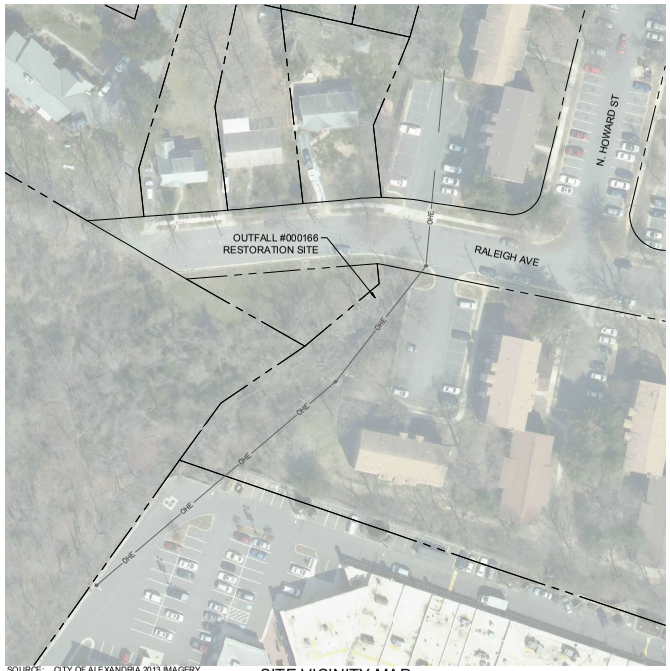
APPENDIX N

RALEIGH AVE OUTFALL INTO HOLMES RUN CONCEPT DESIGN

CITY OF ALEXANDRIA, VIRGINIA

HOLMES RUN OUTFALL #000166
CONCEPTUAL DESIGN

Sheet Index	
Sheet Number	Sheet Title
01	COVER SHEET
02	EXISTING CONDITIONS - PHOTOS
03	EXISTING CONDITIONS - PLAN AND PROFILE
04	RESTORATION CONCEPT LAYOUT
05	STREAM RESTOATION STRUCTURE DETAILS - LOG VANE & TOE WOOD
06	STREAM RESTORATION STRUCTURE DETAILS - PLUNGE AND STEP POOL



SOURCE: CITY OF ALEXANDRIA 2013 IMAGERY
LOCATION: RALEIGH AVE., HOLMES RUN PARK
(38.814183, -77.111759)

SITE VICINITY MAP

50 0 50 100 FT
1 inch = 50 feet

PROJECT DESCRIPTION:

THE PROPOSED PROJECT INCLUDES THE RESTORATION OF APPROXIMATELY 100 LINEAR FEET OF STREAM BED AND BANKS DOWNSTREAM OF AN EXISTING 36 INCH REINFORCED CONCRETE PIPE (RCP) OUTFALL.

EXISTING CONDITIONS NOTES:

FLOW EXITING THE EXISTING 36" RCP HAS UNDERMINED THE CONCRETE OUTFALL APRON REMOVING SOIL AND CREATING A LARGE SCOUR HOLE. THE EXISTING OUTFALL IS DIRECTED TOWARDS THE EXISTING OUTSIDE BANK AND HAS BEGUN TO UNDERMINE THE TOE OF SLOPE. STREAM CHANNEL APPEARS STABLE DOWNSTREAM OF THE PROJECT LOCATION WHERE BANK HEIGHT DECREASES. CONSTRUCTION ACCESS TO THE SITE WILL MOST LIKELY OCCUR FROM RALEIGH AVENUE VIA HOLMES RUN PARK PROPERTY. BASED ON THE PRELIMINARY CONCEPT, THE APPROXIMATE LIMITS OF DISTURBANCE (LOD) ARE 0.2 ACRES. IT SHOULD BE NOTED THIS IS APPROXIMATE AND WILL REQUIRE REVISION ONCE A SURVEY IS COMPLETED. WOOD STAFF IDENTIFIED 3 HEADCUTS DOWNSTREAM OF THE PROPOSED PROJECT LOCATION. THESE HEADCUTS ARE OUTSIDE THE SCOPE OF THIS PROJECT, HOWEVER THEY HAVE BEEN SHOWN ON THIS PLAN FOR REFERENCE.

NOT FOR CONSTRUCTION

NO.	DD	MON	YYYY	ISSUE / REVISION DESCRIPTION	ENG.	APPR.

