

Manheim Township

COMBINED
POLLUTANT REDUCTION PLAN
ADDENDUM 2
Permit Term (2018-2023)

Draft: July 24, 2017
Final: September 15, 2017
Revised: May 23, 2018
Addendum 1: January 10, 2020
Addendum 2: November 19, 2025

Prepared For:
MANHEIM TOWNSHIP
1840 Municipal Drive
Lancaster, PA 17601



Prepared by:
 **C.S. DAVIDSON, INC.**
ENGINEERING A BETTER COMMUNITY
322 North Arch Street, Floor 3, Lancaster, PA 17603

Executive Summary

Please let this document serve as the official Addendum No. 2 to the previously approved “Combined Pollutant Reduction Plan” for Manheim Township Dated September 15, 2017, and previously revised May 23, 2018. This document replaces Section E of the aforementioned Plan “BMPs to Achieve the Minimum Required Reductions”. The Township has completed ten of the previously proposed projects and as-built load removal values as well as the as constructed construction costs have been added to the project data tables. The Township has also identified three additional site that are to be constructed in the coming years. These projects have been added to the tables. All proposed projects have gone through detailed engineering and are either fully permitted or in the process of being permitted with the PADEP. This section has also been revised to include scheduled year of construction and estimated construction costs for each project. Additionally, the addendum includes the 25,000 lbs./yr. credit established by the Township’s collaboration in the Multi-municipal Little Conestoga Blue/Green Stream Restoration project. This is to also serve as supplemental information pertaining to the three projects proposed since the initial addendum of January 10, 2020.

Section E

BMPS to Achieve the Minimum Required Reductions

Revised November 19, 2025

BMP to Achieve the Minimum Required Reductions

The Township has defined thirteen projects to exceed the previously determined 488,499 pounds sediment per year reduction minimum requirements. Of those projects ten have been constructed. For pollutant reduction calculation, the DEP Simplified Method was utilized to remain consistent with pollutant loading baseline and previously proposed BMPs.

Manheim Township Constructed/Proposed BMPs:

Name	TN (lbs)	TP (lbs)	TSS (lbs)
Little Conestoga Blue/Green Restoration Projects	-	-	25,000(Credit)**
RLPS	132	119	84,863*
Wetherburn Commons	118	107	62,383*
Stoner Park	110	100	65,794*
Stonehenge Linear Park	162	147	98,467*
RLPS Extension	92	83	54,754*
Grandview Stream Restoration	81	73	48,470*
Pleasure Road	130	118	77,661*
Overlook Park Basin Retrofit	64	3	2,280
Grandview Extension	155	140	92,453
Granite Run Phase 1	117	106	69,923
Granite Run Phase 2	104	95	62,473
Total	1,265	1,091	744,521

*Based on actual constructed length.

**See Little Conestoga Creek Blue/Green Stream Restoration Section of Addendum.

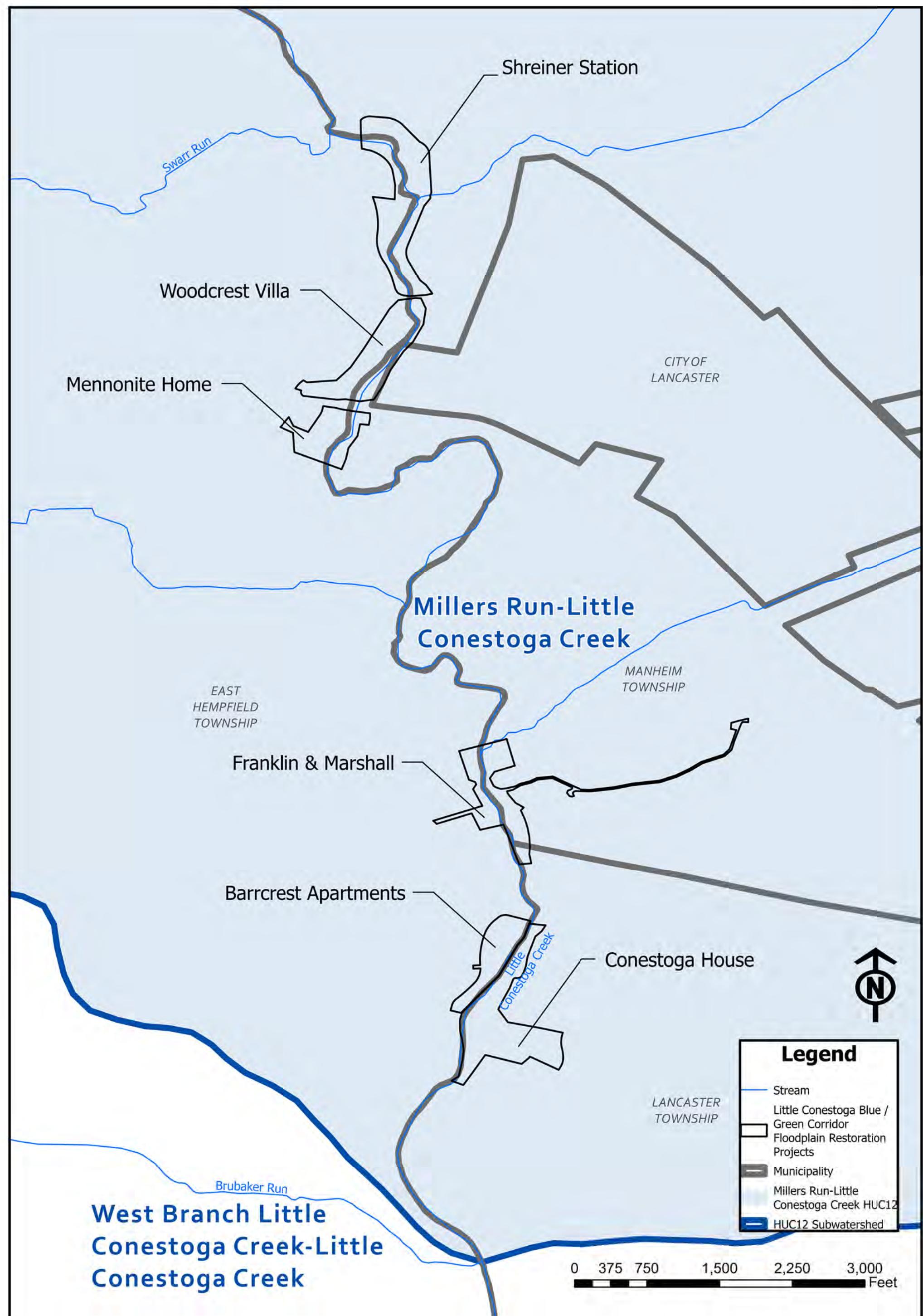
Required Pollutant Load Removal (TSS) = 488,499 lbs/yr
Anticipated Pollutant Load Removal from projects (TSS) = 744,521 lbs/yr
-256,022 lbs/yr

Project	Construction Year	Construction Cost
RLPS	Constructed 2022	\$201,422
Wetherburn Commons	Constructed 2022	\$202,725
Stoner Park	Constructed 2020	\$276,700
Stonehenge Linear Park	Constructed 2022	\$259,706
RLPS Extension	Constructed 2022	\$144,770
Grandview Stream Restoration	Constructed 2020	\$106,600
Pleasure Road	Constructed 2022	\$200,742
Overlook Park Basin Retrofit	Constructed 2020	\$114,450
Grandview Extension	Constructed 2024/25	\$358,966
Little Conestoga Blue/Green Resto Projects	Applied From 2024	\$75,000 (Contribution)
Granite Run Phase 1	Proposed 2026/27	\$271,490 (Estimated)
Granite Run Phase 2	Proposed 2028	\$242,563 (Estimated)
Total		\$2,455,134

The summary sheet for each proposed BMP and preliminary engineering design is included within this section.

Little Conestoga Creek Blue/Green Restoration Credit

Constructed BMP



Attachment 1:

Little Conestoga Blue / Green Corridor Floodplain Restoration Projects within
Millers Run - Little Conestoga Creek HUC12 Subwatershed

Little Conestoga Blue/Green Corridor Floodplain Restoration

Load Reduction Summary

LSI Project No. D-1245.5-21

September 14, 2023

Revised: July 15, 2024

Introduction

The Little Conestoga Creek Foundation has begun the Little Conestoga Creek Blue/Green Corridor project along the Little Conestoga Creek in Lancaster County, Pennsylvania. The vision for the Blue/Green Corridor is to establish a series of floodplain restoration projects in combination with a pedestrian trail, linking recreation with restoration projects. The trail will strategically connect a 3+-mile pedestrian corridor along the Little Conestoga Creek and interface into pedestrian trail networks that are presently disconnected. The floodplain restorations along this reach will remove legacy sediment impairments, promote the reduction of fine-grained sediment in the waterway and restore riparian wetlands. The floodplain restoration at the Barrcrest Apartments has been completed and the remaining projects are anticipated to be designed and implemented in phases over the next 1-3 years.

The purpose of the floodplain restoration component of the project is to remove legacy sediment, restore impaired historic wetlands along the stream corridor and enhance natural aquatic resources within the floodplain. The restored wetlands and enhanced aquatic functions will replicate natural conditions and processes to the maximum extent possible given modern constraints (infrastructure, property limitations, sediment regime, etc.). Removing the legacy sediment also will eliminate a substantial sediment and nutrient source from within the Little Conestoga Creek Watershed by preventing bank erosion. Restored floodplain and wetland functions within the floodplain will include removing and processing sediment and nutrients transported from the upstream watershed. In addition, reconnecting the floodplain areas with both surface water and groundwater will restore natural biogeochemical processes that improve water quality from hyporheic exchanges. The restored natural aquatic resources also will provide important secondary benefits of aquatic habitat restoration, including critical wetland and stream habitats that support indigenous flora and fauna. Overall, the project will provide significant systemic ecological uplift by restoring natural aquatic resources and the processes they provide.

This project will provide significant sediment and nutrient load reductions within the Little Conestoga Creek watershed. The resulting load reductions could contribute towards the targets in the approved Pollutant Reduction Plans (PRP) for the municipalities participating in the various project sites along the reach. Load reduction estimates presented in this summary and the attachments are based on the Protocols described in A Unified Guide for Crediting Stream and Floodplain Restoration Projects in the Chesapeake Bay Watershed (Wood, Schueler and Stack, 2021) (Expert Panel Report).

Project Status

The Blue/Green corridor consists of numerous properties in various stages of implementation. As of the date of this report, the project statuses and associated grading utilized in this pollutant reduction analysis are as follows:

- Shreiner Station: 50% design
- Woodcrest Villa: 75% design
- Mennonite Home: Final design completed, Chapter 105 permit obtained
- Franklin & Marshall: 75% design
- Barrcrest: Construction Completed 2023
- Conestoga House: Final design completed, Chapter 105 permit obtained
- Trib to Little Conestoga Creek: Final design completed, Chapter 105 permit obtained

Site Assessment and Monitoring

As part of the geomorphic site assessment completed prior to the floodplain restoration, bank erosion rates were estimated using the Bank Assessment for Non-point source Consequences of Sediment (BANCS) method, which utilizes a Bank Erodibility Hazard Index (BEHI) and Near Bank Stress (NBS) evaluation to approximate annual bank erosion based on regional curves developed from empirical data (Rosgen, 2009). Sets of bank pins were installed throughout the reach at locations that were chosen to represent the ranges of typical conditions found in the restoration area. Each project site received the following number of sets:

- Shreiner Station: 3 sets
- Woodcrest Villa: 3 sets
- Mennonite Home: 3 sets
- Franklin & Marshall: 1 set
- Barrcrest: 2 sets
- Conestoga House: 2 sets
- Trib to Little Conestoga Creek: 2 sets

Bulk density and soil nutrient samples were collected at each bank pin location and analyzed at an accredited lab to provide site specific data for use in the load reduction calculations. Initial BANCS assessments and estimates were conducted at the time of bank pin installation. These dates are as follows:

- Shreiner Station: October 6, 2020
- Woodcrest Villa: October 6, 2020
- Mennonite Home: October 6, 2020
- Franklin & Marshall: October 26, 2020

- Barrcrest: October 26, 2020
- Conestoga House: October 26, 2020
- Trib to Little Conestoga Creek: October 26, 2020

The Barrcrest site bank pins were measured again on September 14, 2022, to determine actual rates of erosion at these representative locations. See Protocol 1 section for further discussion. The remaining project sites will be measured and calibrated prior to construction.

Load Reduction Calculations

Load reduction calculations for the Little Conestoga Blue/Green Corridor floodplain restoration project sites were developed using Protocols 1, 2 and 3, as established in the Expert Panel Report. Protocol 1 estimates reduced sediment and nutrient loading from prevented bank erosion. Protocol 2 estimates nitrogen load reduction as a result of increased nitrogen processing in the hyporheic zone. Protocol 3 estimates the trapping of incoming sediment from the upstream watershed.

The load reduction calculations and results are presented as Attachment 1. The final reported load reductions are adjusted based on a site-specific delivery ratio to align with the baseline load calculation methodology used in the PRP. These delivery ratios are calculated by multiplying the “Stream to River” and “River to Bay” factors for Sediment, Nitrogen, and Phosphorus, respectively as provided by the Chesapeake Bay scenario viewer for the “Stream Bed and Bank” load source in the Land River Segment in which the project resides.

Protocol 1

Protocol 1 identifies the BANCS Assessment as an acceptable method to estimate bank erosion rates. A BANCS assessment was used to establish an initial estimate of the pre-restoration sediment loading resulting from bank erosion. Bank pin monitoring data will be used to calibrate the BANCS estimates to reduce potential variability and provide a more robust erosion rate estimate. Rivermorph software was used to evaluate the BANCS assessment data and develop a reach weighted loading (lb/ft/yr).

For the Barrcrest site, Rivermorph was also used to evaluate the bank pin profiles and calculate the actual erosion rate for use in calibration. The measured erosion rate for Barrcrest confirmed the original erosion rate estimates so no calibration adjustments were necessary.

Bank Pin profiles will be evaluated for the remaining sites prior to construction and calibration adjustments to the erosion rate estimates will be made if appropriate. The BANCS assessment results and bank profile data are provided in Attachment 2.

The final reach weighted average sediment loading is used in the Protocol 1 calculations provided in Attachment 1. Rivermorph uses a default bulk density of 96 lb/ cf so the sediment loading is adjusted based on the field sampled bulk density results. In addition, Protocol 1 suggests a 50% efficiency factor be applied to the final sediment reduction estimate as a factor of safety. Because two methods of bank erosion estimation are used, and because the restoration design applied to this site inherently removes all the eroding

bank material and creates a low shear stress condition, an efficiency factor of 75% is used in this case. This is consistent with the precedent set on other similar floodplain restoration projects in PA.

The soil nitrogen concentration and soil phosphorus concentrations from the lab analysis are multiplied by the final sediment load reduction value to estimate the nitrogen and phosphorus load reductions. Lab analysis results are provided in Attachment 3.

Protocol 2

Protocol 2 estimates nitrogen load reduction through nitrogen processing in the hyporheic zone. Based on the procedures provided in Expert Panel Report, this calculation is a function of floodplain and stream area, the connectedness of base flow and flood flows to groundwater, and the hydraulic conductivity of the substrate. The Little Conestoga Creek Blue/Green Corridor floodplain restoration project will restore connectivity between baseflow and groundwater as well as flood flows, and the anticipated substrate will have good hydraulic conductivity to facilitate hyporheic exchange. Channel substrates were determined via field observation, as the proposed condition does not alter the existing channel.

Anticipated floodplain substrates were determined via exploratory trenches excavated within the project footprints. See the table below for the anticipated substrates on each project site:

Table 1 - Protocol 2 Substrates

Project Site	Channel Substrate	Floodplain Substrate
Shreiner Station	Gravel, Sandy Gravel, Sand, or Peat	Gravel, Sandy Gravel, Sand, or Peat
Woodcrest Villa	Gravel, Sandy Gravel, Sand, or Peat	Gravel, Sandy Gravel, Sand, or Peat
Mennonite Home	Gravel, Sandy Gravel, Sand, or Peat	Gravel, Sandy Gravel, Sand, or Peat
Franklin & Marshall	Clayey Gravel, Sandy Silt or Sandy Clay Loam, Loam, Silt Loam, Silt	Sandy Clay, Clay Loam, Silty Clay Loam, Organic Clay with no coarse grain layer in connected to channel
Barrcrest Apartments	Clayey Gravel, Sandy Silt or Sandy Clay Loam, Loam, Silt Loam, Silt	Sandy Clay, Clay Loam, Silty Clay Loam, Organic Clay with no coarse grain layer in connected to channel
Conestoga House	Clayey Gravel, Sandy Silt or Sandy Clay Loam, Loam, Silt Loam, Silt	Sandy Clay, Clay Loam, Silty Clay Loam, Organic Clay with no coarse grain layer in connected to channel
Trib to Conestoga House	Silty Gravel, Silty Sand or Loamy Sand, Sandy Loam, and Organic Silt with no coarse grain layer connected to channel	Silty Gravel, Silty Sand or Loamy Sand, Sandy Loam, and Organic Silt with no coarse grain layer connected to channel

Protocol 2 assumptions and calculations are provided in Attachment 1.

Protocol 3

Protocol 3 estimates the trapping of incoming sediment from upstream in the watershed. The primary process driving this increased sediment trapping is the connection of the active floodplain to the stream channel, allowing frequent access of flood flows to a wide floodplain, reducing velocity, and encouraging the deposition of sediment rather than

transporting sediment load downstream. The Protocol 3 calculations estimate the percentage of annual stream flow that accesses the floodplain at a depth and velocity that are conducive to sediment deposition.

Representative flow data from a USGS gauge station with similar carbonate geology and urban land cover were used to develop a flow duration curve that was normalized based on watershed area. HEC-RAS two-dimensional models were used to evaluate flow break points for the pre- and post-restoration conditions including, flow rates at top of bank, one- and three-foot flow depth over floodplain, and two feet per second velocity. In addition, base flow is estimated based on harmonic stream flow using the USGS StreamStats web application.

Edge of stream loading rates were obtained from the 2019 Progress Scenario exported from CAST and multiplied by the upstream stream length obtained from ArcGIS to calculate incoming sediment loading to each reach. Because the multiple restoration sites are along the same reach, the sediment loading to each site must take into account the reductions provided by the proposed restorations occurring upstream. This accounting is included in the Protocol 3 calculations and summarized in the table below:

Table 2 - Little Conestoga Blue/Green Corridor Sediment Loading

Project Site	Loading Rate (lbs/mile)*	Upstream Reach Length (miles)**	Sediment Loading (lbs)***	Total Reductions Provided Upstream (lbs)	Net Sediment Loading (lbs)
Shreiner Station	417,081.74	60.14	25,081,463	N/A	25,081,463
Woodcrest Villa		63.83	26,623,323	951,133	25,672,190
Mennonite Home		64.57	26,932,817	2,903,274	24,029,543
Franklin & Marshall		73.23	30,543,101	4,324,223	26,218,878
Barrcrest Apartments		73.94	30,837,428	5,617,726	25,219,702
Conestoga House		74.15	30,928,270	7,730,201	23,198,069
Tributary @ Conestoga House		1.27	529,804	N/A	529,804

* From CAST unit loading for stream bed and banks

**From ArcGIS

***Loading rate times upstream reach length

The project qualifies as wetland restoration with regard to the pollutant removal rates applied to the treated flow, as the purpose of the project is to restore the floodplain to its historical condition, which would have included wetlands. Therefore removal rates for Wetland Restoration included in Table 14 of the Expert Panel Report have been assumed.

The data above was used to estimate the percentage of annual stream flow resulting in treatable flow within the identified sediment trapping zone of the existing and restored floodplain, the sediment and nutrient loading within that treatable flow, the removal efficiency of the restored floodplain and ultimately the estimated sediment and nutrient load reduction, as shown in Attachment 1.

Summary

Based on the data discussed above, and the attached load reduction calculations, the sediment and nutrient load reductions anticipated as a result of the Little Conestoga Blue/Green Corridor Floodplain Restorations are presented in the following table. The table provides “Edge of Stream” reductions representing the load reductions at the site, as well as “Delivered to Bay” estimated based on the sediment and nutrient delivery ratios, discussed above. There are no Chapter 102 or NPDES permits requiring water quality credits associated with this project, so all load reductions are applicable to meeting the PRP targets.

Little Conestoga Blue/Green Corridor Floodplain Restoration: Load Reduction Summary				
Project Site		Total Nitrogen (lbs/yr)	Total Phosphorus (lbs/yr)	Total Suspended Sediment (lbs/yr)
Shreiner Station	Edge of Stream	2,162	384	1,185,316
	Delivered to Bay	1,220	173	420,787
Woodcrest Villa	Edge of Stream	3,035	694	2,181,586
	Delivered to Bay	1,711	313	774,463
Mennonite Home	Edge of Stream	1,842	448	1,504,920
	Delivered to Bay	1,039	202	534,247
Franklin & Marshall	Edge of Stream	1,457	409	1,379,453
	Delivered to Bay	822	185	489,706
Barrcrest Apartments	Edge of Stream	2,488	711	2,343,452
	Delivered to Bay	1,403	321	831,925
Conestoga House	Edge of Stream	2,438	682	2,588,812
	Delivered to Bay	1,375	308	919,028
Trib to Conestoga House	Edge of Stream	322	88	118,810
	Delivered to Bay	182	39	42,177
Project Total	Edge of Stream	13,744	3,416	11,302,349
	Delivered to Bay	7,752	1,540	4,012,334

Attachments

- Attachment 1 – Load Reduction Calculations
- Attachment 2 – Rivermorph BANCS Summary Report & Bank Heights Table
- Attachment 3 – Lab Analysis
- Attachment 4 – Restoration Drawings



LITTLE CONESTOGA - SHREINER STATION

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	445	119	234,183
Protocol 2	739	N/A	N/A
Protocol 3	979	265	951,133
Total	2,162	384	1,185,316

Adjusted Load Reduction Based on Delivery Ratio = **1,220** **173** **420,787** lb/ yr

Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451



LITTLE CONESTOGA - WOODCREST VILLA

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	528	156	229,445
Protocol 2	524	N/A	N/A
Protocol 3	1,982	539	1,952,141
Total	3,035	694	2,181,586

Adjusted Load Reduction Based on Delivery Ratio = **1,711** **313** **774,463** lb/ yr

Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451



LITTLE CONESTOGA - MENNONITE HOME

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	227	65	83,971
Protocol 2	214	N/A	N/A
Protocol 3	1,402	383	1,420,949
Total	1,842	448	1,504,920

Reduced Load Reduction Based on Delivery Ratio =

1,039	202	534,247
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 lb/ yr



LITTLE CONESTOGA - FRANKLIN & MARSHALL

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	172	64	85,951
Protocol 2	26	N/A	N/A
Protocol 3	1,259	345	1,293,503
Total	1,457	409	1,379,453

Adjusted Load Reduction Based on Delivery Ratio =

822	185	489,706	lb/ yr
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Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451



LITTLE CONESTOGA - BARRCREST

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	416	156	230,976
Protocol 2	52	N/A	N/A
Protocol 3	2,020	555	2,112,476
Total	2,488	711	2,343,452

Adjusted Load Reduction Based on Delivery Ratio = **1,403** **321** **831,925** lb/ yr

Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451



LITTLE CONESTOGA - CONESTOGA HOUSE

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	79	31	43,626
Protocol 2	4	N/A	N/A
Protocol 3	2,356	651	2,545,186
Total	2,438	682	2,588,812

Adjusted Load Reduction Based on Delivery Ratio = **1,375** **308** **919,028** lb/ yr

Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451



LITTLE CONESTOGA - CONESTOGA HOUSE - TRIB

Load Reduction Summary

9/14/2023

Load Reduction Method	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1	215	78	86,117
Protocol 2	73	N/A	N/A
Protocol 3	34	9	32,693
Total	322	88	118,810

Adjusted Load Reduction Based on Delivery Ratio = **182** **39** **42,177** lb/ yr

Sediment Delivery Ratio	0.355
Nitrogen Delivery Ratio	0.564
Phosphorus Delivery Ratio	0.451

Grandview Extension Stream Restoration

Constructed BMP

Grandview Extension Stream Restoration

**BEST MANAGEMENT PRACTICE (BMP)
TYPE SELECTION**

Stream Restoration

DESCRIPTION *An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.*

WHEN SELECTING BMP TYPE "STREAM RESTORATION", PLEASE PROVIDE ANTICIPATED LENGTH OF STREAM RESTORATION TO OCCUR

2,060 FT

POLLUTANT TYPE	<u>Total Nitrogen</u> (TN)	<u>Total Phosphorus</u> (TP)	<u>Total Suspended Solids, Sediments (TSS)</u>
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BMP REMOVAL EFFICIENCY FOR EACH POLLUTANT TYPE (%)

	0.075 (lbs/ft/yr)	0.068 (lbs/ft/yr)	44.88 (lbs/ft/yr)
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ESTIMATED DRAINAGE AREA TO SELECTED BMP TYPE (Acres)

ESTIMATED POLLUTANT LOADING FROM ESTIMATED DRAINAGE AREA (lbs/year)

N/A	N/A	N/A
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**LAND COVER DESCRIPTION
LAND COVER BREAKDOWN FOR DRAINAGE AREA (%)**

<u>Developed</u> <u>Impervious</u>	<u>Developed</u> <u>Pervious</u>	<u>Undeveloped</u>

ESTIMATED POLLUTANT LOADING REDUCTION REMOVAL (lbs/year)

155	140	92,453
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ESTIMATED CONSTRUCTION COST OF SELECTED BMP TYPE

\$358,966

ESTIMATED CONSTRUCTION *The cost provided above for the selected BMP Type is provided as a general reference for MS4 COST DETAILS planning purposes. Actual construction costs will vary.*

The estimated construction cost assumes that Stream Restoration costs \$ 250.00 per every one (1) linear foot. It is anticipated that approximately fifty (50) linear feet (LF) will be needed to treat one (1) acre of contributory drainage area.

