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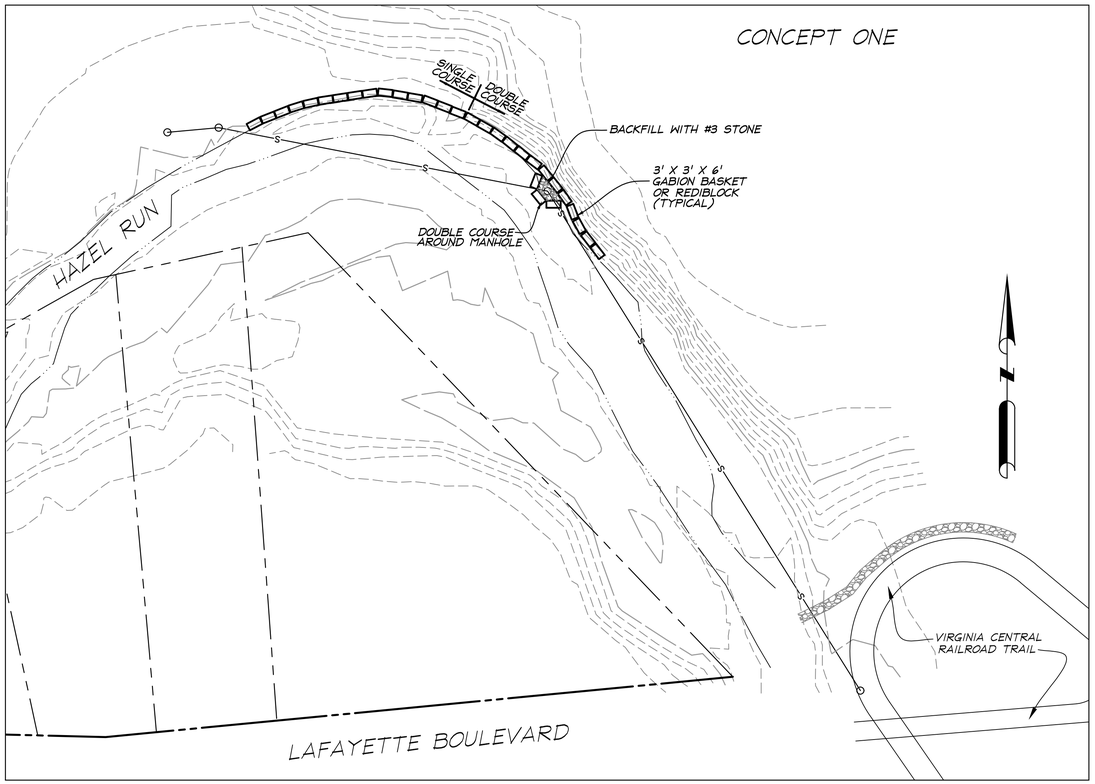

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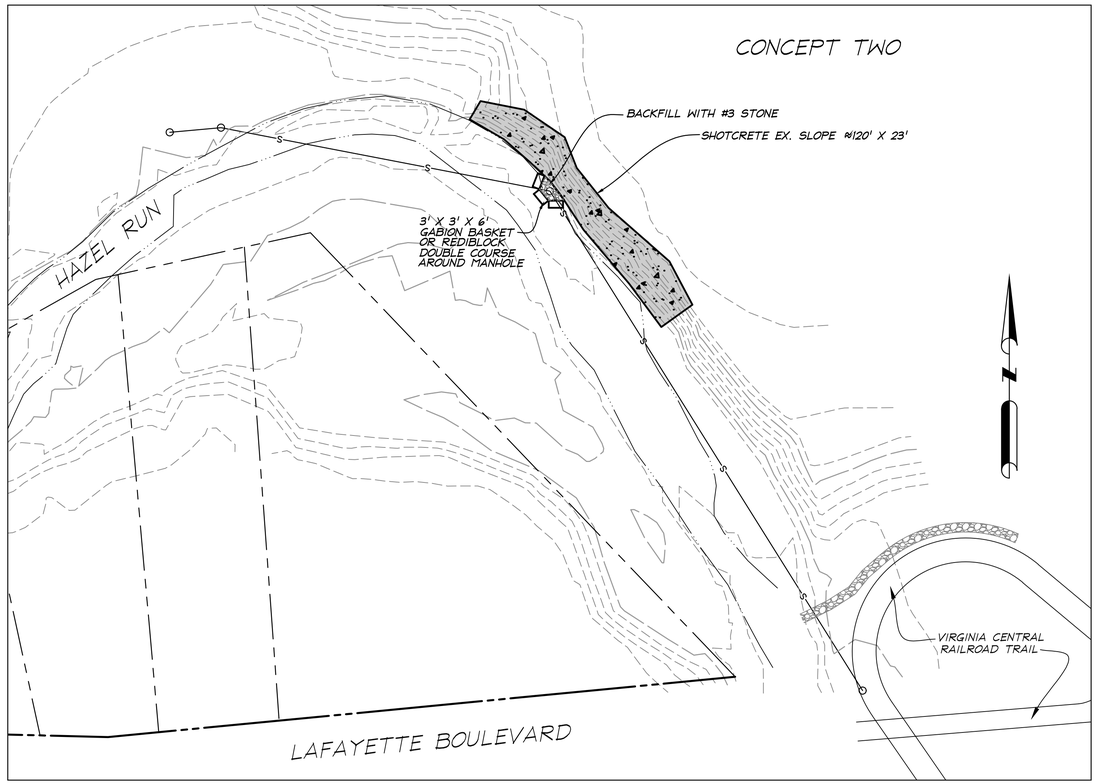