CLIENT: CITY OF ALEXANDRIA
301 KING STREET
ALEXANDRIA, VA 22314

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DRAWN BY: MJH
CHECKED BY: MJH
APPROVED BY: MTB
SCALE: 1" = 50'

PROJECT: PHASE III ASSESSMENTS
CONCEPTUAL OUTFALL RESTORATION
HOLMES RUN OUTFALL #000166

SHEET TITLE: COVER SHEET

PROJECT NO.: 7526173001
DATE: 31 JANUARY 2019
DWG. SIZE: ARCH D
SHEET NUMBER: 01 OF 06

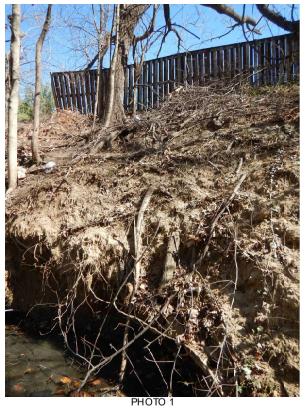


PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

PHOTO 5

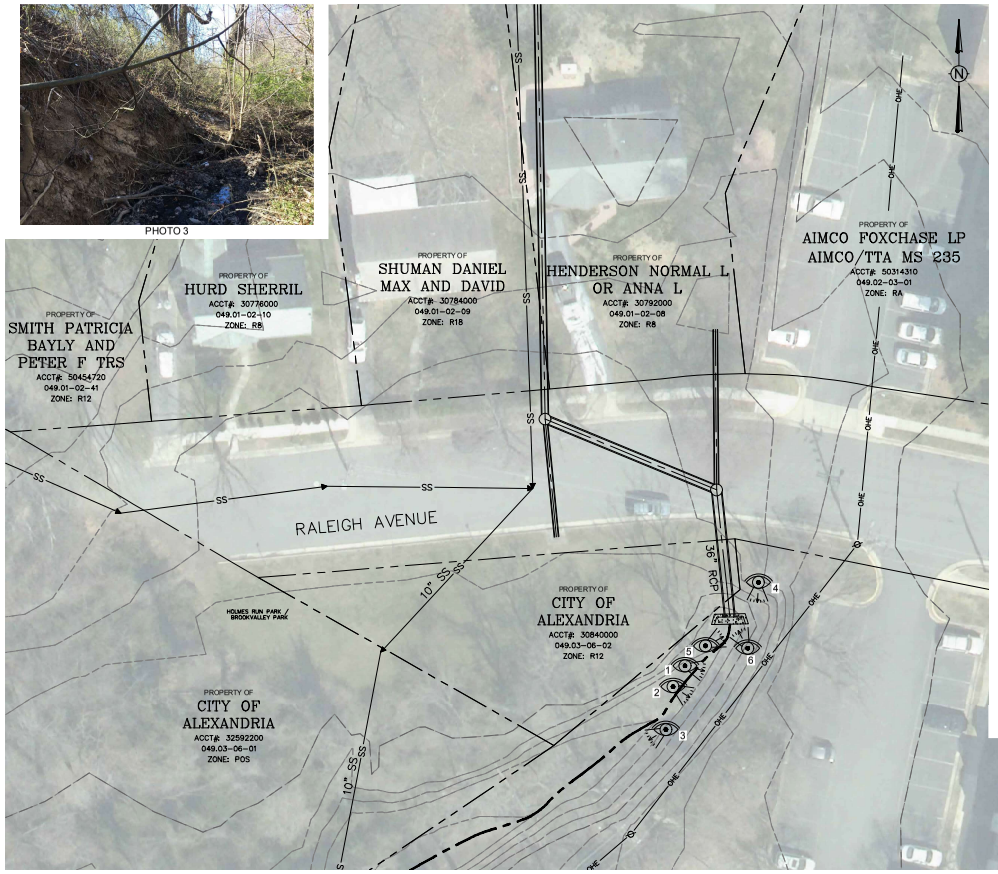
PHOTO 6

NOTE: IN ADDITION TO THE OUTFALL/STREAM DEGREDATIONS IDENTIFIED ABOVE, WOOD STAFF IDENTIFIED THREE HEADCUTS IN THE STREAM DOWNSTREAM OF THE PROPOSED PROJECT AREA. SEE INSET, BELOW, FOR APPROXIMATE LOCATIONS OF THE HEADCUTS.