ADD 25% FOR PROJECT RELATED EXPENSES

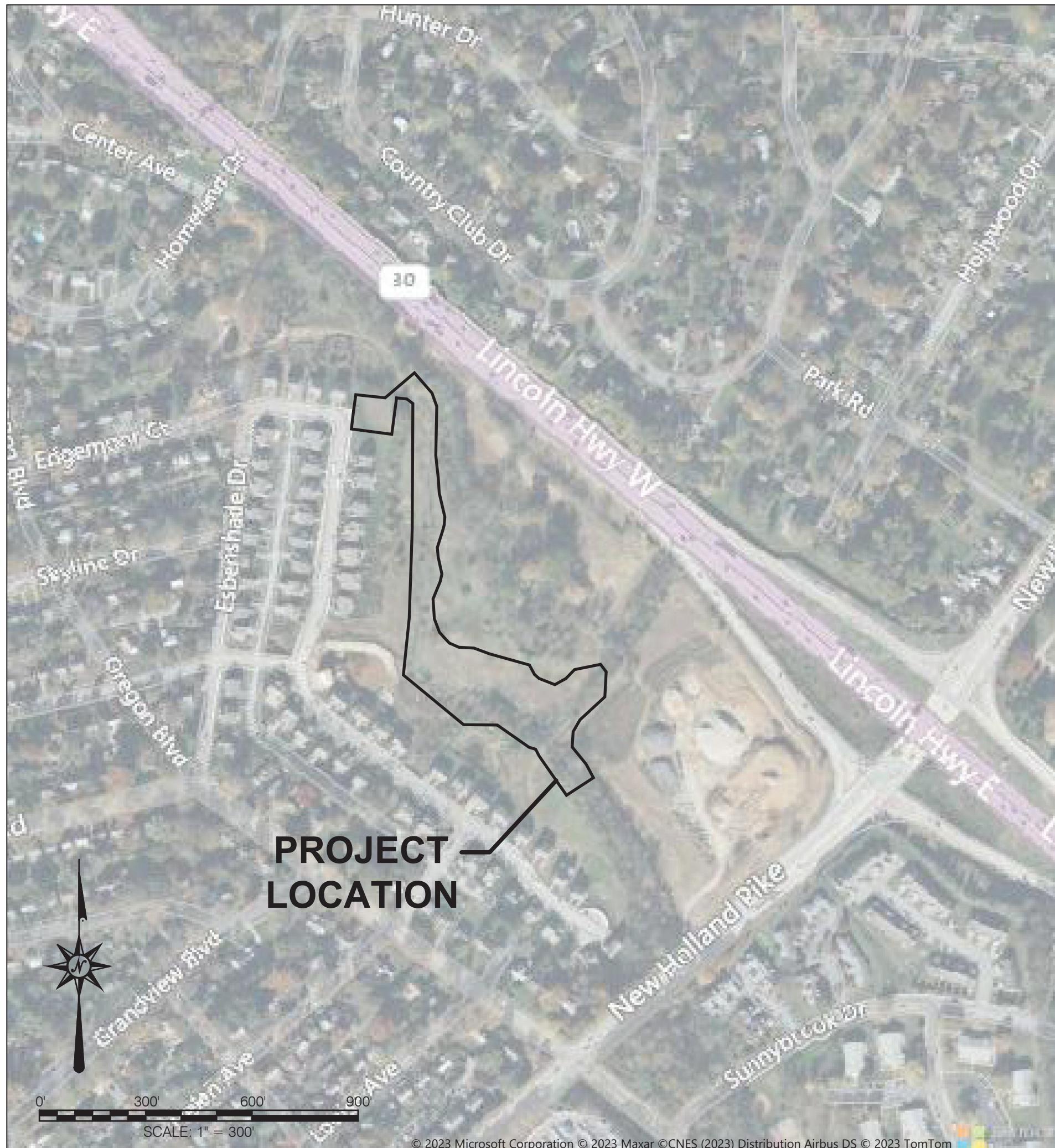
\$448,708

ADDITIONAL COMMENTS: *The estimated construction cost listed above represents the cost of the proposed BMP only. Additional costs for the overall project should be considered.*

GRANDVIEW STREAM RESTORATION

PHASE II

MANHEIM TOWNSHIP, LANCASTER COUNTY, PA



SITE MAP

1" = 300'



717-627-4440
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SHEET INDEX

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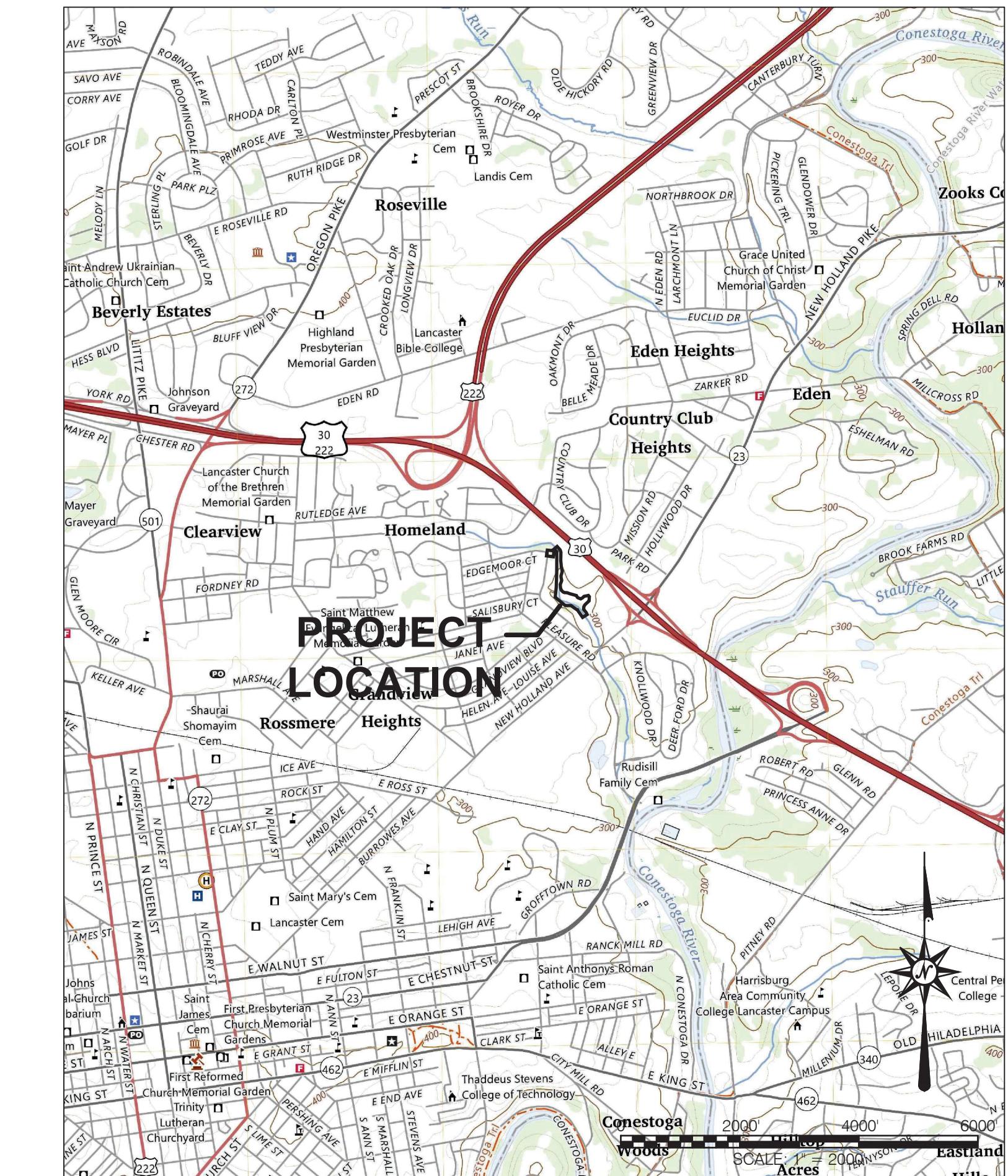


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10/17/2023



LOCATION MAP

1" = 2,000'

SOURCE: USGS 7.5" QUADRANGLE - LANCASTER, PA



C.S. DAVIDSON, INC.

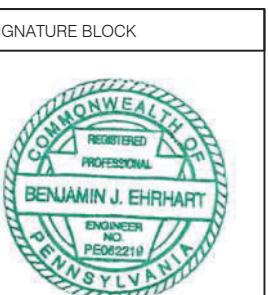
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WWW.CSDAVIDSON.COM





REVISIONS		
NO.	DATE	DESCRIPTION
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PROJECT NUMBER:	D-366.12-23
DRAWN BY:	AK
CHECKED BY:	RG
DATE:	05/31/2024
SCALE:	N/A
SHEET NUMBER:	2

SURVEY AND GENERAL PLAN NOTES

- THE PURPOSE OF THIS PLAN IS TO CONSTRUCT A FLOODPLAIN RESTORATION ALONG THREE (3) UNNAMED TRIBUTARIES TO THE CONESTOGA RIVER IN MANHEIM TOWNSHIP, LANCASTER COUNTY, PA.
- LANDSTUDIES INC. ASSUMES NO LIABILITY FOR USE OR REUSE OF THESE PLANS BY ANY INDIVIDUAL OR ENTITY OTHER THAN LANDSTUDIES' CLIENT.
- REVISIONS MADE TO THIS PLAN SHALL NOT BE THE RESPONSIBILITY OF LANDSTUDIES INC. REVISIONS, SUBSTITUTION OF MATERIALS, OR OTHER CHANGES REQUIRES WRITTEN PERMISSION FROM LANDSTUDIES AND MAY BE SUBJECT TO GOVERNING BODY APPROVAL. SUCH APPROVAL OF REVISIONS OR FIELD CHANGES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- EXISTING CONDITION SITE FEATURES AND TOPOGRAPHIC SURVEY HAS BEEN PREPARED BY LANDSTUDIES FROM SURVEY TAKEN ON 11/14/2023, 11/15/2023, AND 01/08/2024, AND HAS BEEN SUPPLEMENTED BY USGS TOPOGRAPHIC LIDAR SURVEY FROM 2019. PARCEL AND ROAD LINework AND INFORMATION WAS PROVIDED BY LANCASTER COUNTY GIS DIVISION, 4TH QUARTER, 2023.
- ALL ELEVATIONS ARE BASED ON NAVD 88 WITH SURVEY CONTROL ESTABLISHED USING GPS WITH RTK CORRECTIONS FROM REFERENCE NETWORK.
- THE FOLLOWING UTILITIES ARE KNOWN TO EXIST WITHIN THE LIMITS OF EXCAVATION:
 - SANITARY SEWER - LANCASTER AREA SEWER AUTHORITY 717-299-4843
- APPROXIMATE UTILITY AND EASEMENT INFORMATION HAS BEEN PROVIDED BY THE UTILITY OWNER THROUGH THE PA 1-CALL DESIGN PROTOCOLS. THIS SURVEY/BASEMAPING HAS BEEN PROVIDED WITHOUT THE BENEFIT OF A PROPERTY TITLE SEARCH, AND THEREFORE DOES NOT GUARANTEE OR IMPLY THE PROPERTY IS NOT AFFECTED BY EASEMENTS, RIGHTS-OF-WAY OR OTHER RESTRICTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD LOCATE ALL UTILITIES AND COORDINATE APPROPRIATE RELOCATION EFFORTS WITH THE RESPECTIVE UTILITY COMPANIES.
- FLUVIAL SYSTEMS ARE DYNAMIC AND CHANGE OVER TIME. THE EXISTING CONDITIONS TOPOGRAPHY REPRESENTS THE CONDITIONS AT THE TIME OF THE FIELD SURVEY. DESIGN MODIFICATIONS MAY BE NECESSARY TO ACCOMMODATE CHANGES IN THE SITE CONDITIONS AT THE TIME OF CONSTRUCTION. LANDSTUDIES SHALL BE CONSULTED TO VERIFY THE EXISTING SITE CONDITIONS AND IDENTIFY CONSTRUCTION MODIFICATIONS THAT MAY BE NECESSARY BASED ON THOSE CONDITIONS.
- EXISTING FLOODPLAIN LINES AS SHOWN ON THESE PLANS WERE OBTAINED FROM FEMA'S NATIONAL FLOOD HAZARD LAYER (NFHL) COUNTY DATA ON 6/20/2022. THE SITE IS IN A DETAILED STUDY AREA, ZONE AE, EFFECTIVE DATE 6/15/2018.
- VORTEX ENVIRONMENTAL INC COMPLETED A WETLAND DELINEATION FOR THE SITE, INCLUDING FIELD INVESTIGATIONS ON 5/31/2017 AND 7/18/2020. THE RESULTS OF THE INVESTIGATION INDICATE THE PRESENCE OF ONE WETLAND WITHIN THE GRANDVIEW STREAM RESTORATION - PHASE II RESTORATION LIMITS. EXISTING WETLAND BOUNDARIES ARE SHOWN ON THE PLANS.
- A COPY OF THE PROJECT SITE'S EROSION AND SEDIMENT POLLUTION CONTROL PLAN, AND ITS ACCOMPANYING NARRATIVE MUST BE AVAILABLE ON-SITE DURING CONSTRUCTION UNTIL THE SITE HAS BEEN PERMANENTLY STABILIZED AND FOLLOWING VERIFICATION FROM THE APPLICABLE REGULATORY AUTHORITY.
- PREDOMINANT SOILS WITHIN THE PROJECT AREA ARE HAGERSTOWN SILT LOAM, 3 TO 6 PERCENT SLOPES (HAB), HAGERSTOWN SILTY CLAY LOAM, 8 TO 15 PERCENT SLOPES (HBC), HAGERSTOWN-URBAN LAND COMPLEX (HC), LINDSIDE-LINDEN COMPLEX, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED (LE), LINDSIDE SILT LOAM (LN), AND URBAN LAND (UC). SOILS INFORMATION WAS OBTAINED FROM THE USDA NRCS' WEB SOIL SURVEY.

CONTRACTOR NOTES

- THE CONTRACTOR SHALL SCHEDULE ALL NECESSARY INSPECTIONS WITH THE MUNICIPALITY AND COMPLY WITH ALL REQUESTS AND DIRECTIVES INCLUDING CORRECTING DEFECTIVE WORK AS REQUIRED TO OBTAIN FINAL APPROVAL OF THE WORK AND CLOSING OUT THE PROJECT.
- CONTRACTOR SHALL ADHERE TO ALL LOCAL STATE AND FEDERAL REGULATIONS AND SPECIFICATIONS INCLUDING SAFETY STANDARDS AND ANY APPLICABLE GRANT REQUIREMENTS SHOULD THE PROJECT BE FUNDED BY ANY GRANTS.
- SITE CONSTRUCTION SHALL CONFORM TO THE PA BUILDING CODE AND AMERICAN WITH DISABILITIES ACT (ADA) AS APPLICABLE.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, PROCEDURES, SAFETY PRECAUTIONS AND/OR PROGRAMS.
- PRODUCTS SPECIFIED ON THESE PLANS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS/SPECIFICATIONS UNLESS INDICATED OTHERWISE.
- CONSTRUCTION ON ALL IMPROVEMENTS SHALL BE BASED ON ACTUAL FIELD STAKING BY THE CONTRACTOR OR THEIR CONTRACTED SURVEY REPRESENTATIVE, UNLESS APPROVED OTHERWISE. THE CONTRACTOR SHALL NOT DEVIATE FROM THE GEOMETRY OR DIMENSIONS INDICATED ON THE PLANS WITHOUT PRIOR APPROVAL FROM THE DESIGN ENGINEER.
- CONTRACTOR SHALL INSPECT THE SITE TO VERIFY THE EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL VERIFY LAYOUT AND DIMENSIONS ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES REGARDING EXISTING CONDITIONS OR PROPOSED LAYOUT SHALL BE REPORTED TO LANDSTUDIES, INC. PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL NOT CONSIDER DEMOLITION NOTES OR PLAN MARKINGS TO BE ALL-INCLUSIVE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASSESS THE SITE AND PERFORM THE DEMOLITION AS REQUIRED TO PERFORM THE WORK/NEW CONSTRUCTION.
- CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO LOCATE AND PROTECT THE EXISTING UTILITIES WITHIN THE PROJECT AREA WHILE MAINTAINING UNINTERRUPTED SERVICE. CONTRACTOR SHALL FIELD LOCATE ALL UTILITIES AND COORDINATE APPROPRIATE RELOCATION EFFORTS (AS MAY BE NECESSARY) WITH RESPECTIVE UTILITY COMPANIES. THE CONTRACTOR IS REQUIRED TO COORDINATE WITH THE LANCASTER AREA SEWER AUTHORITY FOR SEWER LINE VIDEO INSPECTION BEFORE COMMENCING ANY EARTHMOVING ACTIVITIES. DAMAGE TO ANY UTILITY DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER OF THE UTILITY COMPANY OR AUTHORITY, AT THE CONTRACTOR'S EXPENSE.
- CONTRACTOR SHALL ENSURE THAT GRADING PLAN IS IMPLEMENTED CORRECTLY AND THAT PROPER DRAINAGE IS PROVIDED DURING CONSTRUCTION OPERATIONS.
- THE CONTRACTOR IS RESPONSIBLE TO VERIFY EARTHWORK QUANTITIES INCLUDING APPROPRIATE SOIL MATERIALS AND QUANTITIES TO SATISFY THE CONSTRUCTION REQUIREMENTS PRIOR TO THE START OF CONSTRUCTION.
- ALL UNSUITABLE MATERIALS WITHIN STRUCTURAL FILL AREAS MUST BE REMOVED AND REPLACED WITH SUITABLE MATERIAL TO A DEPTH AS DIRECTED BY THE GEOTECHNICAL ENGINEER AND/OR THE MUNICIPALITY.
- THE CONTRACTOR SHALL VERIFY SUBSURFACE CONDITIONS TO THEIR SATISFACTION PRIOR TO PLACEMENT OF ANY PAVEMENT MATERIALS.
- TOPSOIL MUST BE FREE OF ROCKS, LARGE DEBRIS, WOODY OR VEGETATED MATERIAL, FROZEN PARTICLES OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INHIBIT VEGETATIVE ESTABLISHMENT OR GROWTH. TOPSOIL MUST BE SUITABLE TO SUPPORT A DIVERSE AND HEALTHY VEGETATIVE COVER AND PLANTINGS AS REQUIRED BY THE PROJECT SCOPE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY NEEDED TRAFFIC CONTROL, TRENCH BARRICADES/COVERINGS, SHEETING AND SHORING AS NECESSARY TO COMPLETE THE WORK.
- CONTRACTOR SHALL PROVIDE DUST CONTROL TO AVOID NUISANCE TO SURROUNDING PROPERTY OWNERS, AND AS REQUIRED BY LOCAL AUTHORITIES, MAINTAIN ROADWAYS FREE OF DUST BUILD-UP BY MECHANICAL MEANS OR OTHER APPROVED METHODS. FURNISH AND APPLY CLEAN WATER OR CALCIUM CHLORIDE FOR THE PURPOSE OF ALLAYING DUST CONDITIONS AS REQUIRED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING NEIGHBORING HOME OWNERS IN ADVANCE OF BEGINNING WORK.
- CONTRACTOR WILL BE REQUIRED TO PERFORM PRE-CONSTRUCTION DOCUMENTATION OF ALL SITE CONDITIONS AT THE CORNER LOT OF EDGEWOOD COURT, WHICH WILL BE USED FOR PRIMARY ACCESS TO THE SITE, INCLUDING BUT NOT LIMITED TO, GRADING, VEGETATION, CURB AND SIDEWALK CONDITION, ROAD PAVING, ETC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RETURN THE PARCEL AND ITS ASSOCIATED INFRASTRUCTURE TO THEIR PRE-CONSTRUCTION CONDITION TO THE PARCEL OWNER'S SATISFACTION UPON COMPLETION OF WORK.
- SAW CUTTING OF PAVEMENT, IF REQUIRED, JOINTS SHALL BE STRAIGHT, NEAT AND CLEAN.
- FAILURE TO SPECIFICALLY IDENTIFY ANY WORK WHICH WOULD NORMALLY BE REQUIRED TO COMPLETE THE PROJECT SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO PERFORM SUCH WORK.
- N.I.C. ABBREVIATION STANDS FOR "NOT IN CONTRACT" AND IS WORK NOT REQUIRED BY THE CONTRACTOR(S).
- CONTRACTOR SHALL PRESERVE AND PROTECT EXISTING PLANT MATERIAL UNLESS INDICATED OTHERWISE. DOCUMENTATION OF TREES TO BE PRESERVED IS ADVISED TO SHIELD THE CONTRACTOR FROM POSSIBLE DAMAGE CLAIMS DURING OR POST-CONSTRUCTION.
- EARTHWORK QUANTITIES:
 - ESTIMATED CUT: 3,518 CY
 - ESTIMATED FILL: 731 CY
 - ESTIMATED NET CUT: 2,785 CY
- TEMPORARY ACCESS GRADING:
 - ESTIMATED IMPORT FILL REQUIRED: 400 CY
- OFF-SITE DISPOSAL:
 - ESTIMATED EXCAVATED MATERIAL FOR HAUL-OFF: 3,185 CY
- THE SANITARY SEWER MUST BE TELEvised BEFORE THE START OF CONSTRUCTION, PRIOR TO THE MOBILIZATION OF EQUIPMENT, AND AGAIN AFTER THE CONSTRUCTION, ONCE ALL EQUIPMENT HAS BEEN REMOVED FROM THE SITE. THE TOTAL LENGTH OF THE SANITARY SEWER TO BE TELEvised, BOTH PRE- AND POST-CONSTRUCTION, IS 1,676 LINEAR FEET. FOR A DETAILED DESCRIPTION OF THE SEWER LINES TO BE TELEvised, REFER TO NOTE #1 OF THE CONSTRUCTION SEQUENCE ON SHEET 15.