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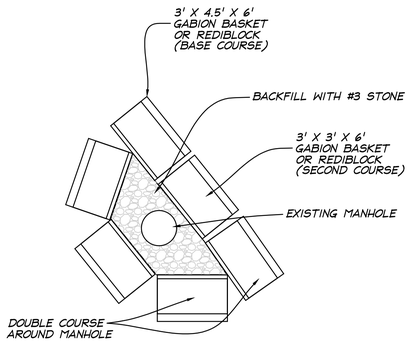

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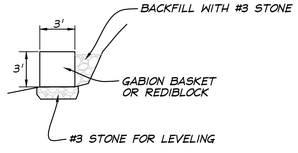

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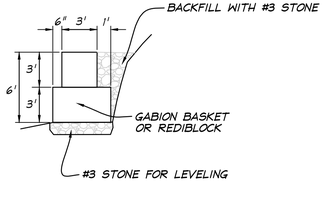

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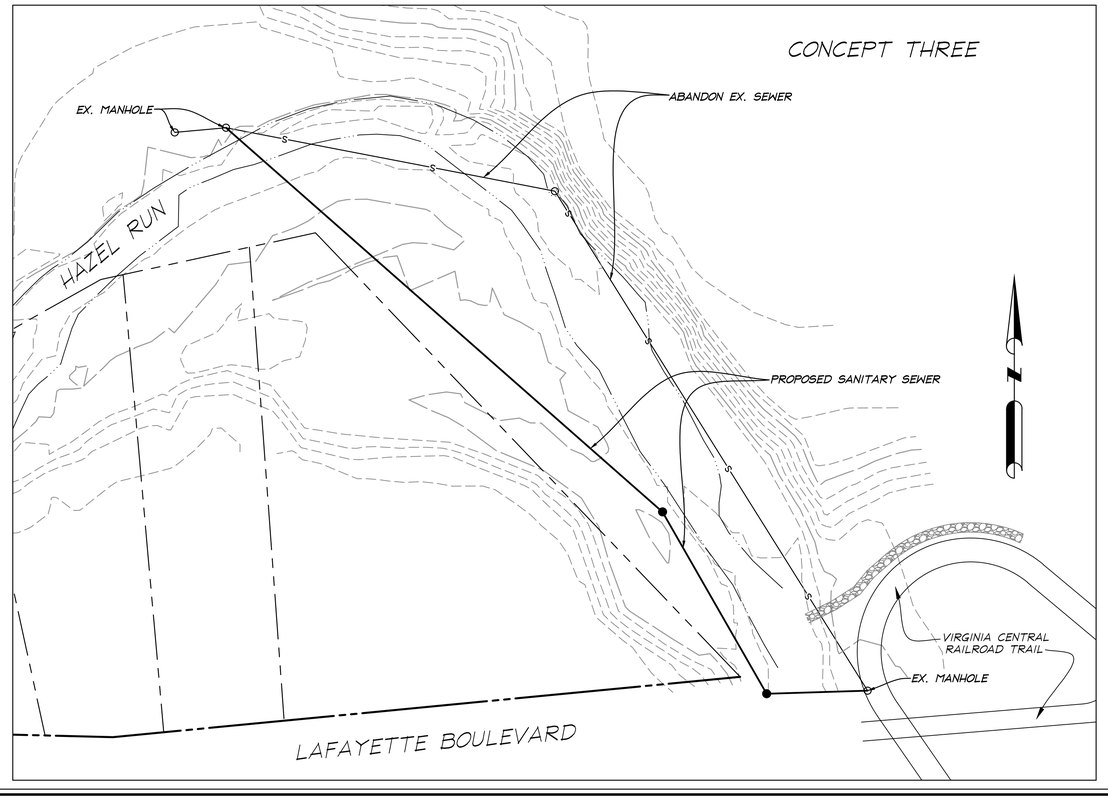