APPROXIMATE HEADCUT LOCATION MAP

50 0 50 100 FT

1 inch = 50 feet



EXISTING CONDITIONS - PHOTO LOCATION MAP

20 0 20 40 FT

1 inch = 20 feet

LEGEND

- LOCATION AND PHOTO DIRECTION
- EXISTING STREAM CENTERLINE
- PROPERTY LINE
- EXISTING STORM SEWER
- SS — EXISTING SANITARY SEWER
- OHE — EXISTING OVERHEAD ELECTRIC

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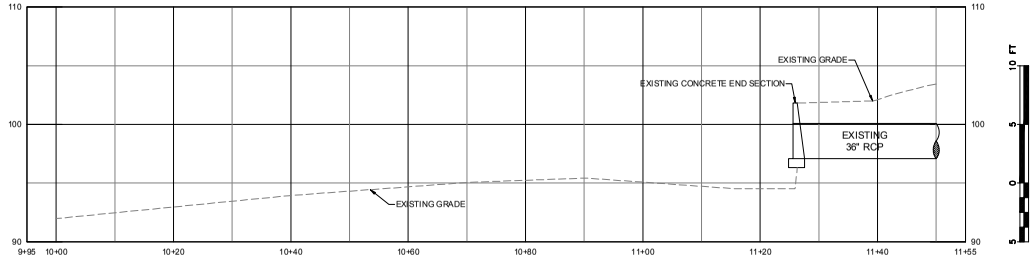
PROJECT: PHASE III ASSESSMENTS, CONCEPTUAL OUTFALL RESTORATION, HOLMES RUN OUTFALL #000166

SHEET TITLE: EXISTING CONDITIONS - PHOTOS

PROJECT NO.: 7526173001
DATE: 31 JANUARY 2019
DWG. SIZE: ARCH D
SHEET NUMBER: 02 OF 06

EXISTING OUTFALL CHANNEL ALIGNMENT

10 0 10 20 FT
1 inch = 10 feet



EXISTING OUTFALL CHANNEL PROFILE

10 0 10 20 FT
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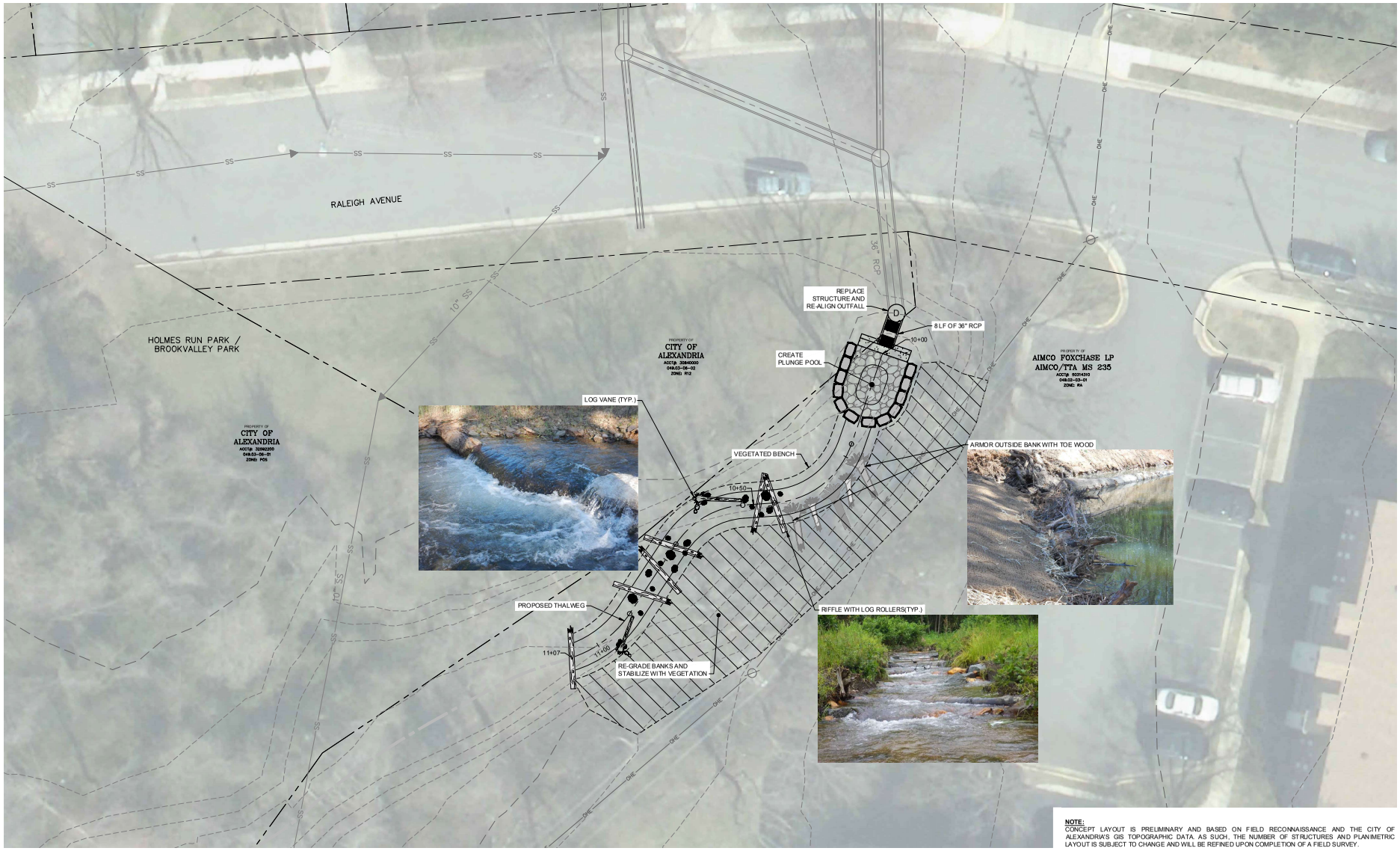
CONCEPTUAL OUTFALL RESTORATION
HOLMES RUN OUTFALL #000166