FLOODPLAIN RESTORATION NOTES

- FLOODPLAIN RESTORATION REQUIRES DYNAMIC IMPLEMENTATION APPROACHES TO ACHIEVE OPTIMAL RESTORATION CONDITIONS. THE CONTRACTOR PERFORMING THE WORK SHALL HAVE RELATIVE EXPERIENCE WORKING WITH FLUVIAL SYSTEMS ON STREAM AND FLOODPLAIN RESTORATIONS. THE CONTRACTOR SHALL UNDERSTAND THAT VARIATIONS OF SOILS AND GROUNDWATER ELEVATION MAY IMPACT SITE AND SOIL CONDITIONS AND SHALL COORDINATE WITH THE ENGINEER TO IMPLEMENT ADAPTIVE MANAGEMENT STRATEGIES TO HANDLE SITE SPECIFIC CONDITIONS ARISING DURING CONSTRUCTION OR WHICH HAVE CHANGED SINCE THE INITIAL ASSESSMENT AND DATA COLLECTION UPON WHICH THE DESIGN IS BASED. ANY ADAPTIVE MANAGEMENT STRATEGIES THAT MAY BE IMPLEMENTED SHALL BE CONSIDERED INCIDENTAL TO THE RESTORATION CONSTRUCTION. A DETAILED DESCRIPTION OF THESE STRATEGIES MAY BE FOUND IN THE OPERATIONS AND MAINTENANCE PLAN. THESE STRATEGIES SHALL ONLY BE IMPLEMENTED AT THE DIRECTION OF THE ENGINEER. ADAPTIVE MANAGEMENT STRATEGIES MAY INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
 - WOODY DEBRIS OR ROOT WAD PLACEMENT
 - LOG SILLS

- STRAW BALES, FASCINES, BRUSH BUNDLES, COIR LOGS, WADDLES, AND MATTING ROLLS
- SOD MAT PLACEMENT
- ADDITIONAL ROCK UNDERLAYMENT
- TARGETED MICROTOPOGRAPHY ADJUSTMENTS
- RE-SEEDING/RE-MATTING
- MINIMIZING COMPACTION TO THE PROPOSED FLOODPLAIN FOOTPRINT IS A KEY TENET OF CONSTRUCTION INTENDED TO MAINTAIN THE INTEGRITY OF THE RESTORATION. FOR THIS REASON, ALL EXCAVATION WITHIN 18' VERTICALLY OF THE PROPOSED FLOODPLAIN FOOTPRINT SHALL BE CONDUCTED WITH A TRACKHOE WORKING BACKWARDS OFF THE FOOTPRINT TO ACHIEVE FINAL GRADE. PROPOSED CHANNELS, HABITAT DEPRESSIONS, LOG SILLS, WOODY DEBRIS AND OTHER FLOODPLAIN FEATURES SHALL BE CONSTRUCTED IN A SIMILAR MANNER IN CONCURRENCE WITH THE FLOODPLAIN GRADING AND UNDER DIRECT SUPERVISION OF THE ENGINEER. IF CONSTRUCTION TRAFFIC ON THE FLOODPLAIN FOOTPRINT IS NECESSARY TO ACCOMMODATE PORTIONS OF CONSTRUCTION, TRAFFIC SHALL BE LIMITED TO ONE PASS AND EQUIPMENT SHALL BE APPROVED IN ADVANCE BY, AND SUBJECT TO OVERSIGHT OF, THE ENGINEER.
- IT IS ANTICIPATED THAT DIVERSE SOIL TYPES & SUBSURFACE MATERIALS WILL BE ENCOUNTERED DURING CONSTRUCTION. AT THE DIRECTION OF THE ENGINEER, THE CONTRACTOR SHALL SEGREGATE MATERIALS BASED ON OVERALL SCOPE OF WORK AND UTILIZE SOIL TYPES BASED ON MOST SUITABLE APPLICATIONS. (I.E. GRAVEL FOR CHANNEL FEATURES; SUITABLE GROWING MEDIUM AT PROPOSED GRADE).
- TO THE EXTENT PRACTICAL, WORK SHALL BE PERFORMED DURING LOW-FLOW CONDITIONS. AVOIDING PERIODS DURING OR IMMEDIATELY FOLLOWING HEAVY PRECIPITATION.
- TO THE EXTENT PRACTICAL, NATIVE VEGETATION (FORBS, GRASSES, TREES, AND SHRUBS) SHALL BE PRESERVED. NATIVE TREES AND SHRUBS SHALL BE WORKED AROUND AND/OR TRANSPLANTED IF SITE CONDITIONS PERMIT OR GRADING REVISIONS WILL BE WITHIN AN ACCEPTABLE TOLERANCE. THE ENGINEER SHALL FIELD VERIFY.
- ONCE FINAL GRADE HAS BEEN ACHIEVED, STABILIZATION SHOULD OCCUR WITHIN 48 HOURS IF CONDITIONS WOULD OTHERWISE RESULT IN SEDIMENT-LADEN RUNOFF LEAVING THE SITE. EXCEPTIONS INCLUDE TIE-INS TO THE EXISTING CHANNEL WHERE FLOW IS BEING MAINTAINED OR WHEN RAIN IS FORECASTED. IN THESE INSTANCES, STABILIZATION MUST OCCUR THE SAME DAY IF CONDITIONS WOULD OTHERWISE RESULT IN SEDIMENT-LADEN RUNOFF LEAVING THE SITE.
- PRIOR TO ANY DISTURBANCE IN AREAS THAT WOULD OTHERWISE BE EXPOSED TO ACTIVE FLOW, FLOW SHALL BE DIVERTED THROUGH IMPLEMENTATION OF A TEMPORARY PUMP-AROUND BYPASS OR DIVERSION BERM AND BYPASS CHANNEL IN ACCORDANCE WITH THE PLANS. THOUGH IT MAY BE NECESSARY DURING INSTALLATION OF BYPASS SYSTEMS OR IN OTHER LIMITED CIRCUMSTANCES, THE CONTRACTOR SHALL MINIMIZE VEHICLE TRAFFIC IN ACTIVE FLOWS. CONSTRUCTION ACTIVITIES OUTSIDE OF THE ACTIVE FLOW MAY BE CONDUCTED WITHOUT USE OF A BYPASS SYSTEM IF THE ACTIVITIES ARE CONDUCTED PRIOR TO FINAL CONNECTION WITH ACTIVE STREAM FLOW. ADDITIONAL LOCALIZED PUMPING MAY BE UTILIZED TO DE-WATER IN THE IMMEDIATE VICINITY OF WHERE WORK IS BEING DONE. ALTERNATIVE SOLUTIONS SHALL BE APPROVED BY THE ENGINEER. BYPASS PUMP SHALL PROVIDE CAPACITY TO SUFFICIENTLY CONVEY FLOWS AT THE TIME OF CONSTRUCTION. MULTIPLE PUMPS MAY BE USED IF NECESSARY. AS THE REACHES ARE DEWATERED, FISHES WITHIN THE DEWATERED AREA SHALL BE CAPTURED UTILIZING A SEINE OR OTHER NET, PLACED IN BUCKETS WITH WATER, AND IMMEDIATELY RELOCATED TO ACTIVE CHANNEL FLOWS OUTSIDE OF THE WORK AREA.
- ADHERE TO THE SPECIFIED LENGTH, DEPTH, AND SLOPE FOR RIFFLES AND POOLS AS INDICATED ON 'P-4 - PROPOSED CHANNEL THALWEG PROFILE' POOL, HABITAT DEPRESSION, AND MID-CHANNEL POOL EDGES, WIDTH, AND SHAPE AS SHOWN ON SHEET 5, AS WELL AS ROOT WADS, WOODY DEBRIS, AND OTHER FLOODPLAIN FEATURES ARE APPROXIMATE AND FINAL LAYOUT WILL BE DETERMINED AND APPROVED BY THE PROJECT ENGINEER BASED ON SITE CONDITIONS DURING CONSTRUCTION. ROOT WADS AND WOODY DEBRIS WILL BE LIMITED TO THE AVAILABILITY OF MATERIAL REMOVED FROM THE PROJECT SITE.

PROJECT INSPECTION MILESTONES

THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE ENGINEER AT LEAST ONE WEEK PRIOR TO THE ANTICIPATED START OF EACH ACTIVITY SO THAT NECESSARY SITE INSPECTIONS CAN BE MADE AND GUIDANCE PROVIDED. THE ENGINEER MAY REQUIRE ADDITIONAL INSPECTION POINTS OR MULTIPLE INSPECTIONS OF A GIVEN FEATURE THROUGH THE COURSE OF CONSTRUCTION.

- PRIOR TO CLEARING/ TREES MARKED FOR REMOVAL
- STAKEOUT
- E&S CONTROLS
- START OF EXCAVATION
- START OF CHANNEL CONSTRUCTION
- FIRST WOODY DEBRIS INSTALLATION
- FIRST LOG SILL INSTALLATION - SUBSEQUENT LOG SILLS INSTALLATIONS THAT WERE NOT OBSERVED BY THE ENGINEER SHALL BE FLAGGED OR OTHERWISE IDENTIFIED SO THAT SILL ELEVATIONS MAY BE EASILY CONFIRMED BY PROBING.
- ADDITIONAL REVIEW OF FLOODPLAIN, CHANNEL, AND STRUCTURE INSTALLATION AS REQUESTED BY PROJECT DESIGNER
- PRIOR TO SEEDING AND MATTING (BY SECTION)
- SEED, LABEL AND WEIGHT (BY SECTION)
- AFTER SEEDING AND MATTING (BY SECTION)
- TREES ON SITE PRIOR TO AND FOLLOWING PLANTING
- PRIOR TO DEMOBILIZATION





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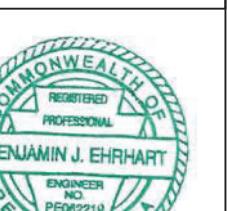
GRANDVIEW STREAM RESTORATION

PHASE II

MANHEIM TOWNSHIP

1840 MUNICIPAL DRIVE
LANCASTER, PA 17601

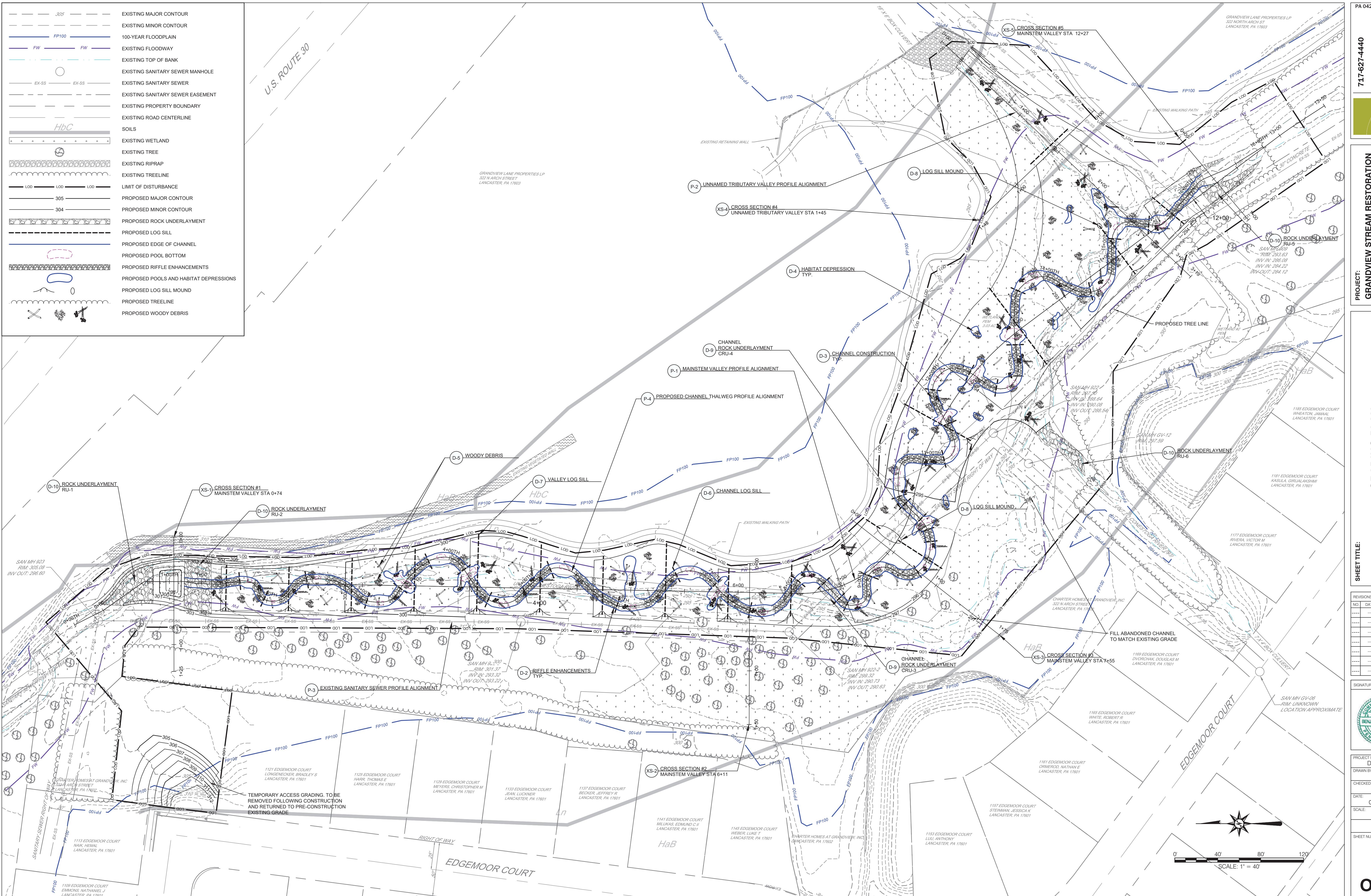
EXISTING CONDITIONS & DEMOLITION PLAN

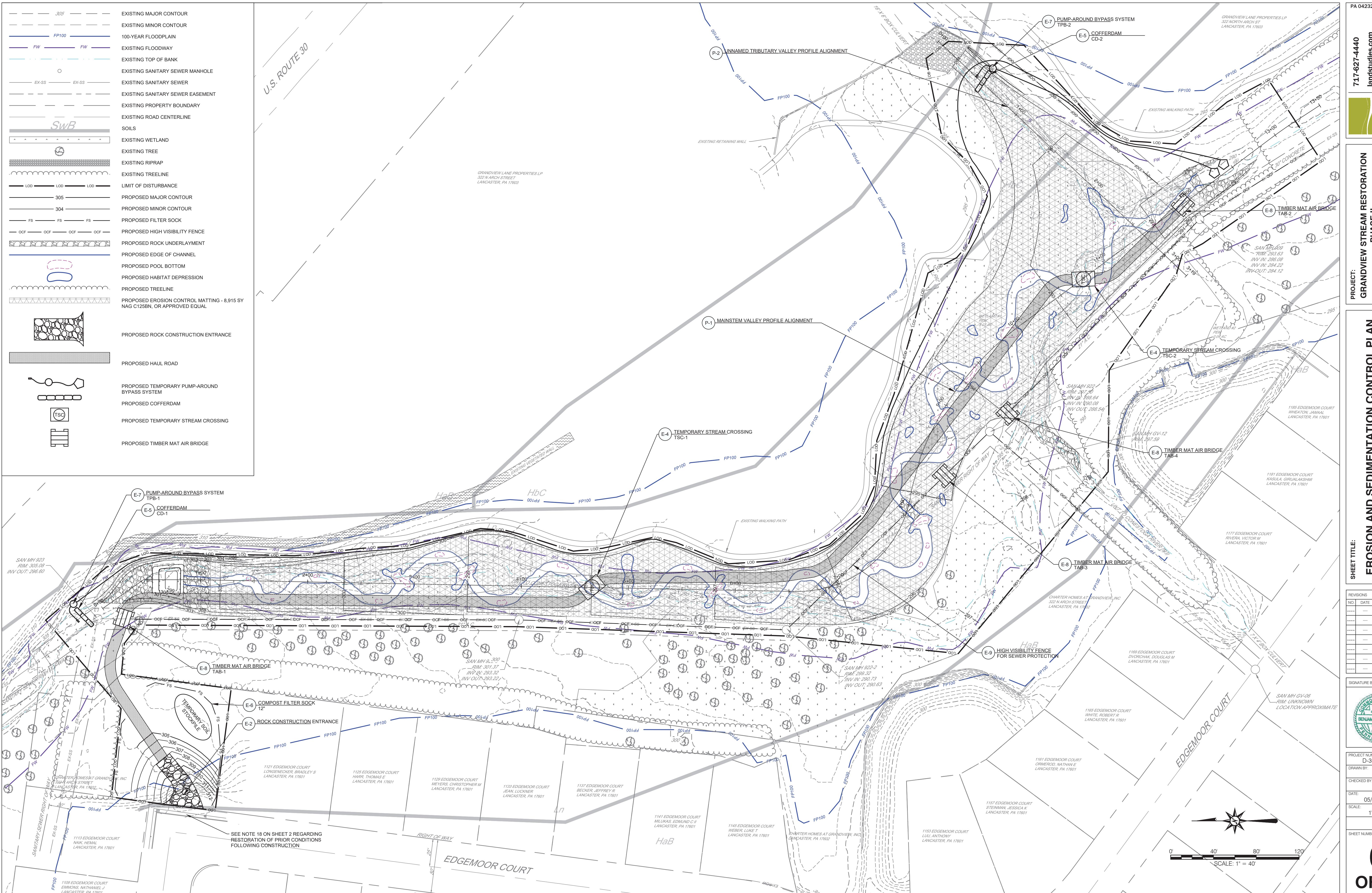


CT NUMBER: D-366.12-23
BN BY: AK
ED BY: RG
05/31/2024
1" = 40'

NUMBER:

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OF 18





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GRANDVIEW STREAM RESTORATION
PHASE II

MANHEIM TOWNSHIP

1840 MUNICIPAL DRIVE
LANCASTER, PA 17601

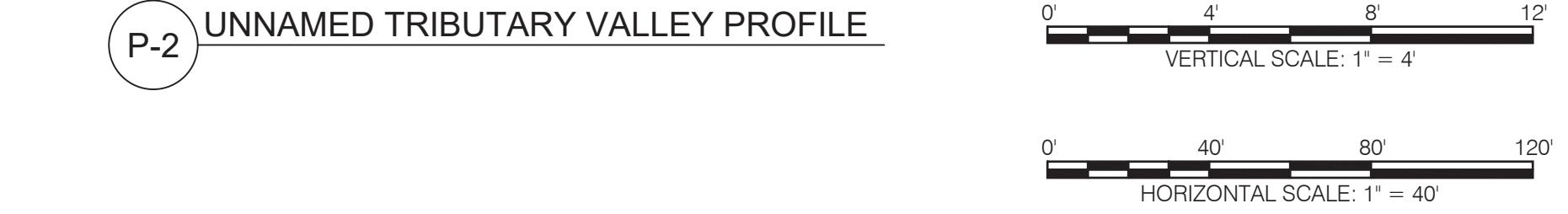
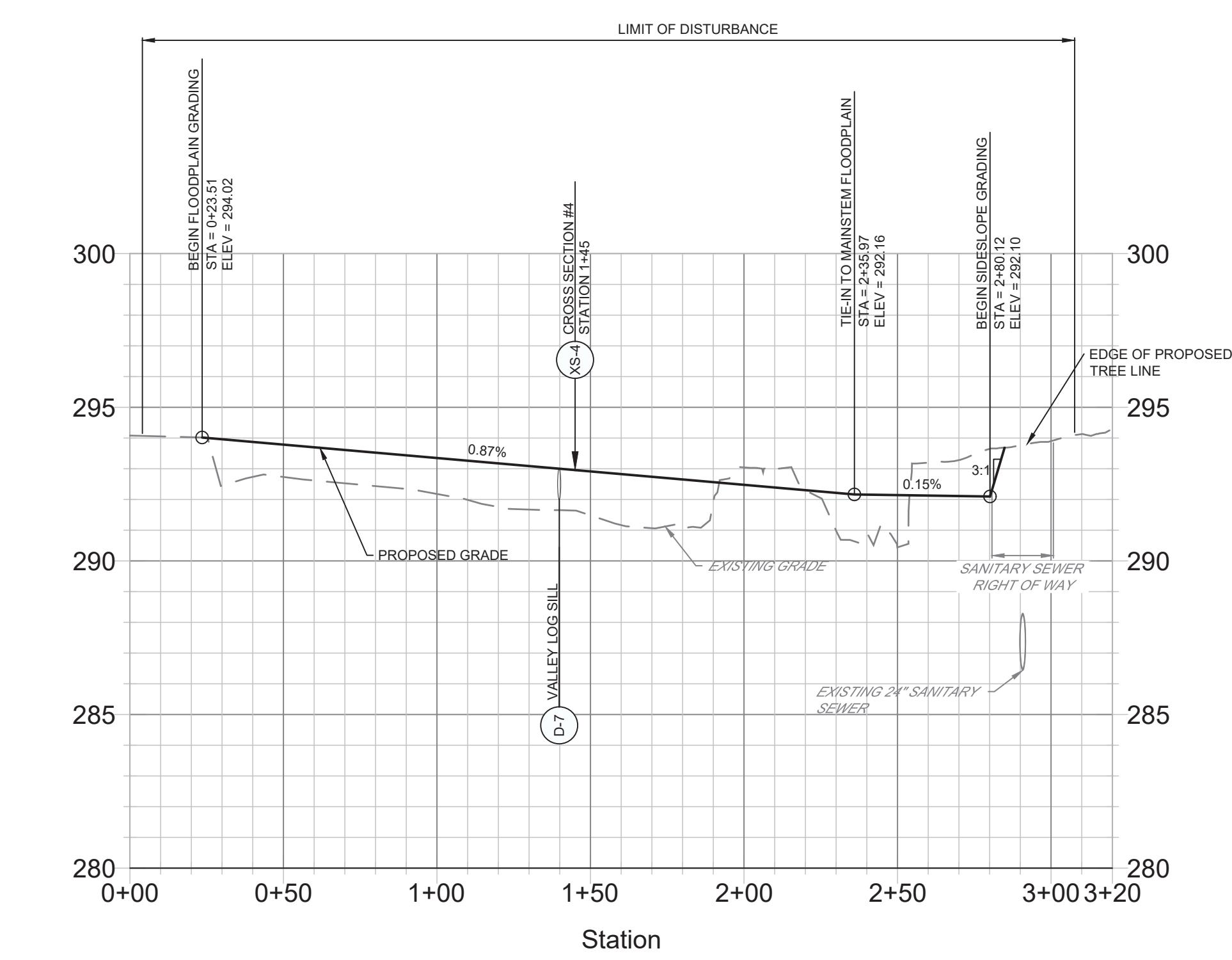
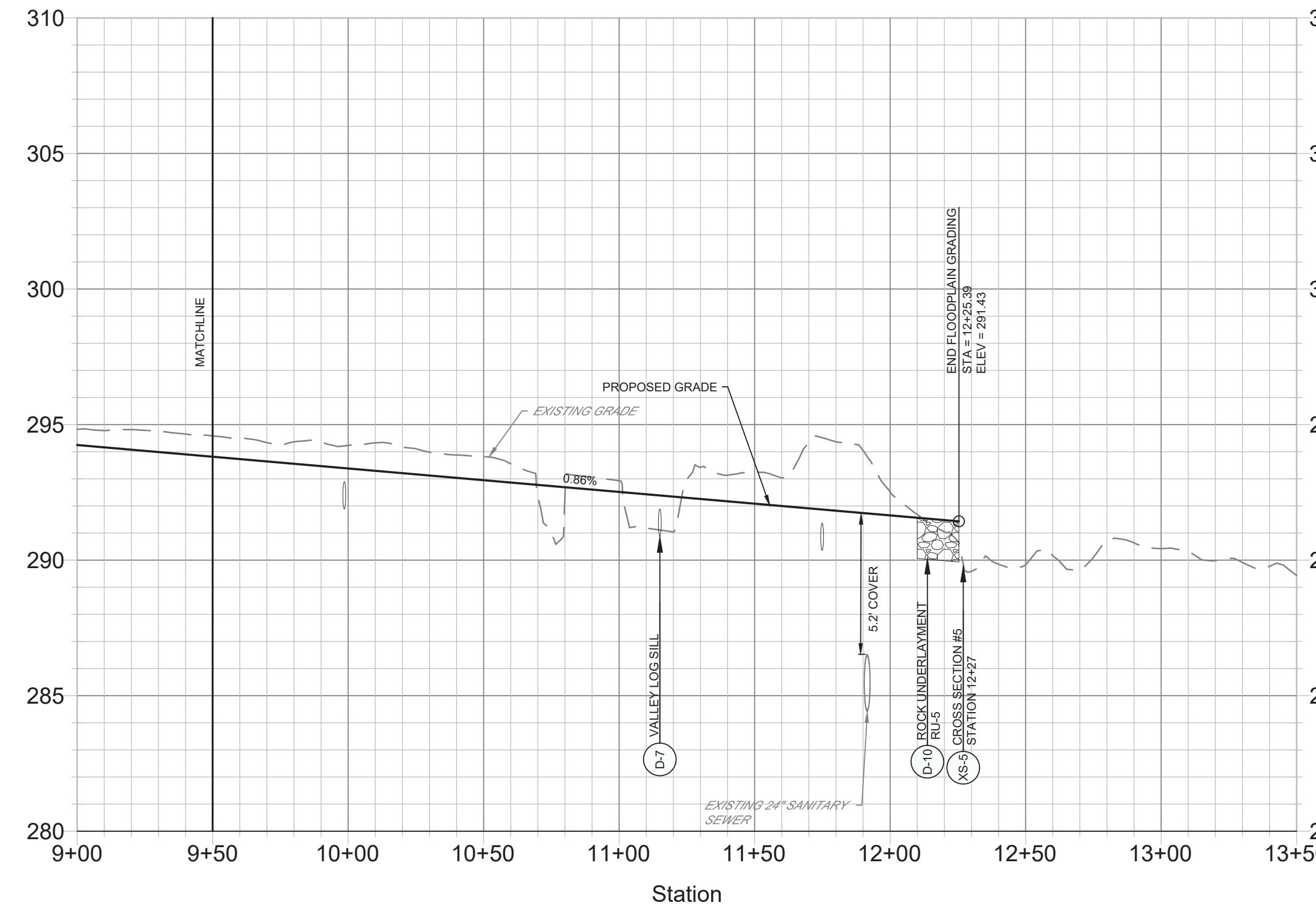
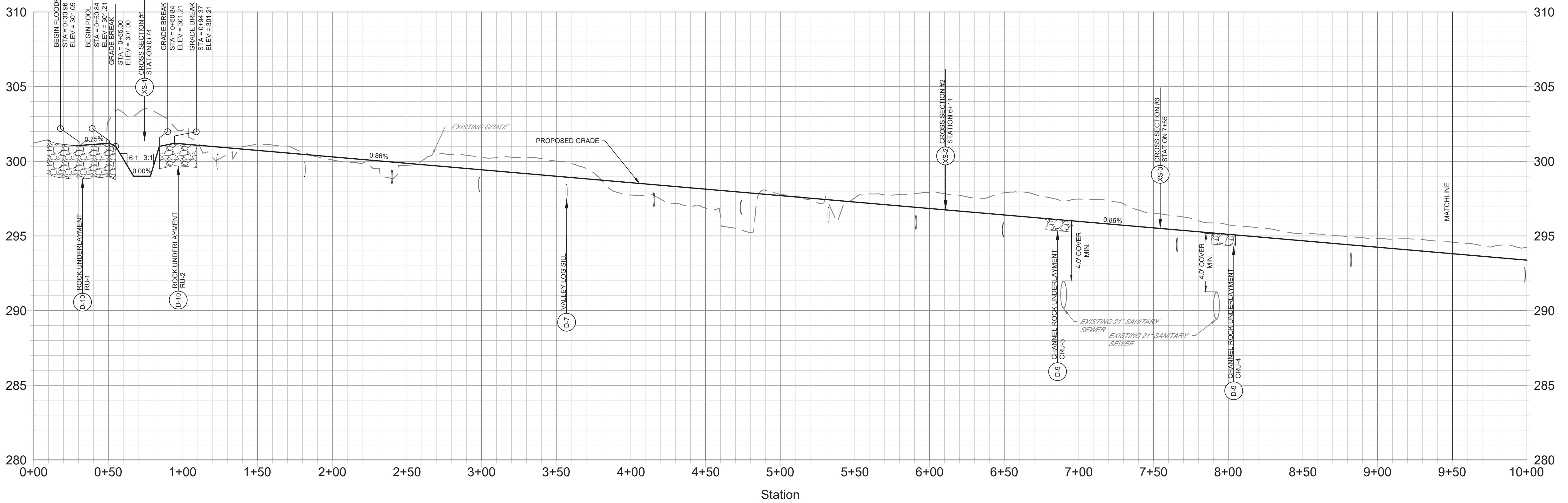
EROSION AND SEDIMENTATION CONTROL PLAN



