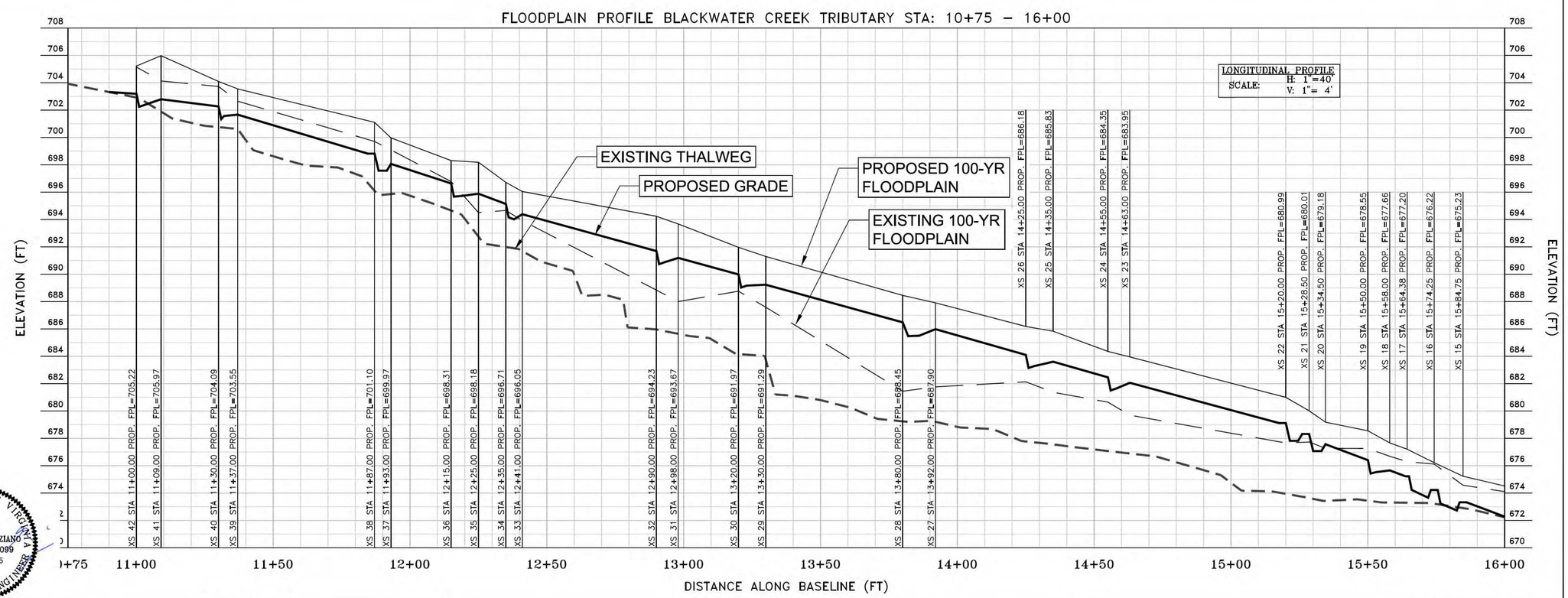

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CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

CIVIL

FLOODPLAIN ANALYSIS

FILE NAME 100-YEAR FLOODPLAIN ANALYSIS
DWG BC12
SHEET 14 OF 35
DATE OCTOBER 2016
REV 0

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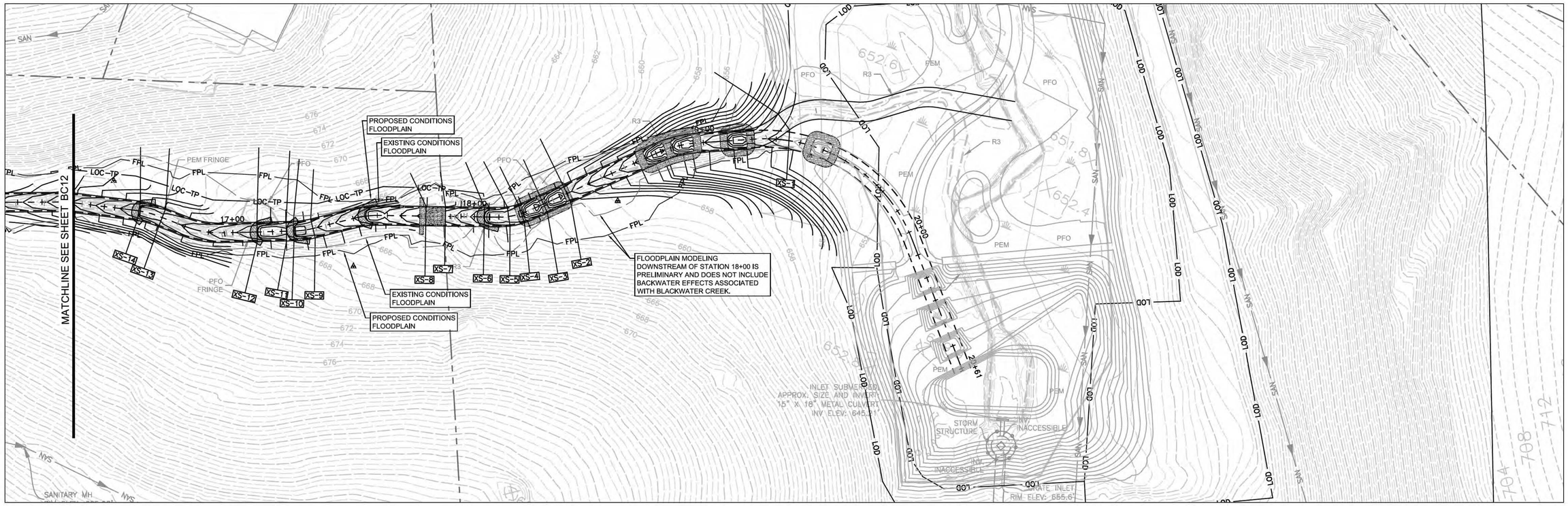