SHEET TITLE:
EXISTING CONDITIONS - PLAN AND PROFILE

PROJECT NO.: 7526173001
DATE: 31 JANUARY 2019
DWG. SIZE: ARCH D
SHEET NUMBER: 03 OF 06



NOTE:
CONCEPT LAYOUT IS PRELIMINARY AND BASED ON FIELD RECONNAISSANCE AND THE CITY OF ALEXANDRIA'S GIS TOPOGRAPHIC DATA. AS SUCH, THE NUMBER OF STRUCTURES AND PLANIMETRIC LAYOUT IS SUBJECT TO CHANGE AND WILL BE REFINED UPON COMPLETION OF A FIELD SURVEY.

CONCEPTUAL OUTFALL RESTORATION PLAN

10 0 10 20 FT
1 inch = 10 feet

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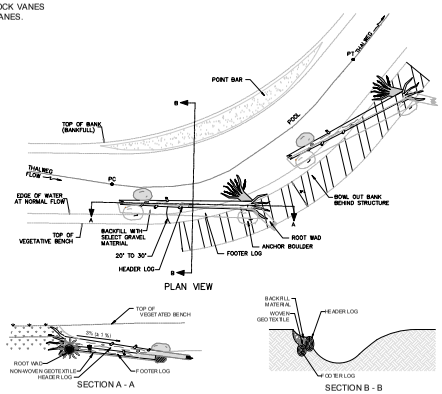
SCALE:	1" = 10'

PROJECT:
PHASE III ASSESSMENTS
CONCEPTUAL OUTFALL RESTORATION
HOLMES RUN OUTFALL #000166

SHEET TITLE:
RESTORATION CONCEPT LAYOUT

PROJECT NO.:	7526173001
DATE:	31 JANUARY 2019
DWG. SIZE	ARCH D
SHEET NUMBER	04 OF 06

NOTE:
DEPENDING ON THE AVAILABILITY OF WOOD MATERIAL AND DROUGHT PRONE NATURE OF THE OUTFALL, ROCK VANES MAY BE REQUIRED FOR SUBSTITUTION OF LOG VANES.