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05/31/2024
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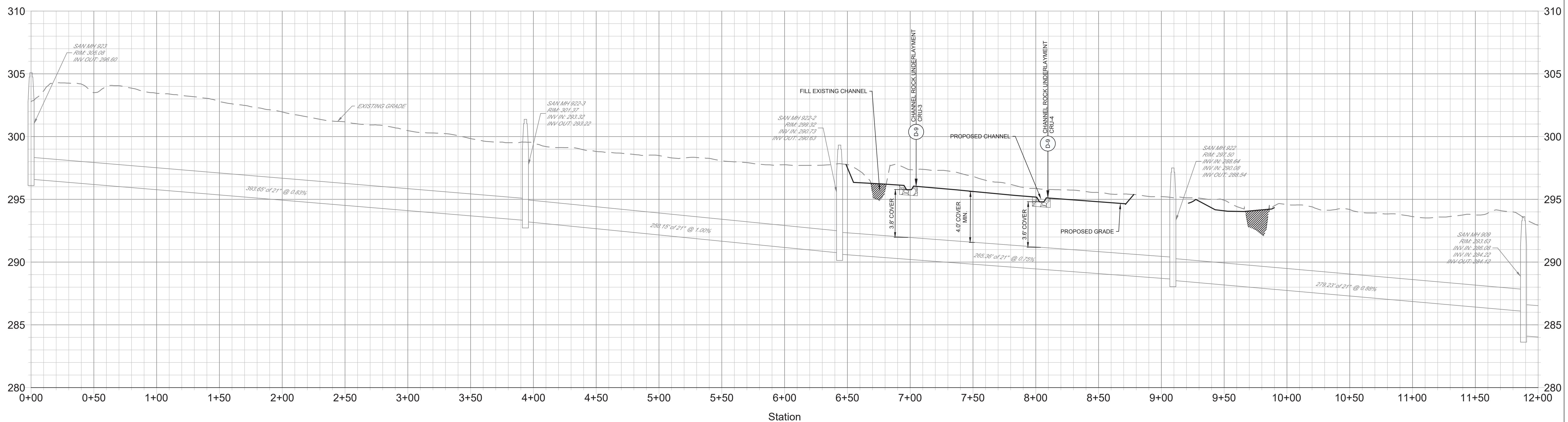
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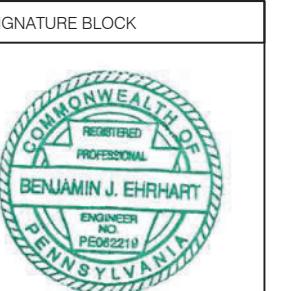


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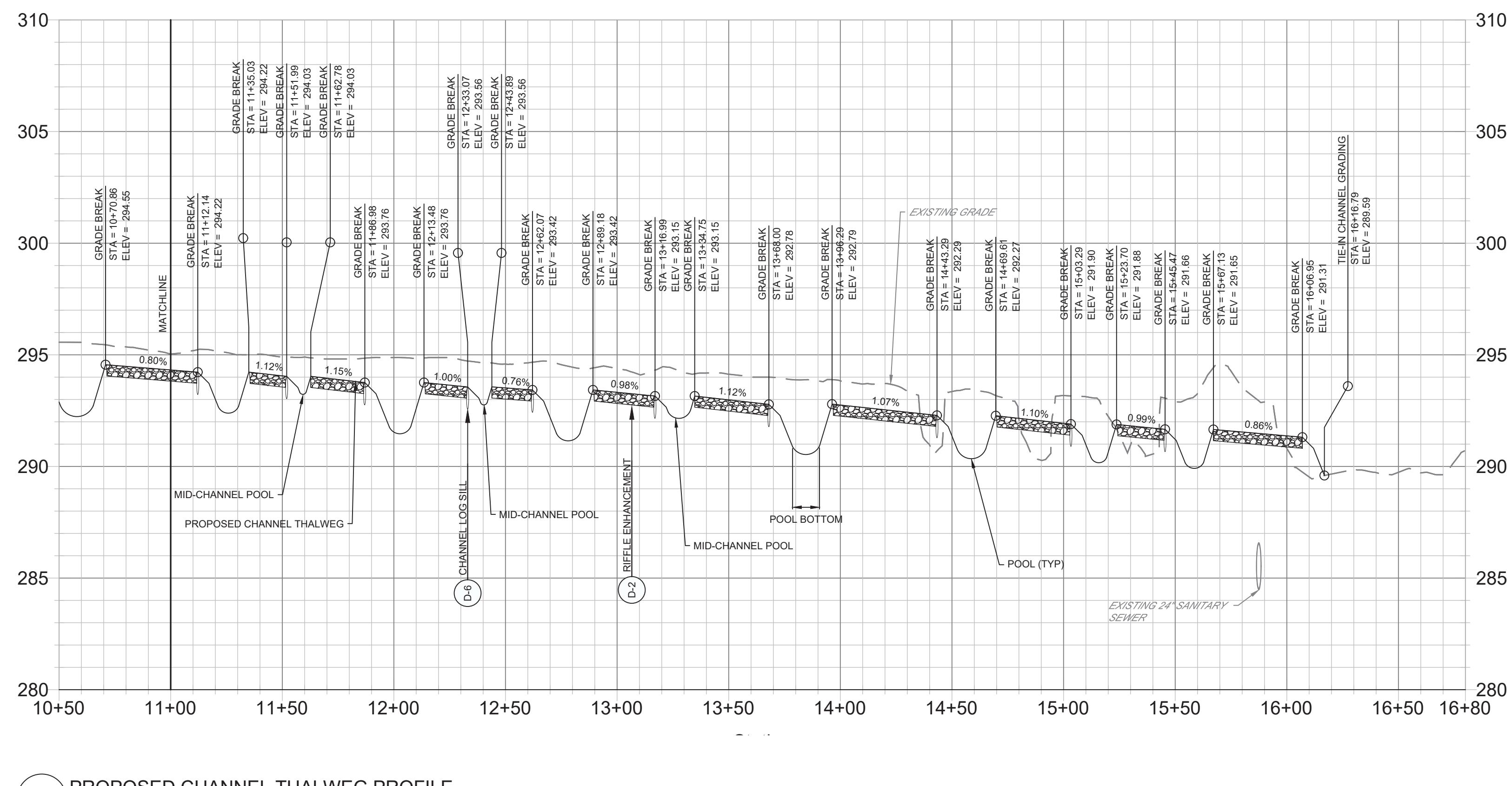
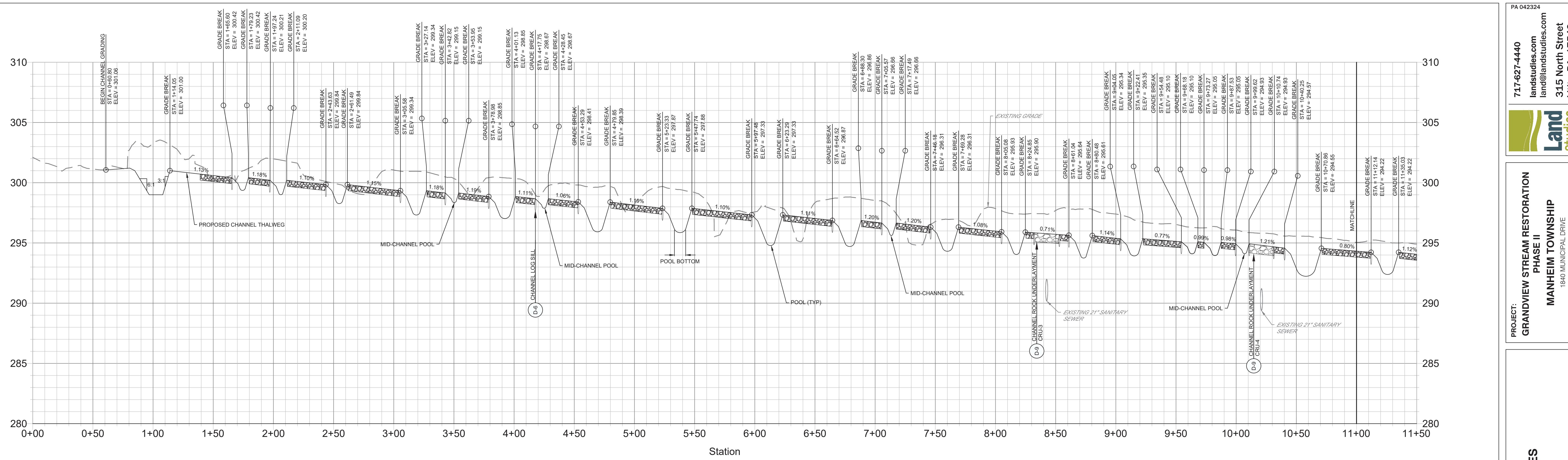
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PROJECT NUMBER:	D-366.12-23
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CHECKED BY:	RG
DATE:	05/31/2024
SCALE:	AS SHOWN



P-4 PROPOSED CHANNEL THALWEG PROFILE

0' 4' 8' 12'
VERTICAL SCALE: 1" = 4'

0' 40' 80' 120'
HORIZONTAL SCALE: 1" = 40'

DESIGN PROFILES

SHEET TITLE:

REVISIONS

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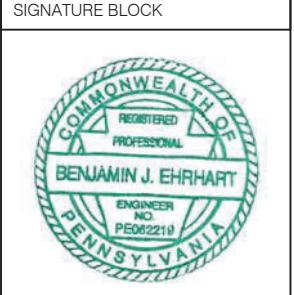
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CROSS SECTIONS

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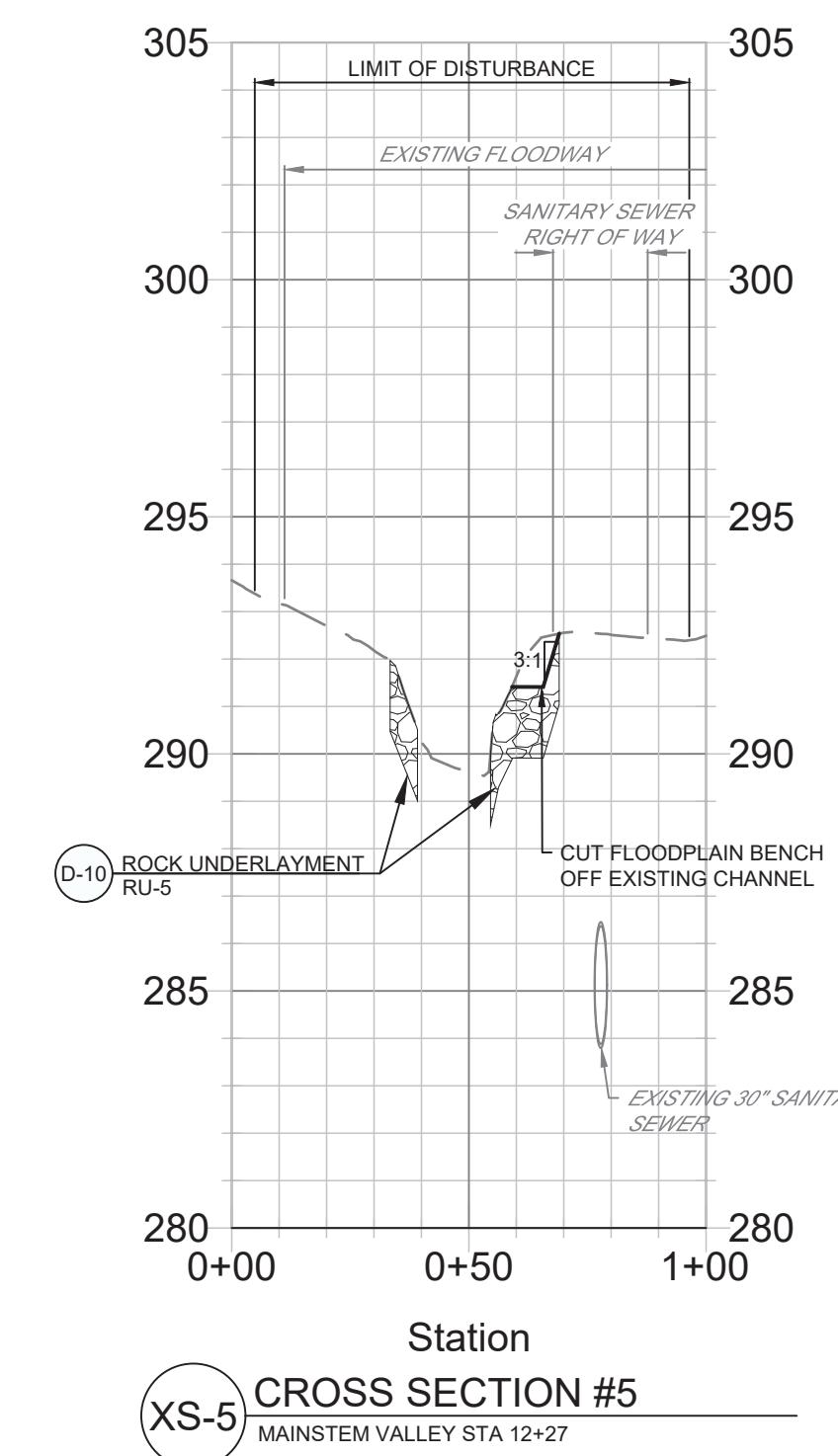
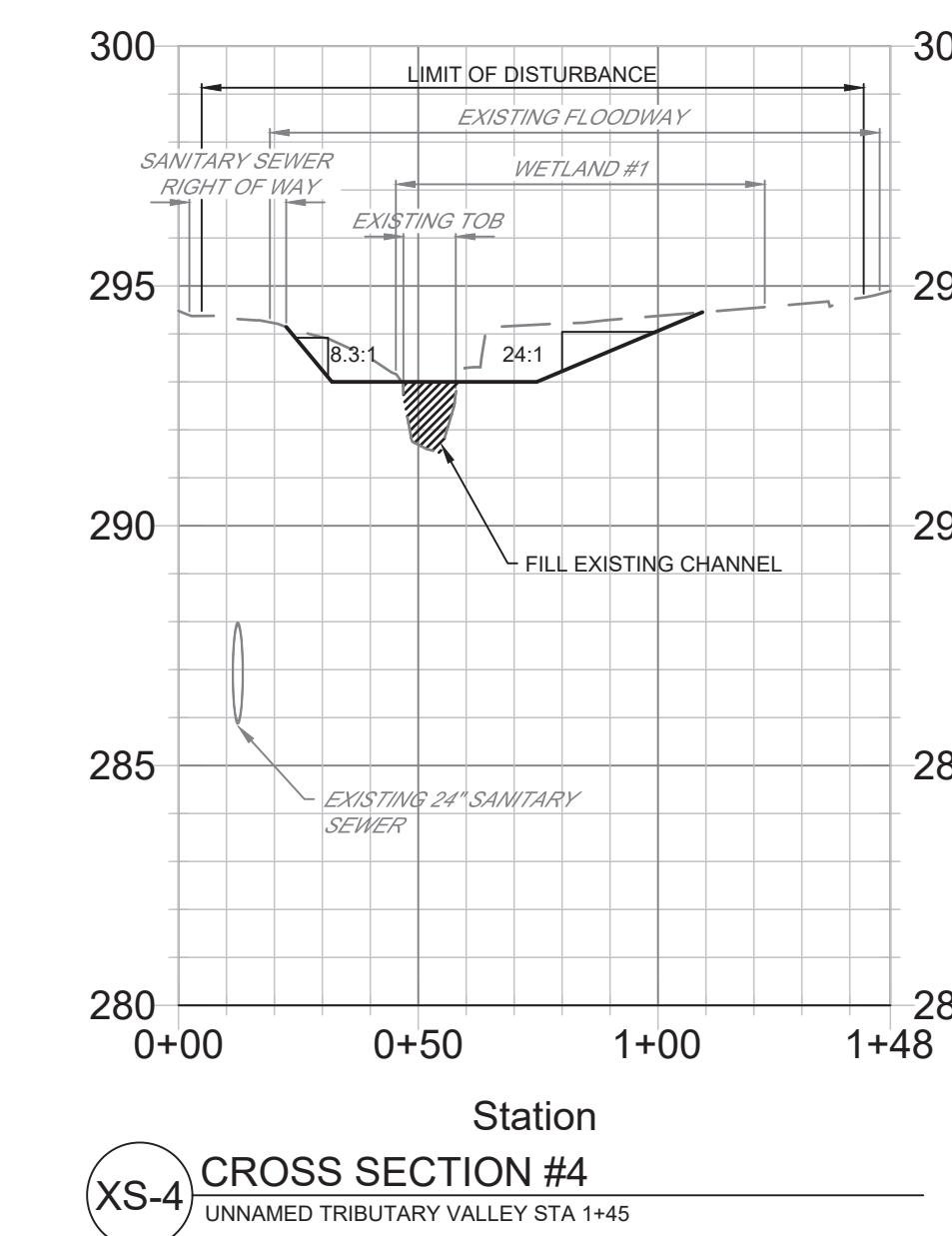
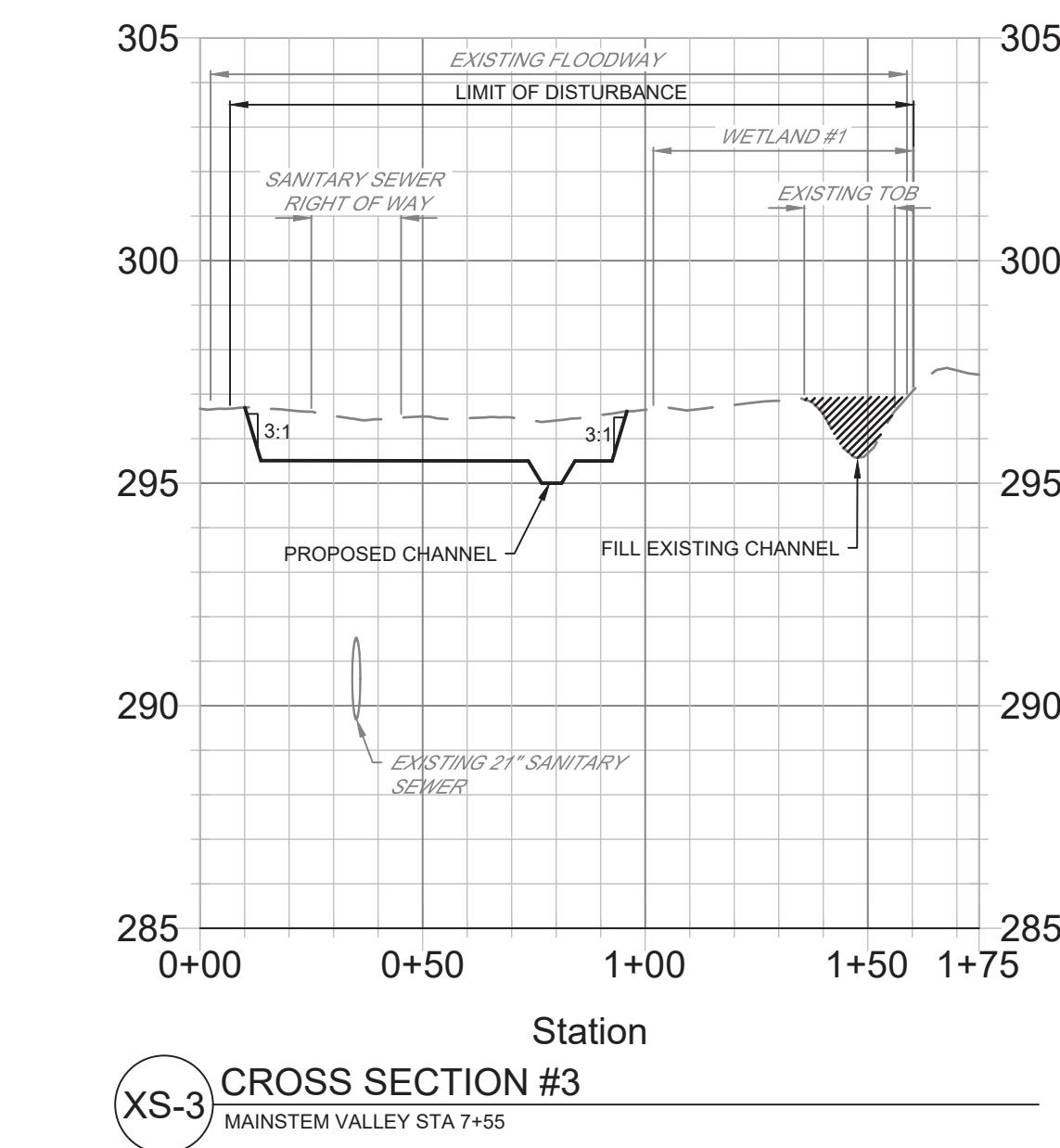
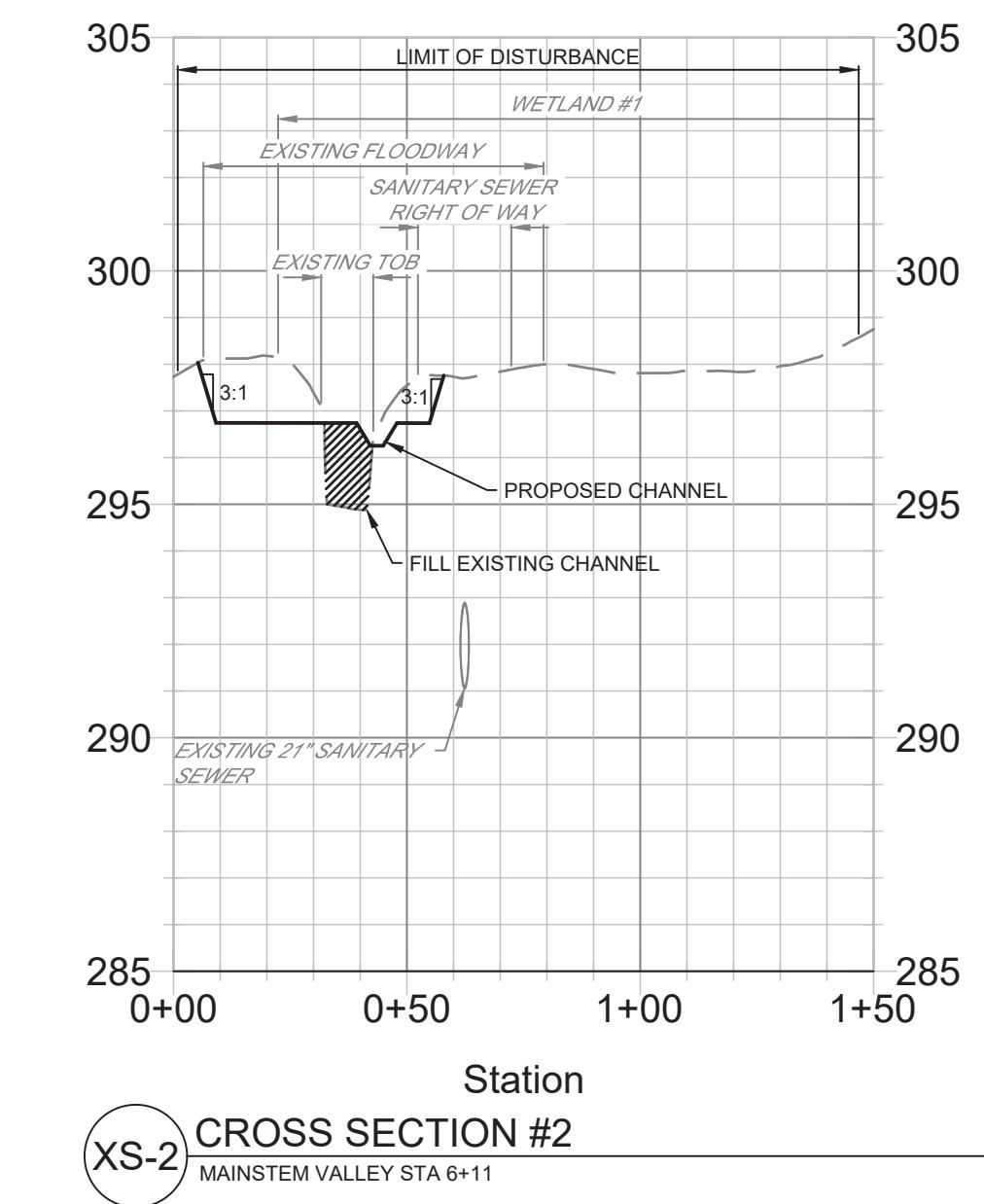
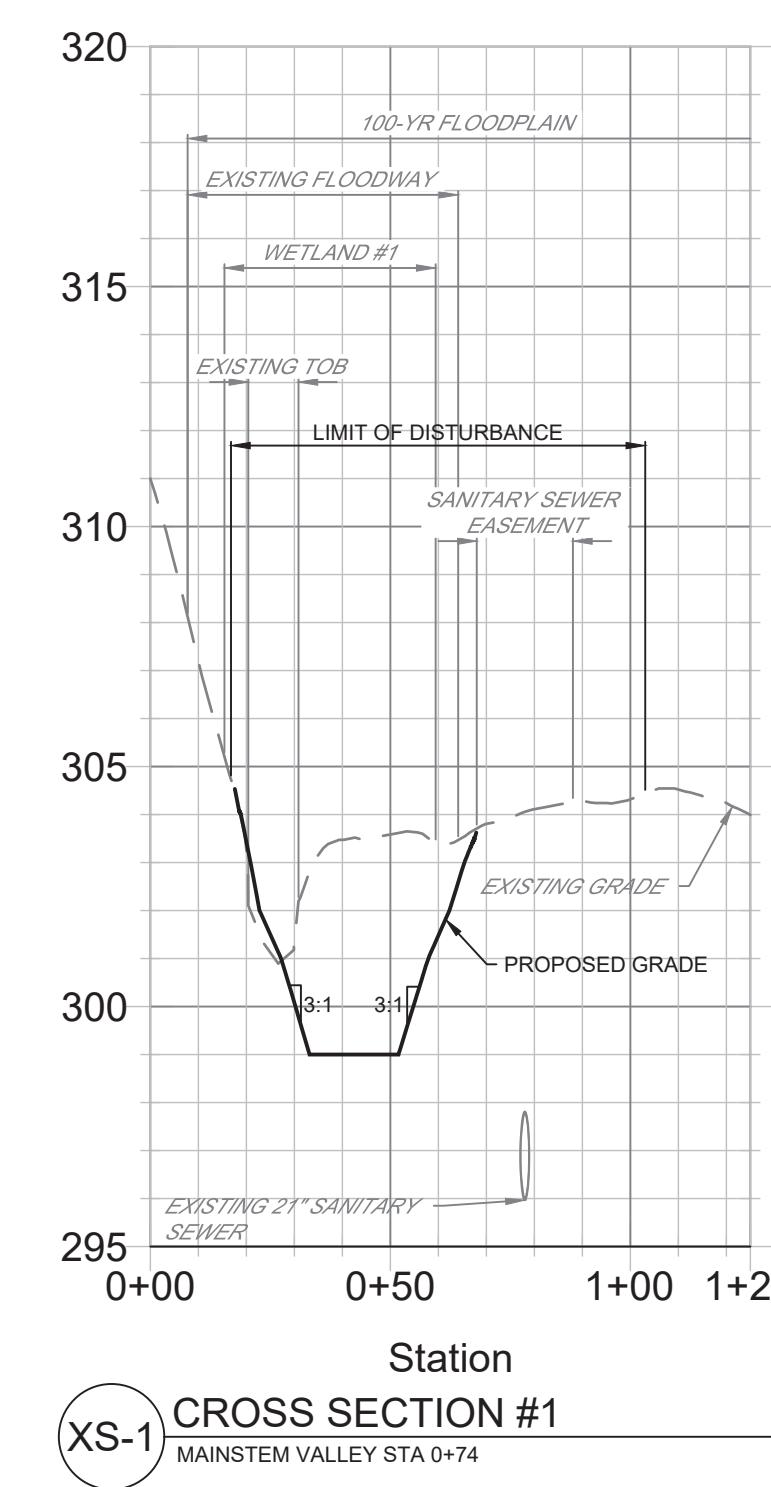
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PROJECT NUMBER	D-366.12-23
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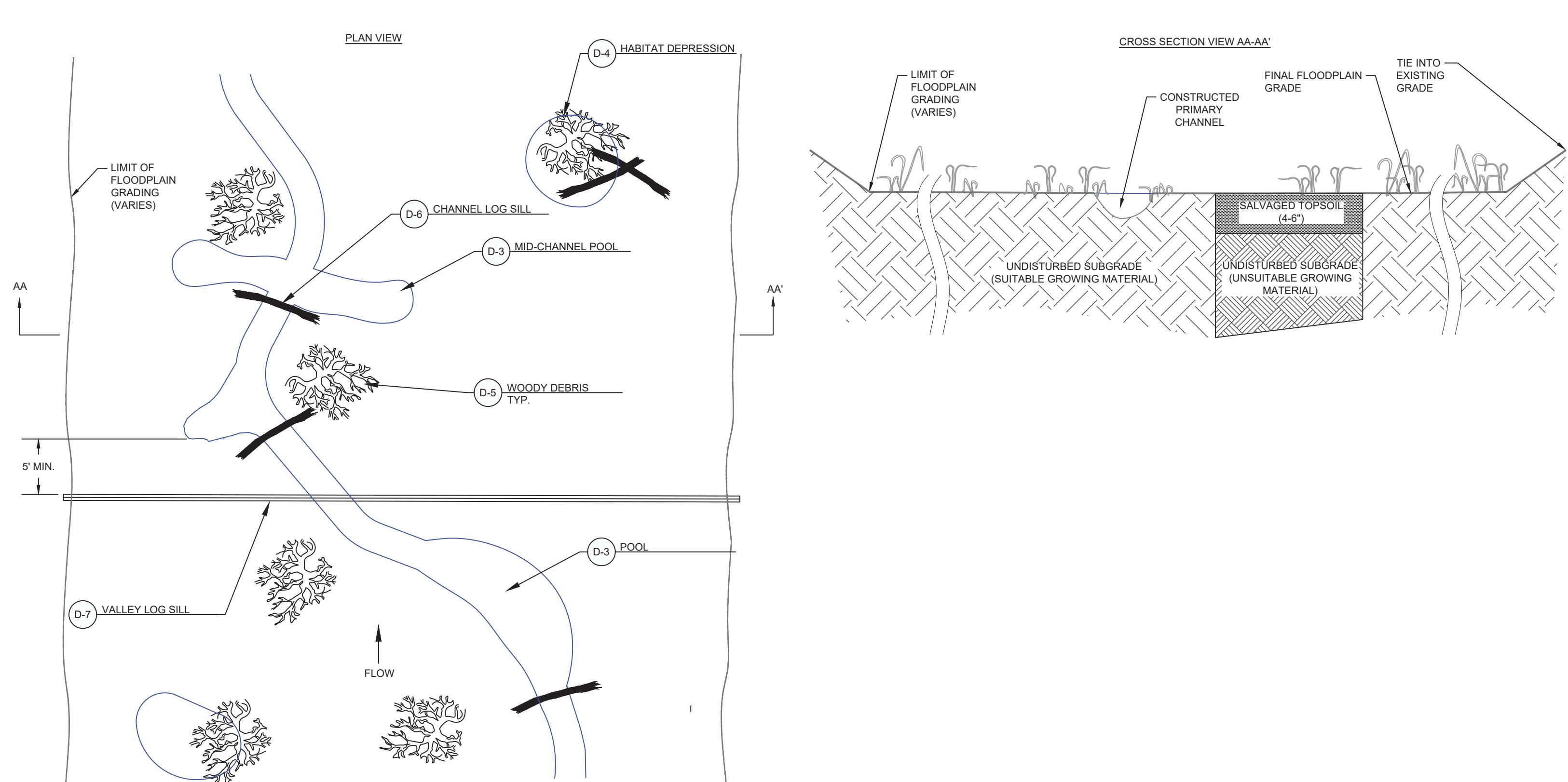
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OF 18