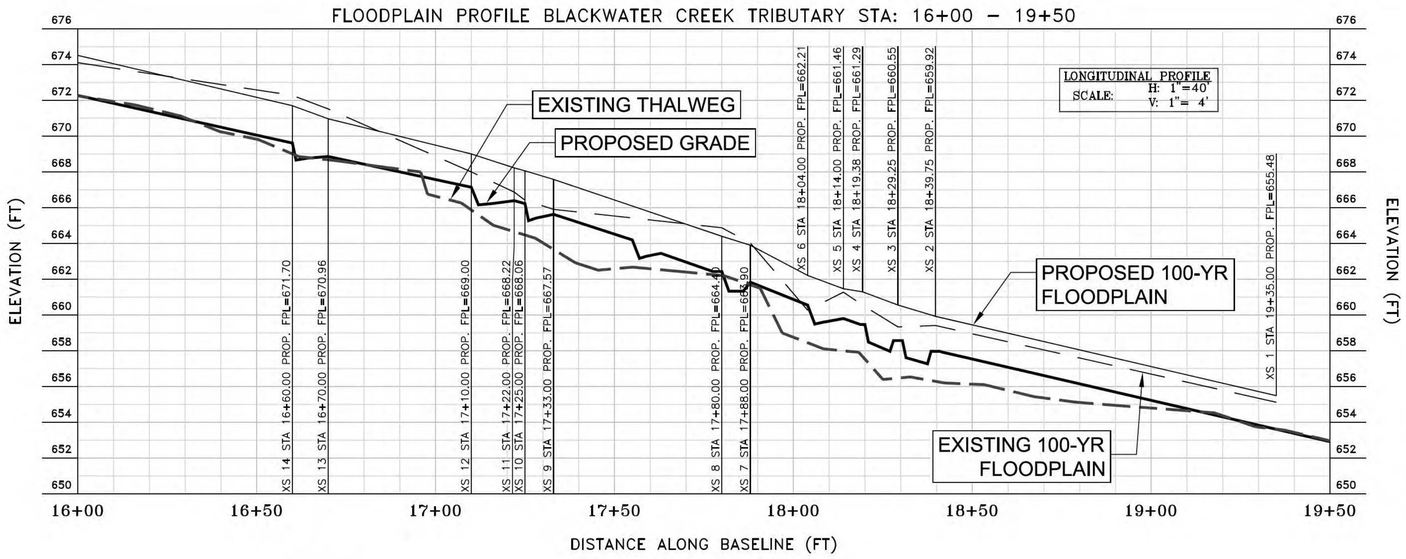

NOTE: THE PROFILE SHOWN HERE CORRESPONDS TO PRELIMINARY FLOODPLAIN MODELING. THE REVISED DESIGN SHOWN IN PLAN VIEW INCLUDES ADDITIONAL STRUCTURES AND A LOWERED DOWNSTREAM TIE OUT ELEVATION TO TIE IN WITH LOWERED GRADES ASSOCIATED WITH EXCAVATION OF POND SEDIMENT DEPOSITION. THUS, DESIGN FLOOD ELEVATIONS WILL BE LOWER THAN DEPICTED IN THIS PROFILE AND NO CONFLICTS EXIST.

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RICHMOND, VIRGINIA 23235

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APPROVED

NO.	DATE	APPD	REVISION

SCALE
20 10 0 20 40 60
SCALE: 1"=20'

CITY OF LYNCHBURG, VIRGINIA
DEPARTMENT OF WATER RESOURCES
GREENWOOD POND BMP RETROFIT
AND BLACKWATER CREEK
TRIBUTARY STREAM RESTORATION

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FLOODPLAIN ANALYSIS (CONT'D)

FILE NAME 100-YEAR FLOODPLAIN ANALYSIS
DWG BC13
SHEET 15 OF 35
DATE OCTOBER 2016
REV 0

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