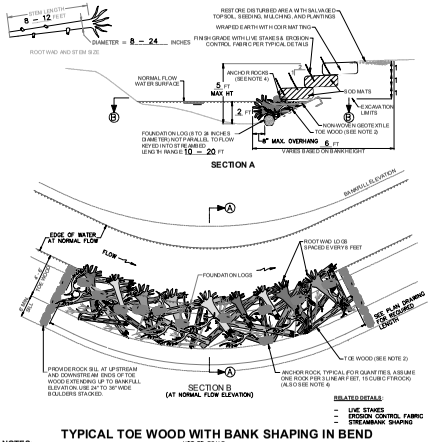
NOTES:

1. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE EQUAL TO OR FROM THE TOP OF THE LOG. THE NAILS SHALL BE ON 12IN CENTERS. FILTER FABRIC SHALL BE BURIED IN THE BOTTOM OF THE CHANNEL AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.
2. A TRENCH SHALL BE DUG IN SUCH A MANNER THAT THE ANCHOR BOULDERS ARE BURIED BENEATH THE BED SURFACE ELEVATION.
3. A HYDRAULIC EXCAVATOR WITH A BUCKET THAT CONTAINS A HYDRAULIC THUMB SHALL BE USED TO PLACE BOULDERS AND LOGS WITH THE SUPERVISION OF THE ENGINEER
4. HEADER AND FOOTER LOGS SHALL BE A MINIMUM OF 15 24 IN IN DIAMETER WITH A LENGTH OF 35 TO 50 FT. THE HEADER LOG SHALL BE SET IN PLACE FIRST WITH THE FOOTER LOG UNDERNEATH AND BEHIND THE HEADER LOG PRIOR TO BACKFILLING THE TRENCH
5. 1/3 OF THE WAY ACROSS THE CHANNEL FROM THE OUTSIDE BANK THE HEADER ROCK SHALL BE PLACED AT 2 IN. ABOVE THE CHANNEL INVERT ELEVATION
6. EACH WATER POOL TO A MINIMUM DEPTH OF 3 FEET BELOW EXISTING STREAMBED. IF BEDROCK IS ENCOUNTERED BEFORE REACHING THE MINIMUM DEPTH, THE EXCAVATION MAY STOP AT BEDROCK. EXCAVATED MATERIAL MAY BE USED FOR BACKFILLING ALONG THE LOG VANE.
7. SEED, MULCH, AND RESTORE DISTURBED AREAS TO PRE-EXISTING CONDITIONS OR BETTER. PROVIDE PLANTINGS AS REQUIRED BY PLANTING PLAN IF PROVIDED.
8. ANY SOIL DISTURBED DURING THE PLACEMENT OF J-HOOK VANES, SHALL BE SEEDED USING TEMPORARY AND PERMANENT SEEDING METHODS.
9. FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE VANE. FILTER FABRIC SHALL PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE.
10. THE GAP BETWEEN THE HEADER AND FOOTER LOG SHALL BE CHINKED BY HAND WITH GRAVEL, COBBLE AND WOODY DEBRIS FROM THE UPSTREAM DIRECTION.
11. THE HORIZONTAL ANGLE OF THE HEADER LOG OF THE VANE AND THE BANK SHALL BE BETWEEN 20 DEGREES
12. SELECT GRAVE MATERIAL CAN BE HARVESTED FROM SPOIL PILES ON SITE BUT SHOULD HAVE A GRADATION WITH A D16 40MM (1.6IN), D50=80MM (3.1IN), D84=200MM (8IN), D95=300MM (12IN), OR BE APPROVED BY ON-SITE TECHNICAL REPRESENTATIVE.
13. THE ROOTWAD SHALL BE A MINIMUM OF 6.5 FT IN LENGTH, WITH A ROOT FAN WITH A DIAMETER OF AT LEAST 3 FT, AND A DIAMETER OF 18IN - 24IN.
14. STRUCTURE INVERT ELEVATION SHALL BE THE SAME ELEVATION AS THE RIFFLE IMMEDIATELY DOWNSTREAM OF THE STRUCTURE IN THE PLAN VIEW.

TYPICAL LOG VANE

EXAMPLE CONSTRUCTED LOG VANE

NOTE:
DEPENDING ON THE AVAILABILITY OF WOOD MATERIAL AND DROUGHT PRONE NATURE OF THE OUTFALL, ROCK TOE MAY BE REQUIRED FOR SUBSTITUTION OF THE TOE WOOD.