4' 8' 12'
 VERTICAL SCALE: 1" = 4'

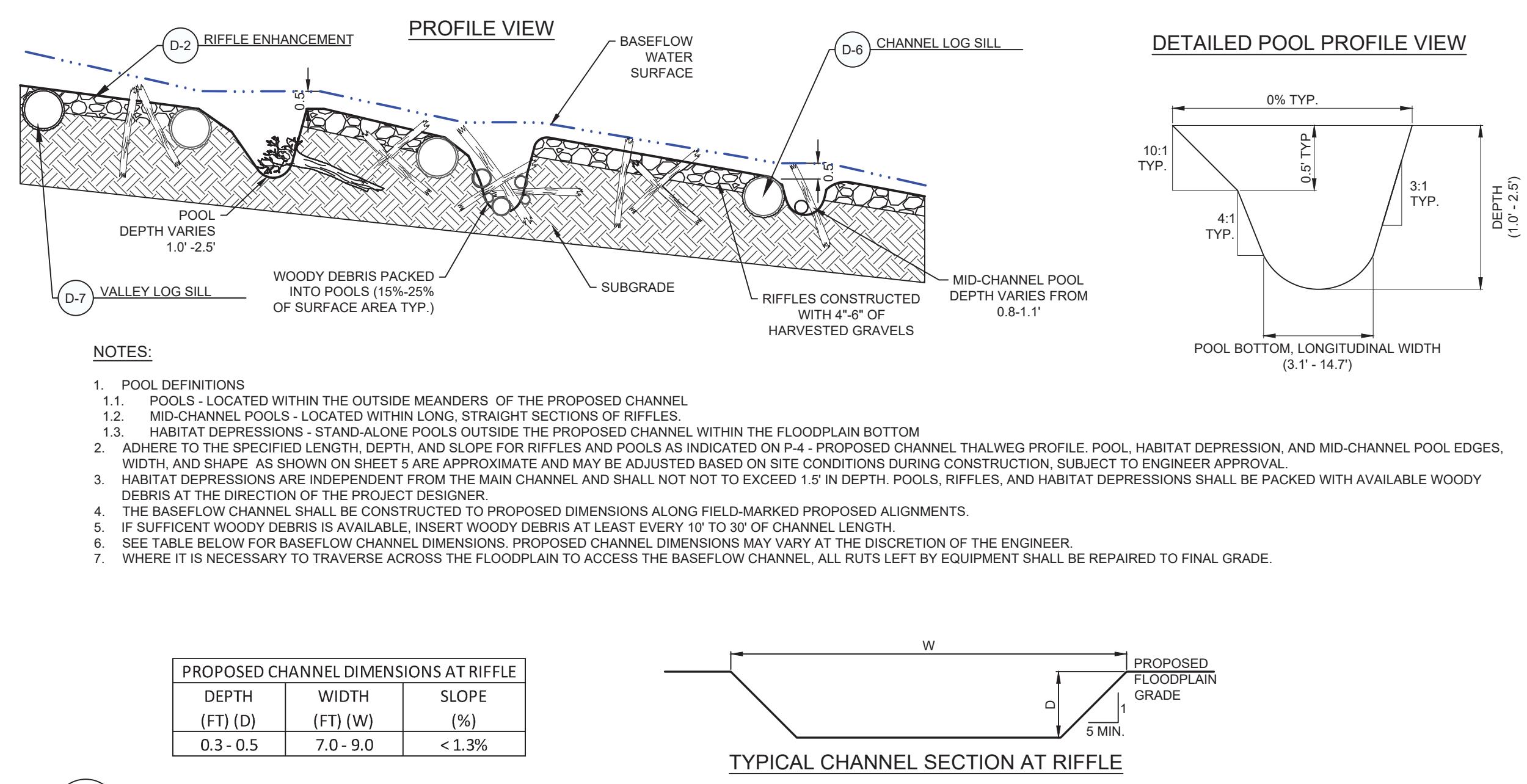
40' 80' 120'
 HORIZONTAL SCALE: 1" = 40'



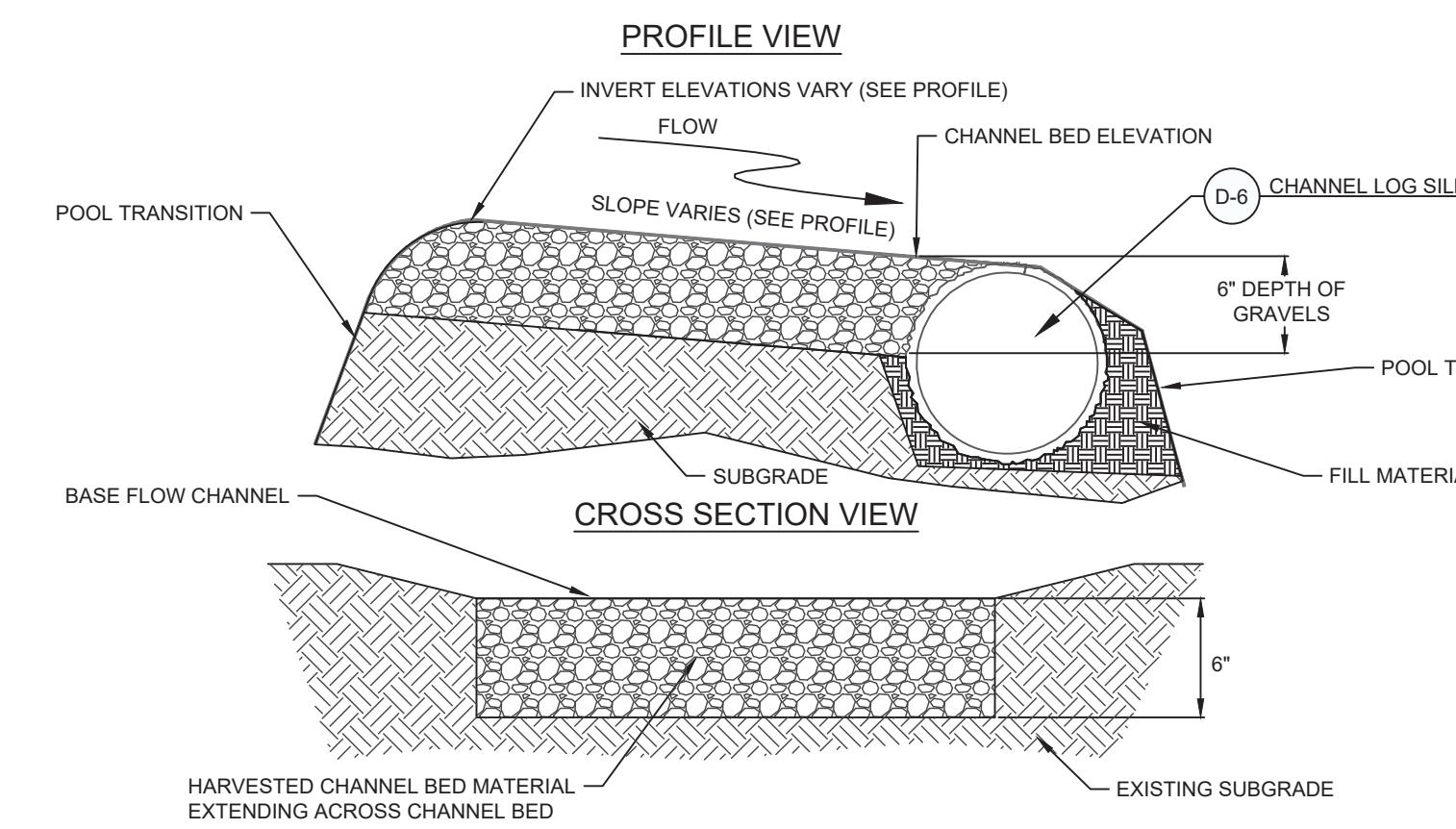
FLOODPLAIN & CHANNEL CONSTRUCTION NOTES:

1. EXCAVATE PROPOSED FLOODPLAIN TO DESIGN ELEVATIONS AS EXCESSIVE STONE OR SEWER AGGREGATE) BE PRESENT TO ADDING SALVAGED TOPSOIL.
2. CONTRACTOR OR CONTRACTORS SURVEY REPRESENTATIVES.
3. CONSTRUCT THE PRIMARY CHANNEL TO PROPOSED DIMENSIONS.
4. EXCAVATE PROPOSED POOLS AS SPECIFIED IN DETAIL D-3 AND D-4.
5. SOME IRREGULARITIES IN FINAL GRADE ARE ACCEPTABLE, AS LONG AS THE CHANNEL IS NOT OBSTRUCTED.
6. SEED AND MAT THE RESTORED FLOODPLAIN PER THE LANDSCAPE PLAN.
7. PLANT TREES PER THE LANDSCAPE PLAN.
8. WHERE IT IS NECESSARY TO TRAVERSE ACROSS THE FLOODPLAIN, DO SO CAREFULLY AND WITH APPROPRIATE EQUIPMENT.

1. EXCAVATE PROPOSED FLOODPLAIN TO DESIGN ELEVATIONS. ASSESS THE EXCAVATED MATERIAL FOR SUITABILITY AS GROWING MEDIUM. IF THE MATERIAL IS SUITABLE (CONTAINS AT LEAST 35% TOPSOIL), LEAVE IN PLACE AND PROCEED WITH CONSTRUCTION. SHOULD UNSUITABLE MATERIALS (SUCH AS EXCESSIVE STONE OR SEWER AGGREGATE) BE PRESENT, OVER-EXCAVATE BY 4-6 INCHES AND SUBSTITUTE WITH SALVAGED TOPSOIL UNTIL REACHING FINAL FLOODPLAIN GRADE. ENSURE INSTALLATION OF WOODY DEBRIS, ROCK UNDERLayment, AND LOG SILLS AS SPECIFIED IN THE PLAN PRIOR TO ADDING SALVAGED TOPSOIL.
2. CONTRACTOR OR CONTRACTORS SURVEY REPRESENTATIVE SHALL FIELD MARK PROPOSED ALIGNMENTS OF PRIMARY STREAM CHANNELS AND NOTIFY THE DESIGN ENGINEER FOR APPROVAL PRIOR TO CHANNEL CONSTRUCTION.
3. CONSTRUCT THE PRIMARY CHANNEL TO PROPOSED DIMENSIONS ALONG THE FIELD-MARKED PROPOSED ALIGNMENT.
4. EXCAVATE PROPOSED POOLS AS SPECIFIED IN DETAIL D-3 AND PROFILE P-3.
5. SOME IRREGULARITIES IN FINAL GRADE ARE ACCEPTABLE, AT THE DIRECTION OF THE PROJECT ENGINEER TO CREATE MICRO-TOPOGRAPHY (NOT TO EXCEED +/- 3"), WHICH IS NOT DEPICTED BY PROPOSED CONTOURS. DO NOT COMPACT TOPSOIL.
6. SEED AND MAT THE RESTORED FLOODPLAIN PER THE LANDSCAPE PLAN.
7. PLANT TREES PER THE LANDSCAPE PLAN.
8. WHERE IT IS NECESSARY TO TRAVERSE ACROSS THE FLOODPLAIN, ALL PITS LEFT BY EQUIPMENT SHALL BE FILLED IF DEEMED NECESSARY BY THE PROJECT ENGINEER.



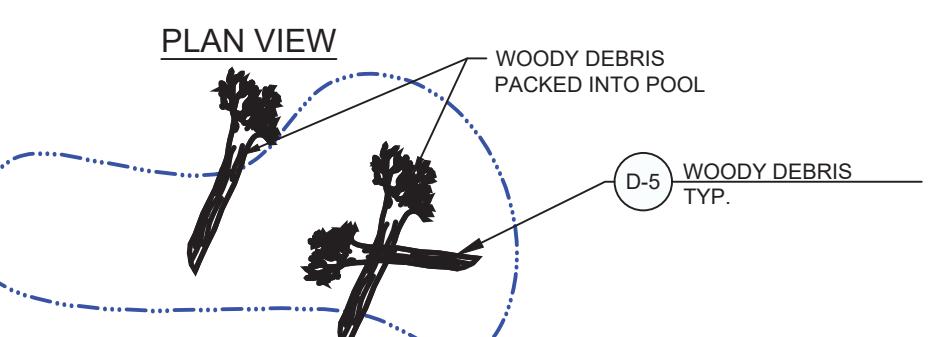
D-3 CHANNEL CONSTRUCTION
NOT TO SCALE



NOTES:

1. SALVAGE GRAVELS AND COBBLES FROM EXISTING CHANNEL BEDS FOR USE IN TARGETED AREAS OF RIFFLE ENHANCEMENT. IF INSUFFICIENT MATERIALS ARE PRESENT ON-SITE TO CONSTRUCT ALL INDICATED AREAS OF RIFFLE ENHANCEMENT, THE CONTRACTOR SHALL FURNISH ADDITIONAL MATERIAL MATCHING THE GRADATION OF EXISTING BED MATERIAL, SUBJECT TO THE APPROVAL OF THE ENGINEER.
2. EXCAVATE THE CHANNEL BED TO THE APPROPRIATE DEPTH AS INDICATED ON THE DRAWINGS, TO ALLOW GRAVEL MATERIAL TO BE PLACED TO THE SLOPE AND ELEVATIONS OF THE PROPOSED BASE FLOW CHANNEL PROFILE. CONSTRUCTED RIFFLES SHALL HAVE A DEPTH OF 4" - 6".
3. WHERE SUFFICIENT GRAVELS ARE PRESENT AT PROPOSED CHANNEL BED ELEVATIONS, THE ENGINEER MAY DETERMINE THAT RIFFLE ENHANCEMENT IS NOT REQUIRED. IF THIS IS THE CASE, RIFFLE ENHANCEMENT SHALL NOT BE NECESSARY IN THOSE REACHES, SUBJECT TO THE APPROVAL OF THE ENGINEER.
4. ALL SALVAGED AND FURNISHED CHANNEL BED MATERIALS MUST BE WASHED AS THEY ARE BEING PLACED TO ENSURE THEY ARE FREE OF ANY SOIL MATERIALS THAT MAY WASH OUT IN ACTIVE FLOW CONDITIONS.
5. PLACE CHANNEL BED MATERIAL TO ELEVATIONS SPECIFIED ON THE PROPOSED BASEFLOW CHANNEL PROFILE - P-4. PLACE WOODY DEBRIS PER SPECIFICATIONS IN DETAIL D-5.