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HAZEL RUN SANITARY SEWER MODIFICATIONS CONCEPT PLANS

CITY OF FREDERICKSBURG, VIRGINIA

NO.	REVISION	DATE

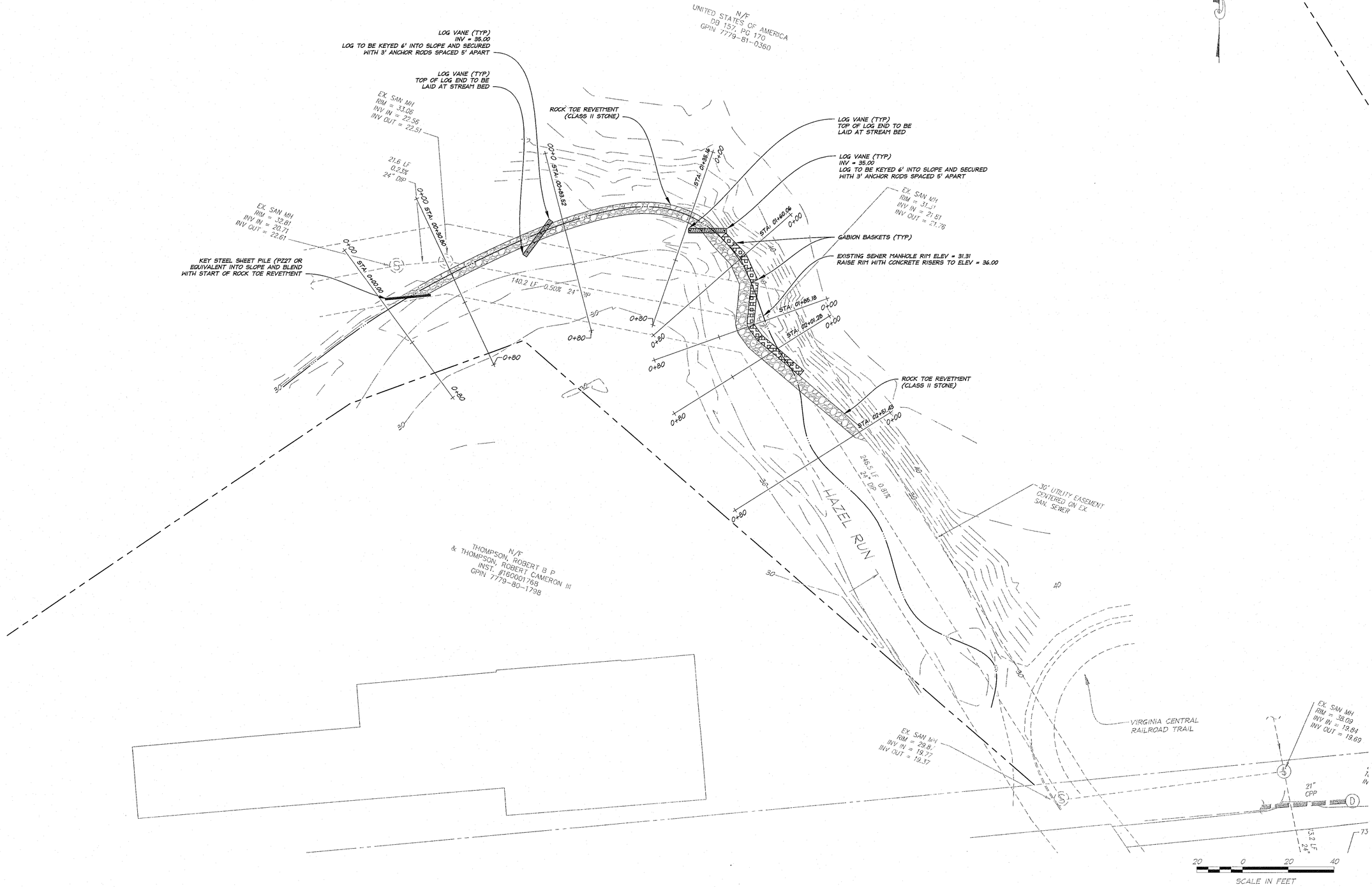
DESIGNED BY:
DRAWN BY:
CHECKED BY:
SCALE: 1" = 30'
DATE: 10/31/2016
PROFESSIONAL SEAL