RELATED DETAILS:
- LIVE STAKES
- EROSION CONTROL FABRIC
- STREAMBANK SHAPING

TYPICAL TOE WOOD WITH BANK SHAPING IN BEND

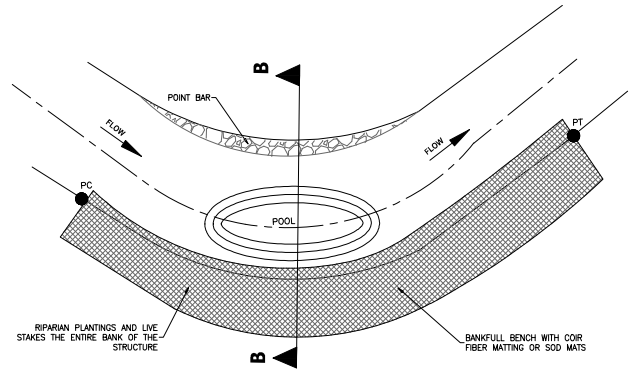
NOT TO SCALE

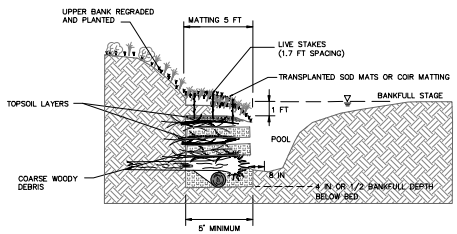
NOTES:

1. PLACE THE TOP OF TOE WOOD AT OR WITHIN ONE FOOT OF THE ESTABLISHED NORMAL FLOW ELEVATION.
2. TOE WOOD CONSISTS OF A MIX OF "DEAD WOOD" LOGS, BRANCHES, SHRUBS, AND OTHER WOODY VEGETATION INSTALLED AT VARIOUS ANGLES, BUT NOT PARALLEL TO THE FLOW. LAYER THE WOODY DEBRIS MATERIAL ON BOTTOM AND FORM A MAT OF BRANCHES FROM LAYER ANGLE ROOTWADS SLIGHTLY UPSTREAM INTO FLOW.
3. FILL BETWEEN ROOTWAD LOGS WITH MIX OF WOODY DEBRIS PER NOTE 2.
4. PROVIDE ANCHOR ROCKS TO WEIGHT DOWN LARGER SIZE LOGS. USE A MINIMUM ROCK SIZE OF 2.0 FT MEDIAN DIAMETER.

TYPICAL USES:

- PROVIDES EXCELLENT AQUATIC HABITAT BY INTRODUCING ORGANIC MATTER AND COVER TO THE RIPARIAN ENVIRONMENT.
- REDUCES NEAR BANK SHEAR STRESS, WHICH STOPS OR SLOWS BANK EROSION, REDUCES SEDIMENT LOAD, AND SAVES SOIL.
- REINFORCES STREAMBANK USING VEGETATION THAT STRENGTHENS THE BANK OVER TIME.





SECTION B-B

TOE WOOD STRUCTURE NOTES:

1. SALVAGE TREE TOPS AND BRANCHES FROM FALLEN ON-SITE TREES FOR RE-USE AS COARSE WOODY DEBRIS.
2. MIX LAYERS OF TOPSOIL ON TOP OF COARSE WOODY DEBRIS.
3. FOR THE BOTTOM LAYER, INSTALL LIVE STAKES ON TOP OF COARSE WOODY DEBRIS AND COVER WITH A LAYER OF TOPSOIL. THIS SHALL BE AT A DEPTH OF 4 INCHES OR 1/2 BANKFULL, BELOW THE BOTTOM OF THE BED.
4. WOODY DEBRIS SHALL NOT EXTEND INTO THE CHANNEL MORE THAN 8 INCHES.
5. ON STRAIGHT POOL SECTIONS, TOE WOOD SHALL EXTEND FROM END OF VANE ARMS TO HEAD OF RIFFLE.