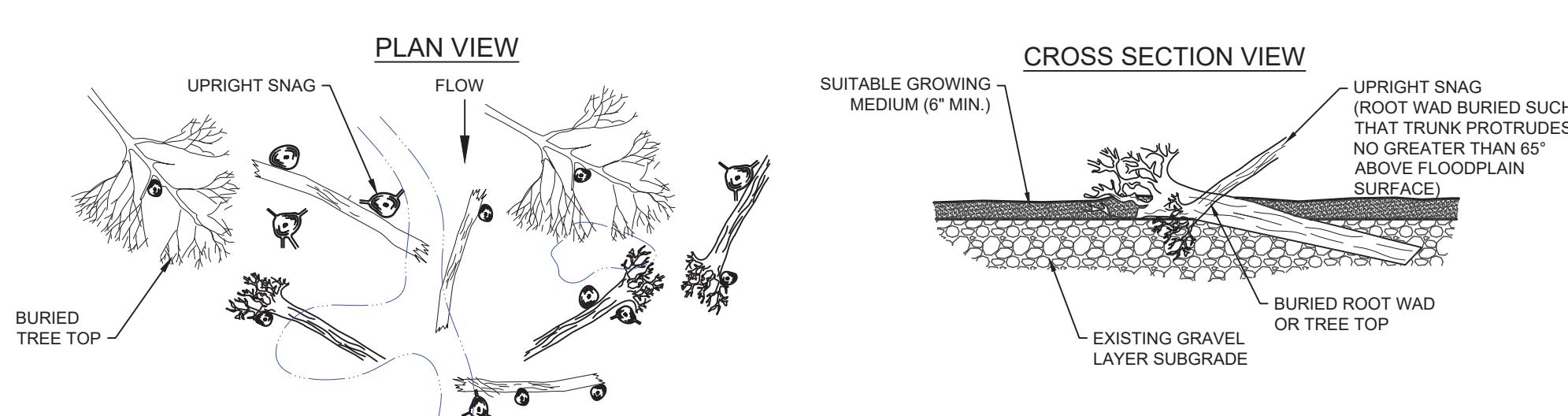
D-2 RIFFLE ENHANCEMENT
NOT TO SCALE



HABITAT DEPRESSION NOTES:

1. HABITAT DEPRESSIONS SHALL BE IN THE VICINITY AND SIMILAR IN SIZE AND SHAPE AS SHOWN ON THE GRADING PLAN. SIZE, LOCATION, AND ORIENTATION MAY BE ADJUSTED BY THE ENGINEER BASED ON SITE CONDITIONS.
2. AT A MINIMUM, HABITAT DEPRESSIONS MUST BE LOCATED FURTHER THAN 15 FEET FROM THE DOWNSTREAM SIDE OF PROPOSED GRADE CONTROL STRUCTURES TO PREVENT GRADE CONTROL STRUCTURE FROM BEING SCOURED OUT.
3. EXCAVATE HABITAT DEPRESSIONS TO A DEPTH OF 1.0 - 1.5'. VARY THE DEPTH ACROSS THE EXTENTS OF THE POOL
4. WOODY DEBRIS STRUCTURES MAY BE PLACED WITHIN HABITAT DEPRESSIONS. HABITAT DEPRESSIONS SHALL BE PACKED WITH BRUSHY

D-4 HABITAT DEPRESSION NOT TO SCALE



NOTES:

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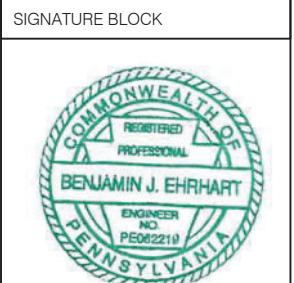
1. INSTALL WOODY DEBRIS AS DEPICTED ON PLANS AND DETAILS. LOCATIONS MAY BE ADJUSTED BY PROJECT ENGINEER BASED ON SITE CONDITIONS
2. IF INSUFFICIENT WOODY DEBRIS EXISTS ON-SITE, THE PRIORITY FOR INSTALLATION IS AS FOLLOWS: CHANNEL POOLS, HABITAT DEPRESSIONS, RIFFLES, THEN FLOODPLAIN BOTTOM. CONSULT WITH THE PROJECT ENGINEER IF PRIORITIZATION IS REQUIRED.
3. AT A MINIMUM, ALL POOL TYPES (POOLS, MID-CHANNEL POOLS, HABITAT DEPRESSIONS) SHALL RECEIVE WOODY DEBRIS. EACH WOODY DEBRIS STRUCTURE SHOULD HAVE A MINIMUM ESTIMATED COMBINED TOTAL TRUNK OR MAIN BRANCH LENGTH OF 15 FEET. ASSUME A MINIMUM OF 52 WOODY DEBRIS STRUCTURES ARE REQUIRED FOR THE PROJECT, AND WILL REQUIRE IMPORT TO MEET MINIMUM AMOUNT IF NOT AVAILABLE ON SITE. DO NOT INSTALL WOODY DEBRIS WITHIN THE SEWER RIGHT-OF-WAY.
4. WOODY DEBRIS SHALL CONSIST OF A COMBINATION OF INDIVIDUAL LOGS, ROOT WADS, AND TREE TOPS HARVESTED FROM TREES/BRUSH THAT HAS BEEN CLEARED FROM THE SITE. LOGS SHALL ONLY BE UTILIZED FOR WOODY DEBRIS IF THEY FAIL TO MEET THE PROPER LENGTH, DIAMETER, OR STRAIGHTNESS REQUIRED FOR LOG SILLS. IN THE EVENT THAT CLEARED WOOD IS INSUFFICIENT, IMPORTED WOOD MATERIAL SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION TO MEET THE MINIMUM REQUIRED WOODY DEBRIS AMOUNT.
5. ALL WOODY DEBRIS SHALL BE PARTIALLY BURIED AND/ OR PINNED WITH UPRIGHT SNAGS SO THAT WILL NOT BE DISPLACED BY HIGH FLOWS.
6. PLACE ROOT WADS OR TREE TOPS ALONG THE CHANNEL, PARTICULARLY IN THE OUTSIDE BENDS OF POOLS SUCH THAT THE BRUSHY PART OF THE DEBRIS EXTENDS INTO THE CHANNEL IN SUCH A MANNER THAT 75% THE EXPOSED WOOD IS UNDERWATER AND OCCUPY 15%-25% OF THE POOL SURFACE AREA.
7. ALL WOODY DEBRIS SHALL BE BURIED IN SUCH A MANNER AS TO PREVENT FLOTATION IN FLOOD EVENTS AND MUST NOT EXCEED 3.0' ABOVE FINISHED FLOODPLAIN.
8. ALL WOOD ON SITE SHALL BE RE-PURPOSED FOR WOODY DEBRIS STRUCTURES, WITH THE EXCEPTION OF INVASIVE SPECIES, BLACK WILLOW AND BLACK WALNUT WHICH SHALL BE MARKED BY THE DESIGN ENGINEER AND BE REMOVED FROM THE SITE BY THE CONTRACTOR.

D-5 WOODY DEBRIS
NOT TO SCALE

DESIGN DETAILS

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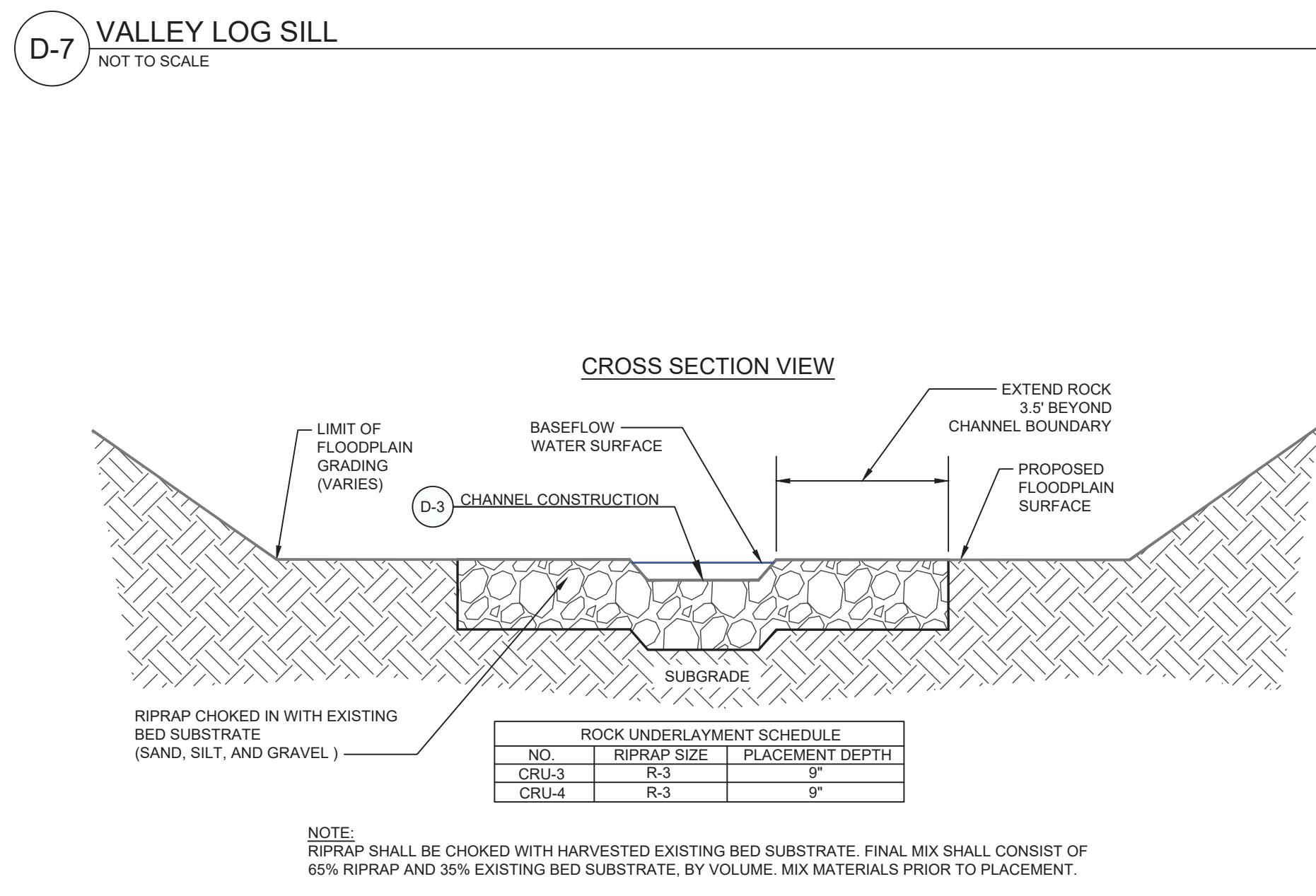
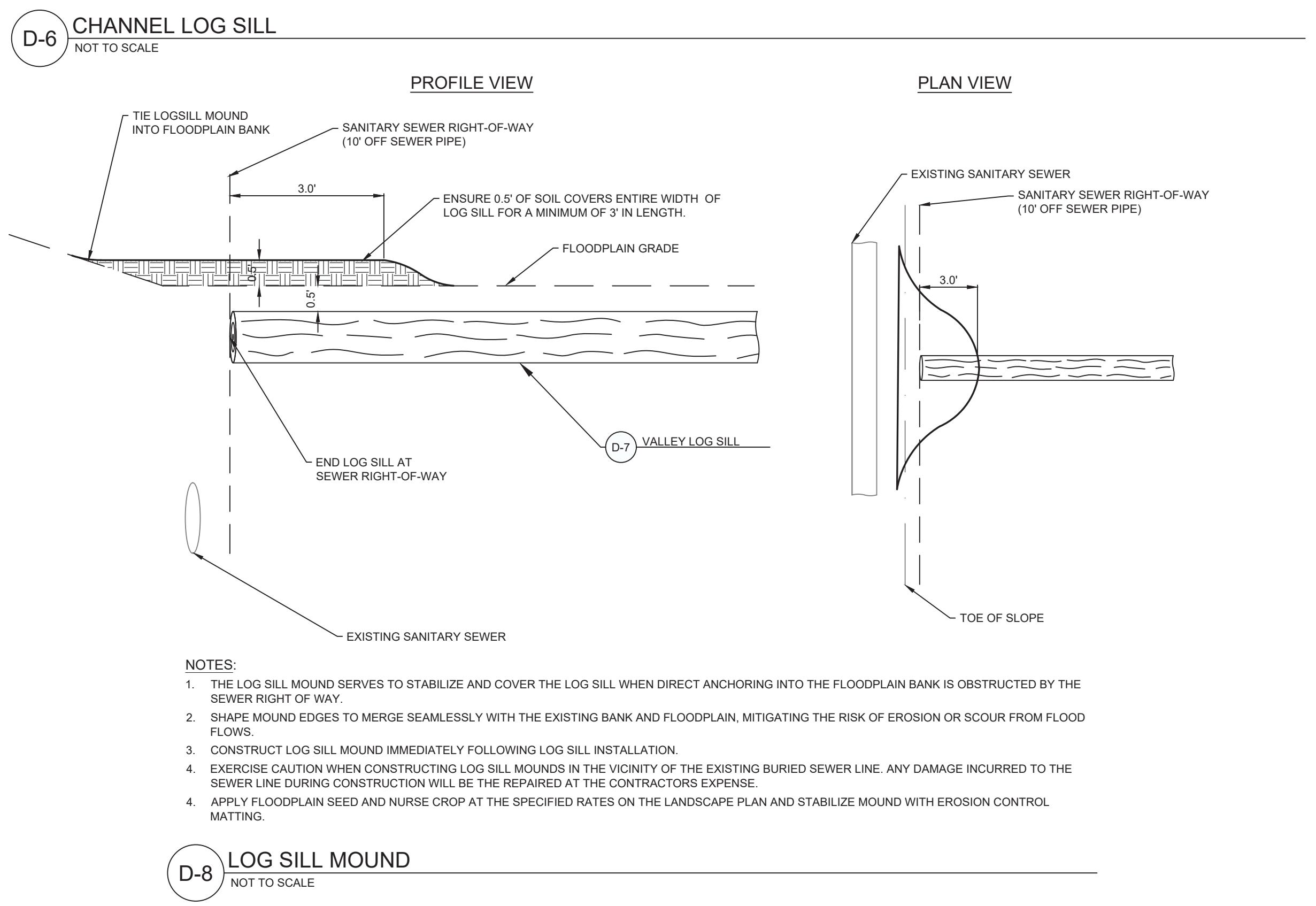
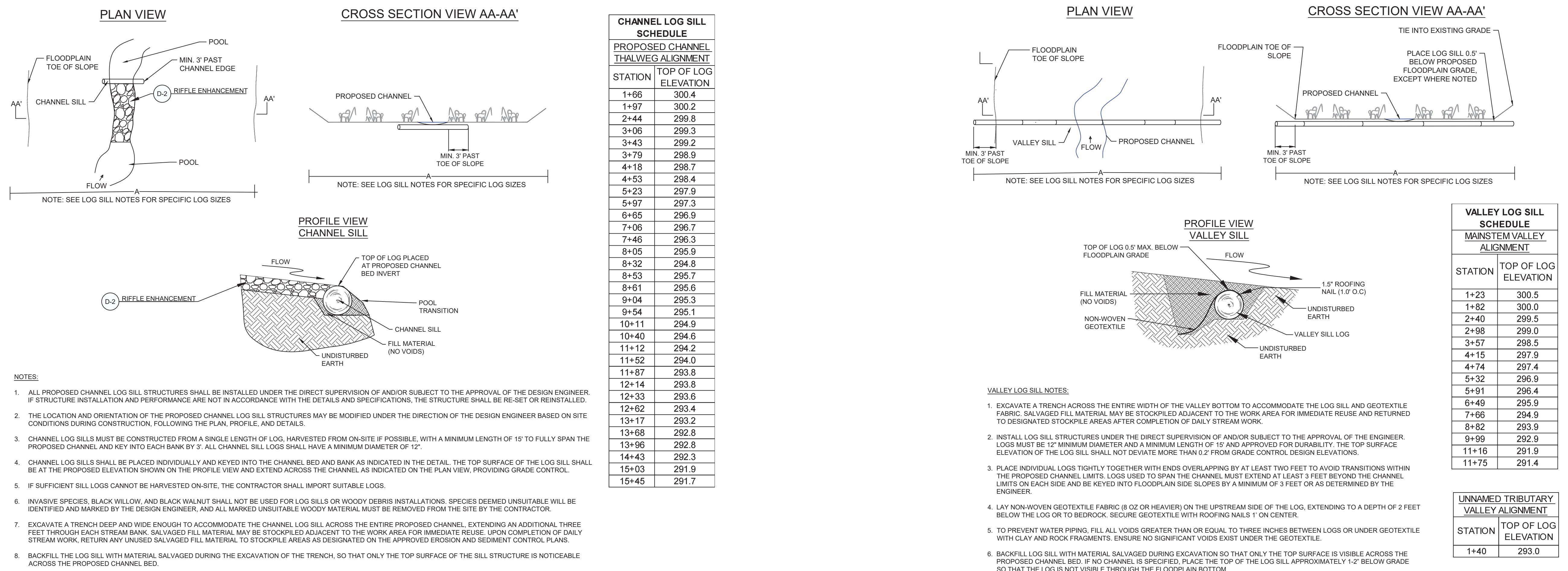
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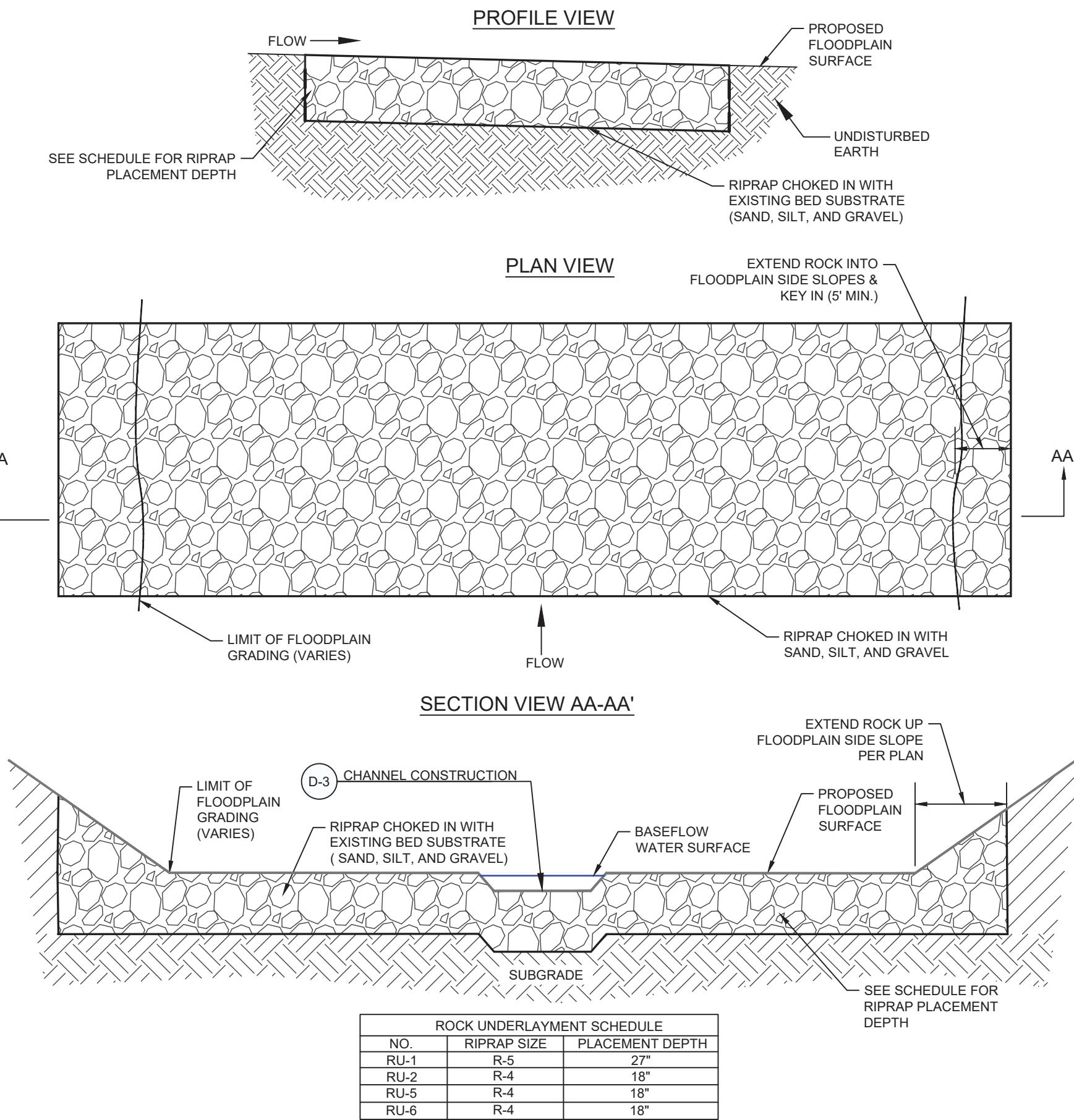
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RG

DATE:
05/31/2024

SCALE:
NTS

SHEET NUMBER:
12
OF 18





NOTE:
RIPRAP SHALL BE CHOKE WITH HARVESTED EXISTING BED SUBSTRATE. FINAL MIX SHALL CONSIST OF
65% RIPRAP AND 35% EXISTING BED SUBSTRATE, BY VOLUME. MIX MATERIALS PRIOR TO PLACEMENT.