DRAWING TITLE

SHEET 1 OF 1

WEA Cad File Name

JOB NO.: 1901-1



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CONSTRUCTION PLANS
HAZEL RUN MODIFICATION

CITY OF FREDERICKSBURG, VA

NO.	REVISION	DATE	APP.

DESIGNED BY:	PLH
DRAWN BY:	MGM
CHECKED BY:	KLO
SCALE:	1" = 20'
DATE:	5/12/2017

PROFESSIONAL SEAL

COMMONWEALTH OF VIRGINIA
KEITH LUC OSTER
Lic. No. 035846
MAY 12, 2017
PROFESSIONAL ENGINEER

DRAWING TITLE

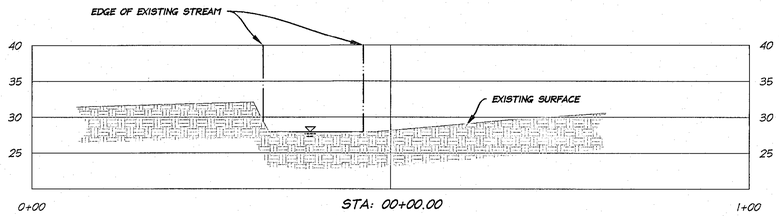
SITE PLAN

C-1
SHEET 1 OF 2

1901-02
WEA Project Number

Municipal Number

Drawing name: P:\1901\1901-02 Hazel Run\Cadd\Engineering\Plans\Site Construction Plans\1901-02 Site Plan.dwg Plan Jul 17, 2017 4:20pm by: phitchko



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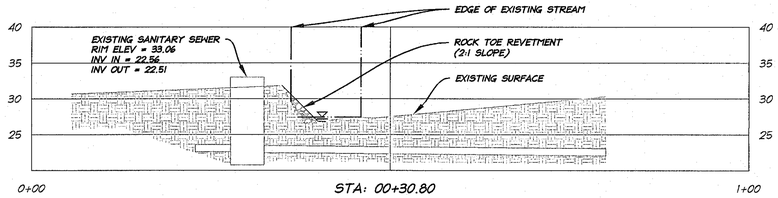

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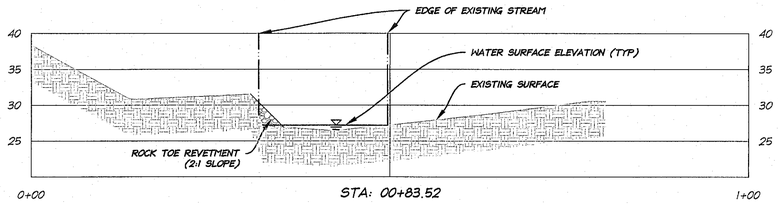

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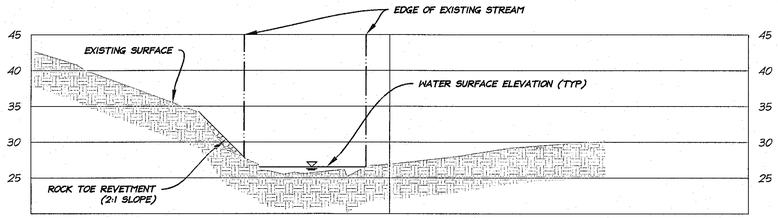