EXAMPLE TOE WOOD

EXAMPLE ROCK WALL WITH TOE WOOD

EXAMPLE ROCK TOE WOOD

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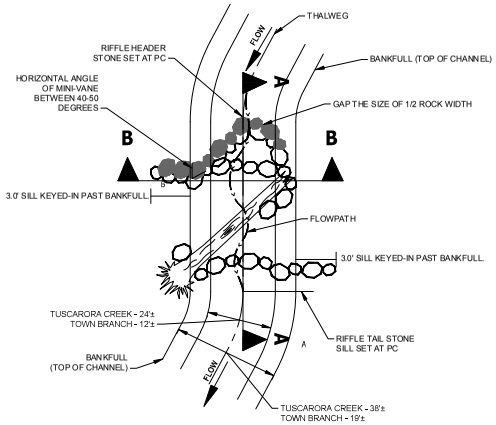
PROJECT:
PHASE III ASSESSMENTS
CONCEPTUAL OUTFALL RESTORATION
HOLMES RUN OUTFALL #000166

SHEET TITLE:
STREAM RESTOATION STRUCTURE DETAILS - LOG VANE & TOE WOOD

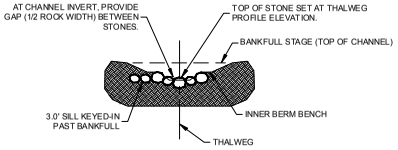
PROJECT NO.: 7526173001
DATE: 31 JANUARY 2019
DWG. SIZE: ARCH D
SHEET NUMBER: 05 OF 06

RIFFLE SECTION STRUCTURES

NTS

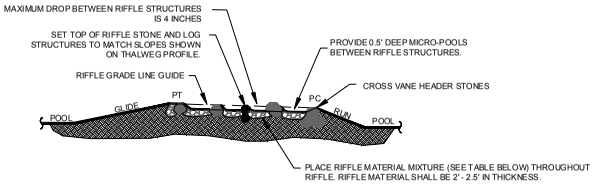


EXAMPLE RIFFLE
(SHOWN FOR INFORMATION ONLY)



TYPICAL RIFFLE STRUCTURE INSTALLATION CROSS SECTION
(NOT TO SCALE)

SECTION B-B



TYPICAL RIFFLE STRUCTURE INSTALLATION PROFILE
(NOT TO SCALE)

SECTION A-A

RIFFLE MATERIAL MIXTURE

CLASS I (D_{50} = 1.1')
CLASS III (D_{50} = 2.2')
57 STONE
SUPPLEMENTAL EX. BED MATERIAL

RIFFLE STRUCTURE STONE

4' X 3' X 2' STRUCTURE STONE

*CLASS I, CLASS III, AND 57 STONE SHALL BE EQUALLY MIXED AND SUPPLEMENTED WITH EXISTING BED MATERIAL AT THE DIRECTION OF THE FIELD ENGINEER.

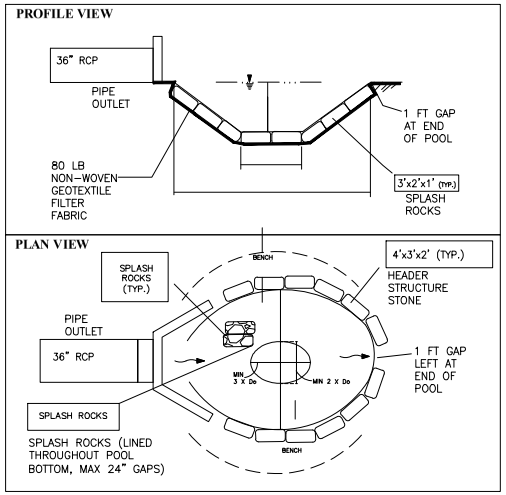
RIFFLE HEADER AND FOOTERS ARE BASED ON SIZES SHOWN IN THE STRUCTURE STONE SIZE TABLE ON SHEET C-46. RIFFLE MATERIAL SHALL BE 2 - 2.5 FEET IN THICKNESS.