D-10 ROCK UNDERLAYMENT
NOT TO SCALE

PROJECT:

GRANDVIEW STREAM RESTORATION
MANHEIM TOWNSHIP
LANCASTER, PA 17601

MANHEIM TOWNSHIP
LANCASTER, PA 17601

PA 042324

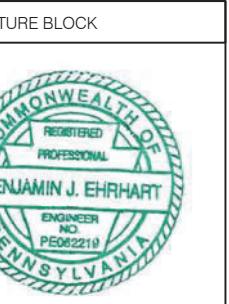
717-627-4440
landstudies.com
land@landstudies.com
315 North Street
Lititz, PA 17543



DESIGN DETAILS

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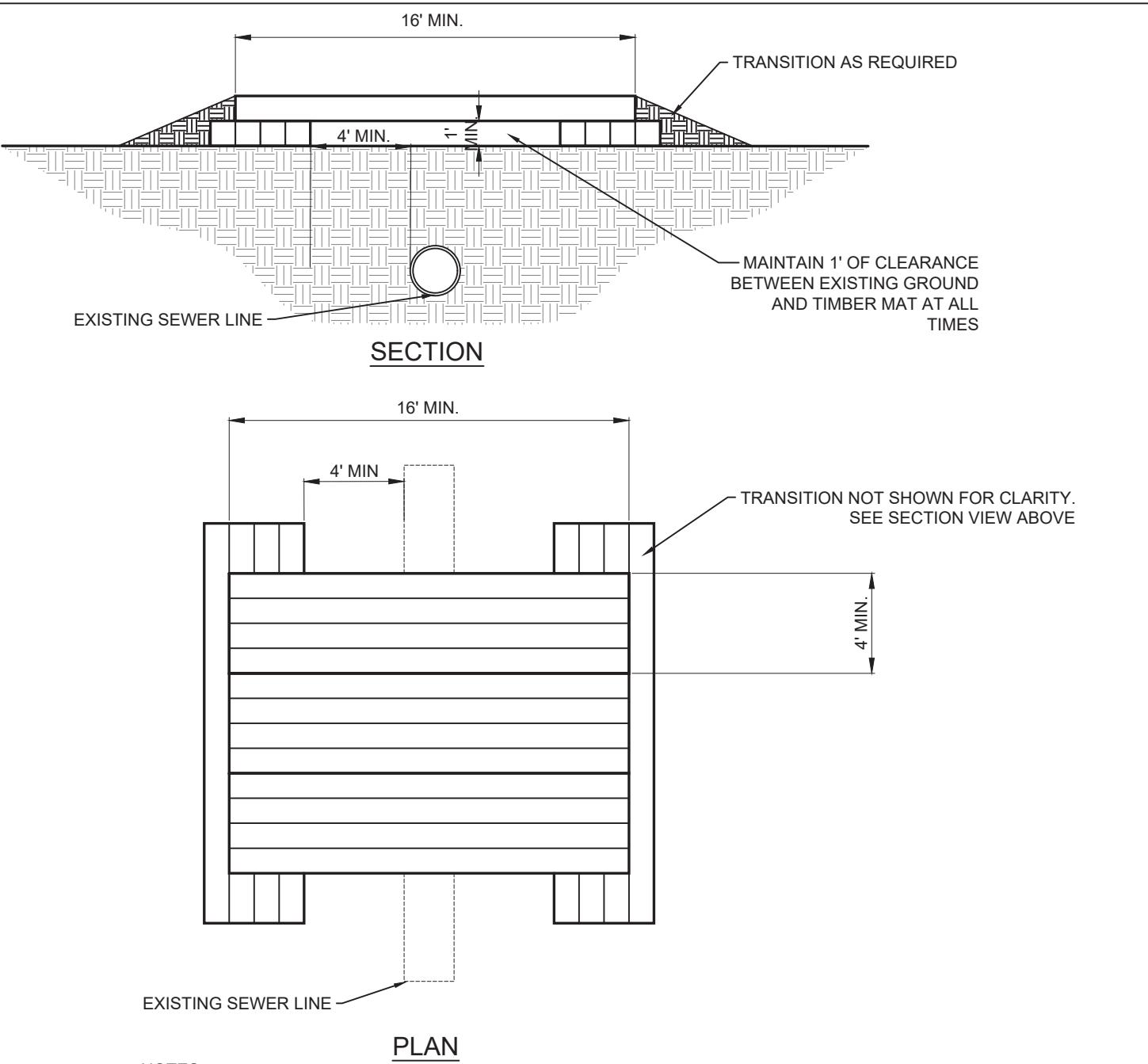
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STANDARD E&S PLAN NOTES

1. ALL EARTH DISTURBANCES, INCLUDING CLEARING AND GRUBBING AS WELL AS CUTS AND FILLS SHALL BE DONE IN ACCORDANCE WITH THE APPROVED E&S PLAN. A COPY OF THE APPROVED DRAWINGS (STAMPED, SIGNED AND DATED BY THE REVIEWING AGENCY) MUST BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES. THE REVIEWING AGENCY SHALL BE NOTIFIED OF ANY CHANGES TO THE APPROVED PLAN PRIOR TO IMPLEMENTATION OF THOSE CHANGES. THE REVIEWING AGENCY MAY REQUIRE A WRITTEN SUBMITTAL OF THOSE CHANGES FOR REVIEW AND APPROVAL AT ITS DISCRETION.

2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO READ, UNDERSTAND AND UPHOLD ALL PERMIT CONDITIONS FROM ANY REVIEWING AGENCIES. THESE AGENCIES MAY INCLUDE US ARMY CORPS OF ENGINEERS, PA DEPARTMENT OF ENVIRONMENTAL PROTECTION, THE COUNTY CONSERVATION DISTRICT AND/OR THE MUNICIPALITY. EXAMPLES OF PERMIT CONDITIONS MAY INCLUDE NOTIFYING AGENCIES (SUCH AS PA FISH & BOAT COMMISSION) AT LEAST 10 DAYS PRIOR TO BEGINNING WORK.

3. AT LEAST 7 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, INCLUDING CLEARING AND GRUBBING, THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE MUNICIPAL OFFICIALS, THE E&S DESIGN ENGINEER, THE LICENSED PROFESSIONAL RESPONSIBLE FOR OVERSIGHT OF CRITICAL STAGES OF IMPLEMENTATION OF THE RESTORATION PLAN, AND A REPRESENTATIVE FROM THE REVIEWING AGENCY (PA DEP, US ARMY CORPS AND/OR THE LOCAL CONSERVATION DISTRICT) TO AN ON-SITE PRECONSTRUCTION MEETING.

4. AT LEAST 3 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.

5. ALL EARTH DISTURBANCE ACTIVITIES SHALL PROCEED IN ACCORDANCE WITH THE SEQUENCE PROVIDED ON THE PLAN DRAWINGS. DEVIATION FROM THAT SEQUENCE MUST BE APPROVED IN WRITING FROM THE DEPARTMENT (OR CONSERVATION DISTRICT) PRIOR TO IMPLEMENTATION.

6. AREAS TO BE FILLED ARE TO BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS AND OTHER OBJECTIONABLE MATERIAL.

7. CLEARING, GRUBBING, AND TOPSOIL STRIPPING SHALL BE LIMITED TO THOSE AREAS DESCRIBED IN EACH STAGE OF THE CONSTRUCTION SEQUENCE. GENERAL SITE CLEARING, GRUBBING AND TOPSOIL STRIPPING MAY NOT COMMENCE IN ANY STAGE OR PHASE OF THE PROJECT UNTIL THE E&S BMPS SPECIFIED BY THE BMP SEQUENCE FOR THAT STAGE OR PHASE HAVE BEEN INSTALLED AND ARE FUNCTIONING AS DESCRIBED IN THIS E&S PLAN.

8. AT NO TIME SHALL CONSTRUCTION VEHICLES BE ALLOWED TO ENTER AREAS OUTSIDE THE LIMIT OF DISTURBANCE BOUNDARIES SHOWN ON THE PLAN MAPS. THESE AREAS MUST BE CLEARLY MARKED AND FENCED OFF BEFORE CLEARING OR GRUBBING OPERATIONS BEGIN.

9. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED AT THE LOCATION(S) SHOWN ON THE PLAN MAP(S) IN THE AMOUNT NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. EACH STOCKPILE SHALL BE PROTECTED IN THE MANNER SHOWN ON THE PLAN DRAWINGS. STOCKPILE HEIGHTS SHALL NOT EXCEED 35 FEET. STOCKPILE SLOPES SHALL BE 2H:1V OR FLATTER.

10. IMMEDIATELY UPON DISCOVERING UNFORESEEN CIRCUMSTANCES POSING THE POTENTIAL FOR ACCELERATED EROSION AND/OR SEDIMENT POLLUTION, THE OPERATOR SHALL IMPLEMENT APPROPRIATE BEST MANAGEMENT PRACTICES TO MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENT POLLUTION AND NOTIFY THE LOCAL CONSERVATION DISTRICT AND/OR THE REGIONAL OFFICE OF THE DEPARTMENT.

11. ALL BUILDING MATERIALS AND WASTES SHALL BE REMOVED FROM THE SITE AND RECYCLED OR DISPOSED OF IN ACCORDANCE WITH THE DEPARTMENT'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1, AND 287.1 ET. SEQ. NO USED MATERIALS OR WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURNED, BURIED, DUMPED, OR DISCHARGED AT THE SITE.

12. ALL OFF-SITE WASTE AND BORROW AREAS MUST HAVE AN E&S PLAN APPROVED BY THE DEPARTMENT (OR LOCAL CONSERVATION DISTRICT) FULLY IMPLEMENTED PRIOR TO BEING ACTIVATED.

13. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY MATERIAL BROUGHT ON SITE IS CLEAN FILL. FORM FP-001 MUST BE RETAINED BY THE PROPERTY OWNER FOR ANY FILL MATERIAL AFFECTED BY A SPILL OR RELEASE OF A REGULATED SUBSTANCE BUT QUALIFYING AS CLEAN FILL DUE TO ANALYTICAL TESTING.

14. ALL PUMPING OF WATER FROM ANY WORK AREA SHALL BE DONE ACCORDING TO THE PROCEDURE DESCRIBED IN THIS PLAN, OVER UNDISTURBED VEGETATED AREAS.

15. VEHICLES AND EQUIPMENT MAY ONLY ENTER THE SITE THROUGH THE APPROVED CONSTRUCTION ENTRANCE ON THE E&S PLAN.

16. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENT BMPS SHALL BE MAINTAINED PROPERLY. MAINTENANCE SHALL INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENT BMPS AFTER EACH RUNOFF EVENT AND ON A WEEKLY BASIS ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING AND RETENNETING MUST BE PERFORMED IMMEDIATELY IF THE E&S BMPS FAIL TO PERFORM AS EXPECTED. MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

17. A LOG SHOWING DATES THAT E&S BMPS WERE INSPECTED AS WELL AS ANY DEFICIENCIES FOUND AND THE DATE THEY WERE CORRECTED SHALL BE MAINTAINED ON THE SITE AND BE MADE AVAILABLE TO REGULATORY AGENCY OFFICIALS AT THE TIME OF INSPECTION.

18. SEDIMENT TRACKED ONTO ANY PUBLIC ROADWAY OR SIDEWALK SHALL BE RETURNED TO THE CONSTRUCTION SITE BY THE END OF EACH WORK DAY AND DISPOSED IN THE MANNER DESCRIBED IN THIS PLAN. IN NO CASE SHALL THE SEDIMENT BE WASHED, SHOVED, OR SWEEP INTO ANY ROADSIDE DITCH, STORM SEWER, OR SURFACE WATER.

19. ALL SEDIMENT REMOVED FROM BMPs SHALL BE DISPOSED OF IN THE MANNER DESCRIBED ON THE PLAN DRAWINGS.

20. ALL FILLS OUTSIDE THE RESTORATION AREA SHALL BE COMPAKTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBLIMATION OR OTHER RELATED PROBLEMS.

21. ALL EARTHEN FILLS SHALL BE PLACED IN COMPAKTED LAYERS NOT TO EXCEED 12 INCHES IN THICKNESS.

22. FILL MATERIALS PLACED OUTSIDE THE RESTORATION AREA SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.

23. FROZEN MATERIALS OR SOFT, MUCKY, OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED INTO FILL OUTSIDE THE RESTORATION AREA.

24. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES OUTSIDE THE RESTORATION AREA.

25. SEEP'S OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE ALLOWED TO DISCHARGE INTO THE RESTORED FLOODPLAIN IN AN ECOLOGICALLY BENEFICIAL MANNER. SEEP'S AND SPRINGS SHALL NOT BE PIPED, CHANNELIZED, OR FILLED.

26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY UPON REACHING FINISHED GRADE. CUT SLOPES IN COMPETENT BEDROCK AND ROCK FILLS NEED NOT BE VEGETATED. SEDED AREAS WITHIN 50 FEET OF A SURFACE WATER, OR AS OTHERWISE SHOWN ON THE PLAN DRAWINGS, SHALL BE BLANKETED ACCORDING TO THE STANDARDS OF THIS PLAN.

27. IMMEDIATELY AFTER EARTH DISTURBANCE ACTIVITIES CEASE IN ANY AREA OR SUB-AREA OF THE PROJECT, THE OPERATOR SHALL STABILIZE ALL DISTURBED AREAS. DURATION-GROWING PERENNIAL VEGETATION OR PROTECTIVE BLANKETING SHALL BE APPLIED AS DESCRIBED IN THE PLAN. AREAS NOT AT FINISHED GRADE, WHICH WILL BE REACTIVATED WITHIN 1 YEAR, MAY BE STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SPECIFICATIONS. THOSE AREAS WHICH WILL NOT BE REACTIVATED WITHIN 1 YEAR SHALL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SPECIFICATIONS.

28. PERMANENT STABILIZATION IS DEFINED AS A MINIMUM UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION. CUT AND FILL SLOPES SHALL BE CAPABLE OF RESISTING FAILURE DUE TO SLUMPING, SLIDING, OR OTHER MOVEMENTS.

29. E&S BMPs SHALL REMAIN FUNCTIONAL AS SUCH UNTIL ALL AREAS TRIBUTARY TO THEM ARE PERMANENTLY STABILIZED OR UNTIL THEY ARE REPLACED BY ANOTHER BMP APPROVED BY THE DEPARTMENT.

30. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE REVIEWING AGENCIES FOR AN INSPECTION PRIOR TO REMOVAL/CONVERSION OF THE E&S BMPs.

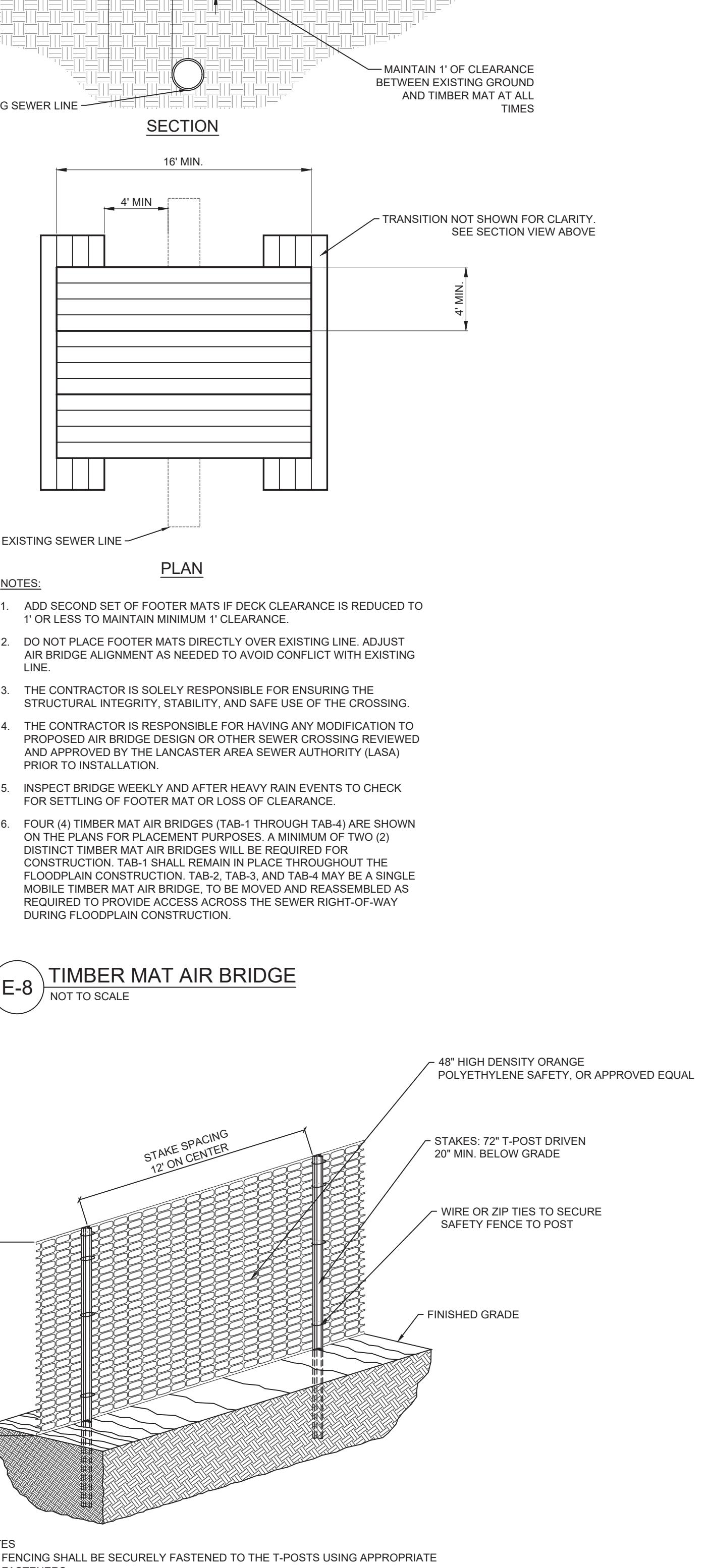
31. AFTER FINAL SITE STABILIZATION HAS BEEN ACHIEVED, TEMPORARY EROSION AND SEDIMENT BMPs MUST BE REMOVED OR CONVERTED TO PERMANENT POST CONSTRUCTION STORMWATER MANAGEMENT BMPs. AREAS DISTURBED DURING REMOVAL OR CONVERSION OF THE BMPs SHALL BE STABILIZED IMMEDIATELY. IN ORDER TO ENSURE RAPID REVEGETATION OF DISTURBED AREAS, SUCH REMOVAL/CONVERSIONS ARE TO BE DONE ONLY DURING THE GERMINATING SEASON.

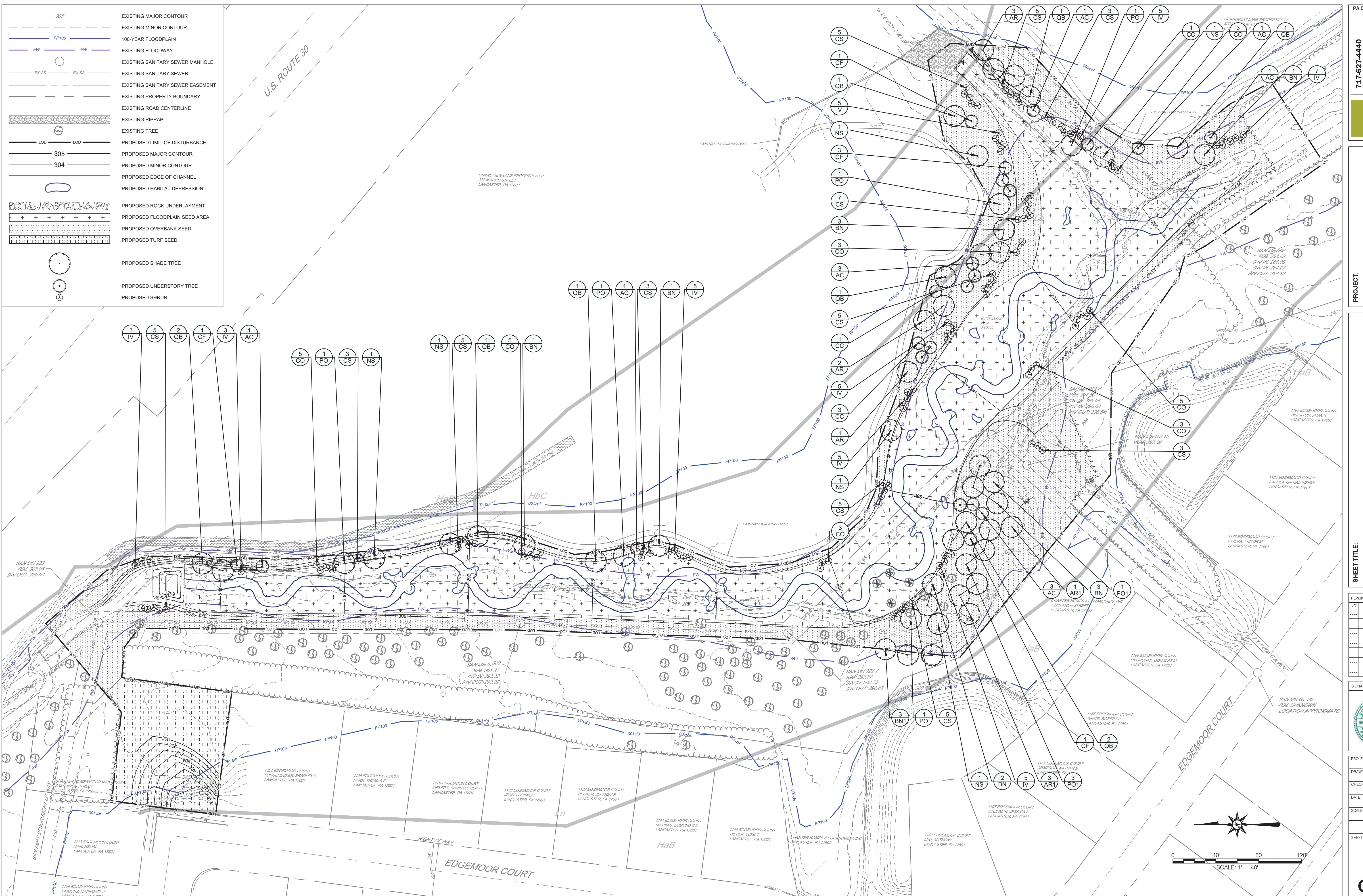
32. UPON COMPLETION OF ALL EARTH DISTURBANCE ACTIVITIES AND PERMANENT STABILIZATION OF ALL DISTURBED AREAS, THE OWNER AND/OR OPERATOR SHALL CONTACT THE REVIEWING AGENCIES TO SCHEDULE A FINAL INSPECTION.

33. FAILURE TO CORRECTLY INSTALL E&S BMPs, FAILURE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE CONSTRUCTION SITE, OR FAILURE TO TAKE IMMEDIATE CORRECTIVE ACTION TO RESOLVE FAILURE OF E&S BMPs MAY RESULT IN ADMINISTRATIVE, CIVIL, AND/OR CRIMINAL PENALTIES AS INSTITUTED BY THE DEPARTMENT AS DEFINED IN SECTION 502 OF THE PENNSYLVANIA CLEAN STREAMS LAW. THE CLEAN STREAMS LAW PROVIDES FOR UP TO \$10,000 PER DAY IN CIVIL PENALTIES, UP TO \$10,000 IN SUMMARY CRIMINAL PENALTIES, AND UP TO \$25,000 IN MISDEMEANOR CRIMINAL PENALTIES FOR EACH VIOLATION.