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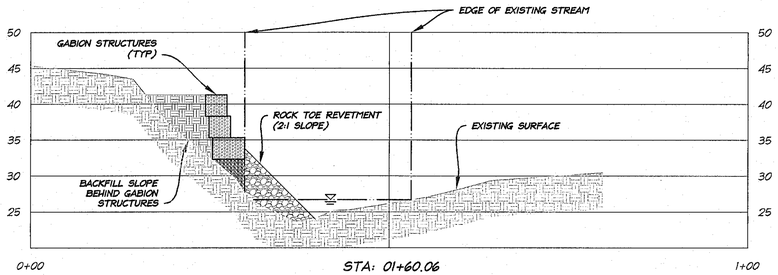

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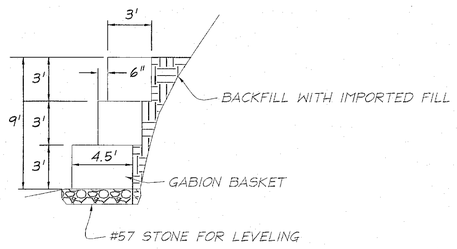

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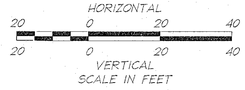

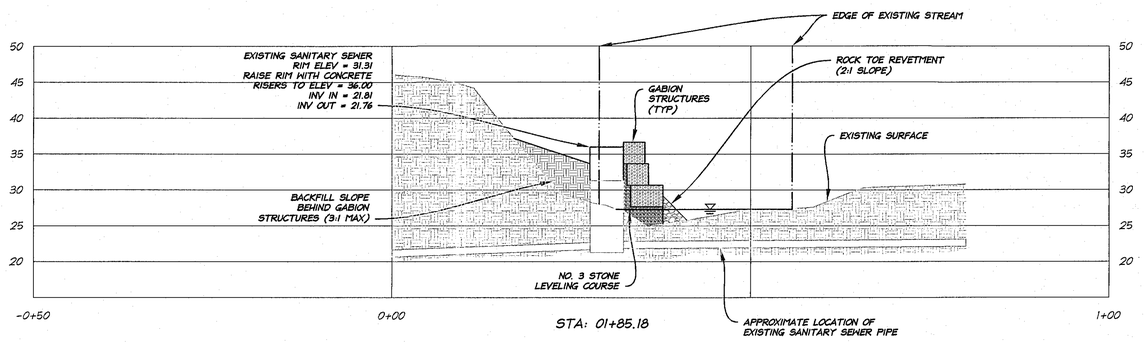

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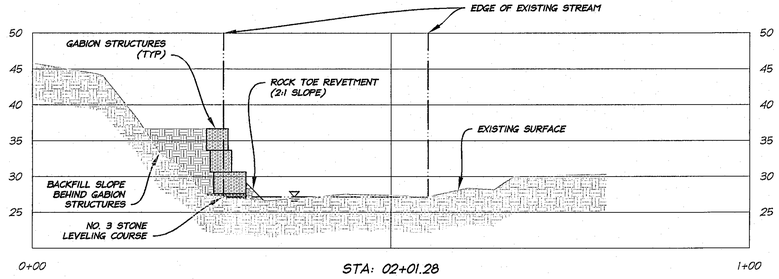

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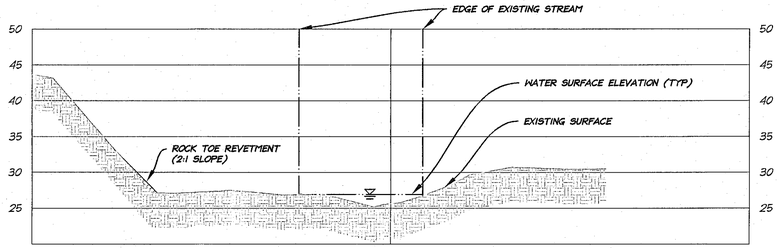

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PRACTICE 4.4: LOG VANES

In-stream wood structure designed to direct near bank erosional forces away from streambank

DESCRIPTION

Log vanes are used to deflect near bank erosional forces away from unstable streambanks and to improve/create aquatic habitat through the formation of scour pools.

APPROPRIATE USES

- To deflect erosional forces away from the streambank at the upstream end of the outer mender bend or other unstable areas.
- In sand, silt, and clay bed streams or in streams where a design preference for woody material is expressed.
- When fish habitat enhancement or flow deflection are desired.