RIFFLE NOTES:

1. THE MAXIMUM AMOUNT OF DROP FROM ONE MINI-VANE TO THE NEXT SHALL BE NO GREATER THAN 4-INCHES. THE COMBINED AMOUNT OF DROP OVER ALL THE MINI-VANES SHALL NOT EXCEED THE TOTAL AMOUNT OF FALL ALONG THE RIFFLE SLOPE.
2. MINI-VANES SHALL BE EQUALLY SPACED ALONG THE RIFFLE.
3. A HYDRAULIC EXCAVATOR WITH A BUCKET THAT CONTAINS A HYDRAULIC THUMB SHALL BE USED TO PLACE BOULDERS AND LOGS WITH THE SUPERVISION OF THE ENGINEER.
4. LOGS FOR CONSTRUCTED RIFFLE SHALL BE A MINIMUM OF 1.5-FOOT IN DIAMETER WITH A LENGTH OF 10± FEET. LOGS AND BOULDERS CAN BE SUBSTITUTED DURING CONSTRUCTION WITH THE APPROVAL OF THE TOWN OF LEESBURG.
5. ⅓ OF THE WAY ACROSS THE CHANNEL FROM THE OUTSIDE BANK, THE HEADER ROCK SHALL BE PLACED AT 2 INCHES ABOVE THE CHANNEL INVERT ELEVATION.
6. THERE SHALL BE A GAP BETWEEN THE HEADER ROCKS OF 1/2 ROCK WIDTH.
7. THE BOULDERS SHALL SLOPE FROM THE BED ELEVATION, AT THE HEAD OF THE VANE, TO ¾ BANKFULL ELEVATION AT A SLOPE OF 3%-5%. HEADER AND FOOTER BOULDERS SHALL BE TIED SECURELY INTO THE BANK IN SUCH A WAY THAT IT ELIMINATES THE POSSIBILITY OF STREAMFLOW DIVERTING AROUND THEM.
8. ANY SOIL DISTURBED DURING THE PLACEMENT OF THE RIFFLE SHALL BE SEEDED USING TEMPORARY AND PERMANENT SEEDING METHODS.
9. THE THALWEG OR LOW POINT IN THE CHANNEL SHALL ALTERNATE LEFT AND RIGHT OF THE CHANNEL CENTERLINE BY 10 INCHES.
10. THE GAP BETWEEN THE HEADER AND FOOTER BOULDERS SHALL BE CHINKED BY HAND WITH GRAVEL AND COBBLE FROM THE UPSTREAM DIRECTION.
11. THE HORIZONTAL ANGLE OF THE HEADER BOULDERS OF THE MINI-VANE AND THE BANK SHALL BE BETWEEN 40-50 DEGREES.
12. RIFFLE MATERIAL SHALL CONSIST OF A 2' - 2.5' THICKNESS OF CLASS I, CLASS III AND 57 STONE MIXED IN EQUAL PARTS BY THE CONTRACTOR AND SUPPLEMENTED WITH EXISTING BED MATERIAL AT THE DIRECTION OF THE ON-SITE TECHNICAL REPRESENTATIVE. ANY DEVIATION FROM THE SPECIFIED MIX DESIGN SHALL BE APPROVED BY THE TOWN OF LEESBURG.
13. IF A ROOT WADS IS USED IN THE STRUCTURE, THE ROOT WAD SHALL BE A MINIMUM OF 7 FT IN LENGTH, WITH A ROOT FAN WITH A DIAMETER OF AT LEAST 4 FT AND A DIAMETER OF 1.5 FT. 90% OF THE ROOT FAN SHALL BE BURIED IN THE BANK OF THE STRUCTURE.
14. THE ELEVATION OF THE STRUCTURES CAN BE INTERPOLATED FROM THE DESIGN PROFILE AT THE LOCATION AND STATIONING OF EACH INDIVIDUAL STRUCTURE.
15. AS THE TAIL OD THE RIFFLE APPROACHES THE PROPOSED CROSS VANES, THE CONTRACTOR SHALL CONSTRUCT THE INNER BERM FEATURE SUCH THAT IT GRADUALLY REDUCES AND FANS OUT/TAPERS INTO THE BACKSIDE OF THE VANE ARM AND DOES NOT IMPEDE OR BLOCK THE FLOW OF WATER THROUGH THE THROAT OF THE CROSS VANE.

PLUNGE POOL

(FIRST POOL BELOW PIPE OUTFALL) - N.T.S.



PLUNGE POOL TYPICAL DETAIL
N.T.S.

CONSTRUCTED PLUNGE POOL
(SHOWN FOR INFORMATION ONLY)

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SHEET TITLE: STREAM RESTORATION STRUCTURE DETAILS - PLUNGE AND STEP POOL

PROJECT NO.: 7526173001
DATE: 31 JANUARY 2019
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SHEET NUMBER: 06 OF 06