LIMITATIONS

- The Qcf height must be accurately located for the stream as the vane is set into the streambank at the Qcf elevation.
- Vanes should not be used in stream reaches with channel slopes greater than 3%.
- Log vanes have limited lengths, so may not be suitable for large rivers.
- Logs degrade over time and may need to be periodically maintained or replaced.

DESIGN REQUIREMENTS AND PROCEDURES

- Log Vanes should intersect the bank at an angle between 20 and 30 degrees. The angle is measured upstream from the tangent line where the vane intercepts the bank. A smaller angle produces a longer arm. A longer arm provides more linear feet of bank protection.
- Log Vane slopes are typically 2-15 percent. Slopes are constrained by length of available logs. The steeper the slope of the vane, the less stable it may be.
- Specify elevation and offset values for both ends of the vane arms. This ensures exact placement of the structure by the contractor.
- Designer must specify a design depth for the scour pool immediately downstream of the log vane. A scour depth analysis is recommended to aid in this effort.
- The log vane must terminate at the Qcf elevation. If the top of bank is above Qcf, a Qcf bench must be created. The log vane must be properly connected or entrenched into the bank at the Qcf elevation.

MATERIAL SPECIFICATIONS

- Logs: 8 inches to 12+ inches in diameter rot-resistant logs.
- Anchors: 1/4 inch minimum diameter, 3 foot long rebar or drift pins for anchoring and connecting logs.
- Support Pilings: 3 inches to 6 inches in diameter logs with one angled and one flat end. Long enough to extend from the normal baseflow elevation to a minimum of one foot below the design scour depth.
- Riprap: Riprap per Standard and Specification 3.19; Riprap of the Virginia Erosion and Sediment Control Handbook for bank armoring and toe protection.

CONSTRUCTION RECOMMENDATIONS

Ensure no leakage/flow under or around the structure by properly grading, sealing, and compacting under and around the structure.

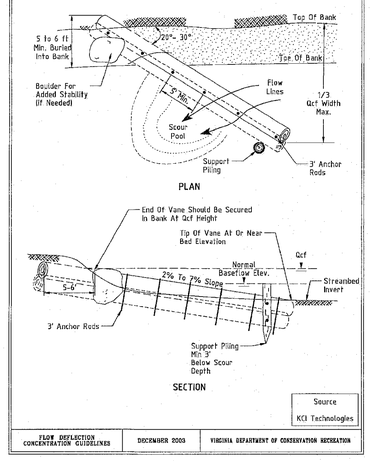
- After installation, check proper function/flow path by observing flow over structure. Repair as needed to ensure proper function.
- The log vane should span a maximum of 1/3 of the Qcf width.

INSTALLATION GUIDELINES

- Excavate a trench along the bottom of the stream bed and to the Qcf elevation in the streambank for the log vane. Excavate a Qcf bench if the top of bank is not at the Qcf elevation. The log vane must be properly connected or entrenched into the bank at the Qcf elevation.
- Anchor logs into the stream bed to a depth below the design scour depth. Logs should be anchored together with anchor rods at a spacing of 5 feet on center. Place an anchor on both sides of the support piling at the streamside end of the structure.
- Place the support piling on the downstream side of the log. The support piling should be driven into the bottom below the anticipated scour depth. Anchor the support piling to the log vane with one anchor per log comprising the vane.
- The log vane should extend into the bank a minimum of 5 to 6 feet. Riprap may be needed upstream and downstream of where the log vane enters the bank to enhance stability. If riprap is used, it should be designed and constructed per Standard and Specification 3.19 of the Virginia Erosion and Sediment Control Handbook.
- Excavate the scour pools to the design depth.

LOG VANES

The Virginia Stream Restoration & Stabilization Best Management Practices Guide
DETAIL 4.4: LOG VANES



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CONSTRUCTION PLANS
HAZEL RUN MODIFICATION

CITY OF FREDERICKSBURG, VA

NO.	REVISION	DATE	APP.

DESIGNED BY:	PLH
DRAWN BY:	MGM
CHECKED BY:	KLO
SCALE:	AS SHOWN
DATE:	5/12/2017

PROFESSIONAL SEAL

COMMONWEALTH OF VIRGINIA
KEITH LUC OSTER
Lic. No. 035848
MAY 12, 2017
PROFESSIONAL ENGINEER

DRAWING TITLE

SECTIONS VIEWS & DETAILS

C-2
SHEET 2 OF 2

1901-02
WEA Project Number

Municipal Number

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