CONSTRUCTION SEQUENCE

- PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL COORDINATE WITH LANCASTER AREA SEWER AUTHORITY (LASA) AND OWNER TO VIDEO INSPECT 1,676 LINEAR FEET OF SANITARY SEWER WITHIN THE PROJECT AREA. ALL SANITARY SEWER LINES MUST BE VIDEO INSPECTED BY THE CONTRACTOR BEFORE CONSTRUCTION (PRIOR TO MOBILIZING) AND AFTER CONSTRUCTION IS COMPLETE. VIDEO MUST BE SUBMITTED TO LASA AND PROJECT OWNER IN AN APPROVED FORMAT.
- START THE MAIN SEWER LINE INSPECTION AT MANHOLE (MH) 923, PROCEED DOWNSTREAM TO MH 908, AND CONTINUE FOR AN ADDITIONAL 125 LINEAR FEET PAST MH 909 TO THE DOWNSTREAM LIMIT OF DISTURBANCE (LOD).
- TELEVIEW THE SEWER LINE FLOWING FROM THE NORTHEAST INTO THE MAIN SEWER AT MH 909.
- IF TELEVIEWING IS PERFORMED AGAINST THE SEWER FLOW, CONCLUDE THE VIDEO INSPECTION 254 FEET UPSTREAM AT THE PROPOSED LIMIT OF DISTURBANCE.
- IF THE VIDEO INSPECTION METHOD REQUIRES FOLLOWING THE FLOW OF THE SEWER, ACCESS THE PIPE AT MH 909-1 AND START THE VIDEO INSPECTION 120 LINEAR FEET DOWNSTREAM AT THE LOD, CONTINUING TO MH 909.
- TELEVIEW THE SEWER LINE FLOWING FROM THE SOUTHWEST AND ENTERING THE MAIN SEWER AT MH 922.
- IF TELEVIEWING IS PERFORMED AGAINST THE SEWER FLOW, ACCESS THE PIPE AND BEGIN VIDEO INSPECTION AT MH 922, CONTINUE THROUGH MH GV-12 AND CONCLUDE VIDEO INSPECTION 109 FEET TO THE LOD.
- IF THE VIDEO INSPECTION METHOD REQUIRES FOLLOWING THE FLOW, ACCESS THE PIPE AT MH GV-06 ON EDGEWOOD COURT, START THE VIDEO INSPECTION 225 LINEAR FEET DOWNSTREAM AT THE LOD, AND CONTINUE TO MH 922.
- THE TELEVIEWING METHOD AND EQUIPMENT MAY REQUIRE TRaversing ADDITIONAL PIPE LENGTHS TO RETRIEVE EQUIPMENT OR TO COMPLETE THE SPECIFIED INSPECTION LENGTH. THESE ADDITIONAL LENGTHS ARE NOT INCLUDED IN THE TOTAL SPECIFIED FOOTAGE.
- AT LEAST 10 DAYS PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST CONTACT THE REGIONAL PA FISH AND BOAT OFFICE AND NOTIFY WHEN CONSTRUCTION WILL BEGIN.
- AT LEAST 7 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES (INCLUDING CLEARING AND GRUBBING) THE OWNER AND/OR OPERATOR SHALL INVITE ALL CONTRACTORS, THE LANDOWNER, APPROPRIATE REGULATORY OFFICIALS, AND THE ENGINEER TO AN ON-SITE PRE-CONSTRUCTION MEETING.
- UPON INSTALLATION OR STABILIZATION OF ALL PERMANENT SEDIMENT CONTROL BMPs AND AT LEAST 3 DAYS PRIOR TO PROCEEDING WITH THE BULK EARTH DISTURBANCE ACTIVITIES, THE OWNER SHALL PROVIDE NOTIFICATION TO ANY RELEVANT REGULATORY OFFICIALS.
- AT LEAST 3 DAYS PRIOR TO STARTING ANY EARTH DISTURBANCE ACTIVITIES, OR EXPANDING INTO AN AREA PREVIOUSLY UNMARKED, THE PENNSYLVANIA ONE CALL SYSTEM INC. SHALL BE NOTIFIED AT 1-800-242-1776 FOR THE LOCATION OF EXISTING UNDERGROUND UTILITIES.
- INSTALL ADEQUATE PROTECTION FOR THE SIDEWALK AT THE CONSTRUCTION ENTRANCE TO PREVENT DAMAGE TO THE SIDEWALK OR ROAD THROUGHOUT THE PROJECT DURATION. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGES TO THE SIDEWALK, STREET, PEDESTRIAN PATH, OR RELATED INFRASTRUCTURE TO THE SATISFACTION OF THE OWNER, AT THE CONTRACTOR'S EXPENSE.
- INSTALL ROCK CONSTRUCTION ENTRANCE, TEMPORARY HAUL ROAD, TIMBER MAT AIR BRIDGE SEWER CROSSINGS AND TEMPORARY STREAM CROSSINGS AS SHOWN IN E&S PLAN. ALL SEWER CROSSINGS MUST UTILIZE THE TIMBER MAT AIR BRIDGE AS DETAILED IN THE PLANS, OR AN ALTERNATIVE METHOD APPROVED BY THE LANCASTER AREA SEWER AUTHORITY. ALL WETLAND CROSSINGS OUTSIDE OF THE PROPOSED GRADING FOOTPRINT MUST BE PROTECTED FROM CONSTRUCTION TRAFFIC USING A TIMBER MAT CROSSING.
- INSTALL FILTER SOCKS, SILT FENCES, AND CONSTRUCTION FENCING AS INDICATED ON THE PLANS AND AS REQUIRED BY THE CONSTRUCTION PHASING. PLACE FILTER SOCKS AND SILT FENCES DOWNHILL FROM ANY AREAS OF DISTURBANCE AT TEMPORARY STOCKPILE SITES. REMOVE TOPSOIL FROM THESE SITES TO ALLOW FOR LATER REGRADING.
- CONSTRUCTION FENCING IS PROPOSED ALONG THE SEWER ALIGNMENT IN AN EFFORT TO PROTECT THE SEWER LINE FROM DAMAGE DURING CONSTRUCTION. ANY DAMAGE INCURRED TO THE SEWER NOT DOCUMENTED BY THE PRE-CONSTRUCTION VIDEO INSPECTION SHALL BE THE ASSUMED LIABILITY OF THE CONTRACTOR TO REPLACE, AT THEIR EXPENSE.
- BEFORE COMMENCING CLEARING AND GRUBBING OPERATIONS, THE ENGINEER IS REQUIRED TO MARK TREES THAT ARE NOT SUITABLE FOR INCORPORATION INTO THE RESTORATION PROJECT. THIS INCLUDES, BUT IS NOT LIMITED TO, SPECIES SUCH AS BLACK WALNUT, BLACK WILLOW, AND OTHER INVASIVE OR PROBLEMATIC SPECIES THAT MAY HINDER THE ESTABLISHMENT OF PROPOSED VEGETATION OR ARE PRONE TO AGGRESSIVE RESPRouting. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF THESE TREES, ENSURING THEY ARE DISPOSED OF OUTSIDE THE BOUNDS OF THE PROPOSED PROJECT AREA.
- COMMENCE CLEARING AND GRUBBING. EXTREME CAUTION IS REQUIRED DURING THE REMOVAL OF TREES SITUATED DIRECTLY ABOVE OR IN CLOSE PROXIMITY TO THE EXISTING SANITARY SEWER LINE. IN SCENARIOS WHERE EXTRACTING STUMPS AND ROOTS POSES A POTENTIAL HAZARD TO THE INTEGRITY OF THE SEWER PIPE, TREES SHOULD BE CUT AT EXISTING GRADE OR LEFT UNDISTURBED. IN CASES WHERE RETAINING A TREE DESIGNATED FOR REMOVAL MIGHT AFFECT THE PROPOSED DESIGN, CONSULT WITH THE ENGINEER. IF REMOVAL IS REQUIRED, AND TREE SEGMENTS GREATER THAN 12' DBH AND 12' LONG SHALL BE STOCKPILED FOR USE AS LOG SILLS. ALL REMAINING ROOTS AND WOOD MATERIAL SHALL BE REMOVED AND INCORPORATED INTO THE FLOWLINE AT THE DIRECTION OF THE ENGINEER.
- A PUMP-AROUND BYPASS SYSTEM IS NECESSARY FOR ANY WORK THAT WILL BE CONDUCTED IN AREAS OUTSIDE THE SEWER RIGHT-OF-WAY. CONSTRUCTION OF THE PUMP-AROUND BYPASS SYSTEM WILL BE CONDUCTED WITHOUT USE OF THE PUMP-AROUND BYPASS IF THE ACTIVITIES ARE CONDUCTED PRIOR TO FINAL CONNECTION WITH ACTIVE STREAM FLOW. FOLLOWING INSTALLATION OF HAUL ROAD AND ASSOCIATED CROSSINGS, INSTALL TEMPORARY PUMP-AROUND BYPASS 1 & 2 (TPB-1 & TPB-2) AND COFFERDAM 1 (CD-1 & CD-2) AND BEGIN PUMP-AROUND BYPASS IN ACCORDANCE WITH THE PLANS AND DETAIL E-7. THOUGH IT MAY BE NECESSARY DURING INSTALLATION, CONTRACTOR SHALL MINIMIZE VEHICLE TRAFFIC IN THE STREAM PRIOR TO BYPASS SYSTEM BECOMING OPERATIONAL. ADDITIONAL LOCALIZED PUMPING MAY BE UTILIZED TO DE-WATER IN THE IMMEDIATE VICINITY OF WHERE WORK IS BEING DONE. DE-WATERING AND DISCHARGE SPLASH PROTECTION SHALL TAKE PLACE IN ACCORDANCE WITH PUMP-AROUND BYPASS SYSTEM DETAIL. ALTERNATIVE SOLUTIONS SHALL BE APPROVED BY THE ENGINEER. BYPASS PUMP SHALL PROVIDE CAPACITY TO SUFFICIENTLY CONVEY LOW-FLOW CONDITION BASEFLOW. MULTIPLE PUMPS MAY BE USED IF NECESSARY. AS THE REACH IS DEWATERED, FISHES SHALL BE CAPTURED UTILIZING A SEINE OR OTHER NET, PLACED IN BUCKETS WITH WATER, AND IMMEDIATELY RELOCATED OUTSIDE OF THE WORK AREA.
- WHEN CONSTRUCTION AREAS AND IMPLANT STABILIZATION EFFORTS HAVE BEEN INSTALLED, BEGIN REMAINING CONSTRUCTION IN ACCORDANCE WITH THE PLAN SET, DISTURBING ONLY AS MUCH AREA AS CAN REASONABLY BE STABILIZED THE SAME DAY.
- THE CONTRACTOR SHALL BEGIN GRADING AT THE DOWNSTREAM EXTENTS PROGRESSING UP-VALLEY, EXCAVATING TO PROPOSED GRADE WHILE TAKING CARE TO AVOID COMPACTING OF THE FLOODPLAIN FOOTPRINT. RESTORATION GRADING DOWNSTREAM OF MAINSTEM VALLEY STATION 12+19 SHALL UTILIZE FLOODPLAIN BENCH GRADING, WHERE THE EXISTING CHANNEL REMAINS INTACT, AND A FLOODPLAIN BENCH IS CUT TO EITHER OR BOTH SIDES TO THE MAXIMUM WIDTH POSSIBLE TO FACILITATE BENCH GRADING. SEE CROSS SECTION #5 ON SHEET 10.
- CONSTRUCTION UPSTREAM OF MAINSTEM VALLEY STATION 12+19 SHALL UTILIZE FLOODPLAIN RESTORATION GRADING, WHICH INCLUDES FILLING THE EXISTING CHANNEL AND CONSTRUCTING A NEW CHANNEL. THE PROPOSED CHANNEL, POOLS, WOOD DEBRIS, LOG SILLS, ROCK UNDERLAYMENT, AND HABITAT DEPRESSIONS SHALL BE CONSTRUCTED CONCURRENTLY WITH THE LINEAR PROGRESSION OF THE FLOODPLAIN AND IN ACCORDANCE WITH THE PLANS & APPLICABLE DETAILS. PREVENT DAMAGE OF THE RESTORED FLOODPLAIN, TEMPORARY STREAM CROSSINGS, SEWER CROSSINGS, AND HAIR ROADS MUST BE REMOVED AS EACH SEGMENT OF CONSTRUCTION IS COMPLETED. CONSTRUCTION OF ALL FEATURES WITHIN THE SEWER RIGHT-OF-WAY SHALL TAKE PLACE PERMAMENT OUTSIDE THE SEWER RIGHT-OF-WAY. UNDER NO CIRCUMSTANCES SHALL HEAVY EQUIPMENT CROSS INTO OR OVER THE SEWER RIGHT-OF-WAY WITHOUT THE USE OF A TIMBER MAT AIR BRIDGE.
- BEGIN GRADING AT THE CONFLUENCE AREAS AND PROCEED UP THE TRIBUTARY VALLEY. UPON COMPLETION OF LEFT TRIBUTARY GRADING, REMOVE TPB-2 AND CD-2.
- CONTINUE GRADING UP-VALLEY. INSTALL TEMPORARY SEWER CROSSINGS AT A SUITABLE LOCATION ON THE EXISTING GRADE TO FACILITATE ABANDONED CHANNEL GRADING AND RIGHT TRIBUTARY GRADING. IF FLOW IN THE INTERMITTENT CHANNEL IS OBSERVED, INSTALL A TEMPORARY PUMP-AROUND BYPASS AS NEEDED TO FACILITATE GRADING. ONCE ABANDONED CHANNEL GRADING AND TRIBUTARY GRADING ARE COMPLETED, REMOVE THE TEMPORARY SEWER CROSSING AND PROCEED WITH GRADING OPERATIONS UP-VALLEY UNTIL RESTORATION GRADING HAS BEEN COMPLETE.
- STOCKPILING SHALL OCCUR IN CONJUNCTION WITH FLOODPLAIN GRADING. EXCAVATED MATERIAL MAY BE TEMPORARILY STOCKPILED AT THE LOCATIONS SHOWN ON THE PLAN PRIOR TO BEING HAULED OFF SITE TO A PERMITTED FACILITY.
- WHEN ENCOUNTERED, GRAVEL MATERIALS MAY BE TEMPORARILY STOCKPILED TO BE INCORPORATED INTO PROPOSED CHANNEL AND FLOODPLAIN FEATURES AT THE DIRECTION OF THE ENGINEER.
- REMOVE TPB-1 AND CD-1.
- REMOVE TEMPORARY ACCESS GRADING ALONG EDGEWOOD COURT AND RESTORE GRADING, VEGETATION, AND IMPACTED INFRASTRUCTURE TO DOCUMENTED PRE-CONSTRUCTION CONDITIONS TO THE APPROVAL OF THE PARCEL OWNER.
- ONCE FINAL GRADE HAS BEEN ACHIEVED, STABILIZATION MUST OCCUR WITHIN 48 HOURS (OR BY THE END OF THE WORKDAY IF RAIN IS FORECASTED). STABILIZE THE FLOODPLAIN BY APPLYING TEMPORARY AND PERMANENT SEED AND MULCHING IN ACCORDANCE WITH THE CONTROL MEASURES OUTLINED ON THIS PLAN.
- INSTALL PLANTINGS IN ACCORDANCE WITH THE LANDSCAPE PLAN.
- COORDINATE POST-CONSTRUCTION SEWER VIDEO INSPECTION WITH LASA. POST-CONSTRUCTION VIDEO MUST BE SUBMITTED TO LASA AND PROJECT OWNER IN AN APPROVED FORMAT.
- REMOVE TEMPORARY EROSION CONTROL BMPs AFTER 70% VEGETATIVE COVER IS ACHIEVED.





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Land
Studies

GRANDVIEW STREAM RESTORATION PHASE II

MANHEIM TOWNSHIP

1840 MUNICIPAL DRIVE
LANCASTER, PA 17601

LANDSCAPE PLAN

A circular notary seal for the Commonwealth of Massachusetts. The outer ring contains the text "NOTARY PUBLIC" at the top and "MASSACHUSETTS" at the bottom, separated by a decorative border. The inner circle contains "THE COMMONWEALTH OF MASSACHUSETTS" at the top, "REGISTERED", "PROFESSIONAL" in the center, and "NOTARY PUBLIC" at the bottom. Below the inner circle is a small triangular emblem.

CT NUMBER:
D-366.12-23
N BY:
AK
ED BY:
RG
05/31/2024
1" = 40'

NUMBER:
16
OF 18

FLOODPLAIN SEED MIX - 1.53 AC.

%	BOTANICAL NAME	COMMON NAME
23.20%	CAREX VULPINOIDEA	FOX SEDGE
22.00%	CAREX LURIDA	LURID SEDGE
20.00%	ELYMUS VIRGINICUS	VIRGINIA WILDRYE
14.00%	CAREX SCOPARIA	BLUNT BROOM SEDGE
3.00%	JUNCUS EFFUSUS	SOFT RUSH
3.00%	VERBENA HASTATA	BLUE Vervain
2.00%	ASCLEPIAS INCARNATA	SWAMP MILKWEED
2.00%	CAREX GRAYI	GRAY'S SEDGE
2.00%	ZIZIA AUREA	GOLDEN ALEXANDERS
1.00%	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER
1.00%	JUNCUS TENUIS	PATH RUSH
1.00%	VERBENA URTICIFOLIA	WHITE Vervain
0.70%	SOLIDAGO RUGOSA	WRINKLELEAF GOLDENROD
0.50%	ASTER LANCEOLATUS	LANCE LEAVED ASTER
0.50%	ASTER PUNICEUS	PURPLESTEM ASTER
0.50%	BIDENS CERNUA	NODDING BUR MARIGOLD
0.50%	CAREX CRINITA	FRINGED SEDGE
0.50%	LOBELIA Siphilitica	GREAT BLUE LOBELIA
0.50%	MIMULUS RINGENS	SQUARE STEMMED MONKEYFLOWER
0.40%	CAREX STIPATA	AWL SEDGE
0.40%	EUPATORIUM PERfoliatum	BONESET
0.30%	HELIANTHUS ANGSTIFOLIUS	NARROWLEAF SUNFLOWER
0.30%	LYCOPUS AMERICANUS	AMERICAN WATER HOREHOUND
0.30%	SCIRPUS ATROVIRENS	GREEN BULRUSH
0.30%	SCIRPUS CYPERINUS	WOOLGRASS
0.10%	ALISMA SUBCORDATUM	MUD PLANTAIN
100%		

APPLICATION RATE 22 LBS/ACRE

NOTES:

1. SEEDED WITH NURSE CROP IN ACCORDANCE WITH NURSE CROP SEEDING CHART

OVERBANK SEED MIX - 1.72 AC.

%	BOTANICAL NAME	COMMON NAME
20.00%	ELYMUS VIRGINICUS	VIRGINIA WILDRYE
18.80%	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM
16.90%	BOUTELOUA CURTIPENDULA	SIDEOTS GRAMA
11.00%	ECHINACEA PURPUREA	PURPLE CONEFLOWER
4.00%	CHAMAECRISTA FASCICULATA	PARTRIDGE PEA
4.00%	COREOPSIS LANCEOLATA	LANCELEAF COREOPSIS
3.70%	RUDBECKIA HIRTA	BLACKEYED SUSAN
2.90%	ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED
2.70%	HELIOPSIS HELIANTHOIDES	OXEYE SUNFLOWER
2.50%	PENSTEMON DIGITALIS	TALL WHITE BEARDTONGUE
2.00%	LIATRIS SPICATA	MARSH BLAZING STAR
2.00%	ZIZIA AUREA	GOLDEN ALEXANDERS
1.30%	ERAGROSTIS SPECTABILIS	PURPLE LOVEGRASS
1.30%	LESPEDEZA CAPITATA	ROUNDHEAD LESPEDEZA
1.30%	SENNIA HEBCARPA	WILD SENNA, VA & WV ECOTYPE
1.00%	BAPTISIA AUSTRALIS	BLUE FALSE INDIGO
0.80%	ASTER OBLONGIFOLIUS	AROMATIC ASTER
0.80%	PYCANthemum INCANUM	HOARY MOUNTAINMINT
0.70%	RUDBECKIA TRILoba	BROWNEYED SUSAN
0.60%	MONARDA FISTULOSA	WILD BERGAMOT
0.50%	ASTER PILOSUS	HEATH ASTER
0.40%	SOLIDAGO NEMORALIS	GRAY GOLDENROD
0.30%	ASTER PRENANThOIDES	ZIGZAG ASTER
0.30%	SOLIDAGO BICOLOR	WHITE GOLDENROD
0.10%	PENSTEMON HIRSUTUS	HAIRY BEARDTONGUE
0.10%	SOLIDAGO JUNcea	EARLY GOLDENROD

APPLICATION RATE: 20 LBS/ACRE

NOTES:

1. SEEDED WITH NURSE CROP IN ACCORDANCE WITH NURSE CROP SEEDING CHART

NURSE CROP

%	BOTANICAL NAME	COMMON NAME	APPLICATION RATE	SEEDING WINDOW
100	SECALE CEREALE	CEREAL RYE	30 LBS/AC	JULY - OCTOBER
100	AVENA SATIVA	OATS	20 LBS/AC	APRIL - JUNE

NOTES:

1. NURSE CROP TO BE SEEDED IN ADDITION TO PERMANENT SEED MIX.

2. IN NO INSTANCE SHALL ANNUAL RYE (LOLIUM MULTIFLORUM) BE USED.

TURF SEED MIX - 0.27 AC

%	BOTANICAL NAME	COMMON NAME
30.00%	FESTUCA RUBRA, 'CARDINAL II'	CREEPING RED FESCUE, 'CARDINAL II'
25.00%	POA PRATENSIS, 'BARON'	KENTUCKY BLUEGRASS, 'BARON'
25.00%	POA PRATENSIS, 'SHAMROCK'	KENTUCKY BLUEGRASS, 'SHAMROCK'
10.00%	SECALE CEREALE	CEREAL RYE
10.00%	LOLIUM PERENNE, 'AMAZING XL'	PERENNIAL RYEGRASS, 'AMAZING XL'

APPLICATION RATE: 200 LBS/ACRE

NOTES:

1. TO BE SEEDED IN AREAS SHOWN ON THE PLANS.

2. TURF GRASS SEED MIX MAY BE USED ON DISTURBED AREAS OUTSIDE OF THE RESTORATION AREA THAT WILL RECEIVE REGULAR MOWING MAINTENANCE.

TREES

KEY	BOTANICAL NAME	COMMON NAME	QTY	MIN. SIZE	CONDITION	NOTES
AR	ACER RUBRUM	RED MAPLE	6	#7	CONTAINER	
AR1	ACER RUBRUM	RED MAPLE	4	#15	CONTAINER	
AC	AMELANCHIER CANADENSIS	SERVICEBERRY	11	#7	CONTAINER	MULTISTEM
BN	BETULA NIGRA	RIVER BIRCH	11	#7	CONTAINER	MULTISTEM
BN1	BETULA NIGRA	RIVER BIRCH	3	#15	CONTAINER	MULTISTEM
CC	CERCIS CANADENSIS	REDBUD	5	#7	CONTAINER	MULTISTEM
CF	CORNUS FLORIDA	FLOWERING DOGWOOD	6	#7	CONTAINER	
NS	NYSSA SYLVATICA	BLACK GUM	6	#7	CONTAINER	
PO	PLATANUS OCCIDENTALIS	SYCAMORE	5	#7	CONTAINER	
PO1	PLATANUS OCCIDENTALIS	SYCAMORE	4	#15	CONTAINER	
QB	QUERCUS BICOLOR	SWAMP WHITE OAK	10	#7	CONTAINER	

NOTES:

1. SEE DETAILS AND NOTES FOR INSTALLATION PRACTICES

SHRUBS

KEY	BOTANICAL NAME	COMMON NAME	QTY	MIN. SIZE	SPACING	NOTES
CO	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	27	#2	SEE PLANS	INSTALL IN WET AREAS
CS	CORNUS SERICEA	RED-OSIER DOGWOOD	54	#2	SEE PLANS	
IV	ILEX VERTICILLATA	WINTERBERRY	43	#2	SEE PLANS	ONE MALE FOR EVERY 10 FEMALE

NOTES:

1. SEE DETAILS AND NOTES FOR INSTALLATION PRACTICES

WETLAND PLUGS

BOTANICAL NAME	COMMON NAME	QTY	SIZE	CONDITION	SPACING
JUNCUS EFFUSUS	SOFT RUSH	200	DP50	CONTAINER	24" O.C.
VERBENA HASTATA	BLUE Vervain	100	DP50	CONTAINER	24" O.C.
ASCLEPIAS INCARNATA	SWAMP MILKWEED	100	DP50	CONTAINER	24" O.C.
CAREX GRAYI	GRAY'S SEDGE	100	DP50	CONTAINER	24" O.C.
ZIZIA AUREA	GOLDEN ALEXANDERS	100	DP50	CONTAINER	24" O.C.
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	100	DP50	CONTAINER	24" O.C.
JUNCUS TENUIS	PATH RUSH	100	DP50	CONTAINER	24" O.C.
VERBENA URTICIFOLIA	WHITE Vervain	100	DP50	CONTAINER	24" O.C.
SOLIDAGO RUGOSA	WRINKLELEAF GOLDENROD	100	DP50	CONTAINER	24" O.C.
ASTER LANCEOLATUS	LANCE LEAVED ASTER	100	DP50	CONTAINER	24" O.C.
ASTER PUNICEUS	PURPLESTEM ASTER	100	DP50	CONTAINER	24" O.C.
BIDENS CERNUA	NODDING BUR MARIGOLD	200	DP50	CONTAINER	24" O.C.
CAREX CRINITA	FRINGED SEDGE	200	DP50	CONTAINER	24" O.C.
LOBELIA Siphilitica	GREAT BLUE LOBELIA	100	DP50	CONTAINER	24" O.C.
MIMULUS RINGENS	SQUARE STEMMED MONKEYFLOWER	100	DP50	CONTAINER	24" O.C.
CAREX STIPATA	AWL SEDGE	100	DP50	CONTAINER	24" O.C.
EUPATORIUM PERfoliatum	BONESET	100	DP50	CONTAINER	24" O.C.
HELIANTHUS ANGSTIFOLIUS	NARROWLEAF SUNFLOWER	100	DP50	CONTAINER	24" O.C.
LYCOPUS AMERICANUS	AMERICAN WATER HOREHOUND	100	DP50	CONTAINER	24" O.C.
SCIRPUS ATROVIRENS	GREEN BULRUSH	100	DP50	CONTAINER	24" O.C.
SCIRPUS CYPERINUS	WOOLGRASS	100	DP50	CONTAINER	24" O.C.
ALISMA SUBCORDATUM	MUD PLANTAIN	100	DP50	CONTAINER	24" O.C.

NOTE:

1. QUANTITY ASSUMED 15% OF FLOODPLAIN BOTTOM TO RECEIVE WETLAND PLUGS.

2. PLUGS TO BE INSTALLED POST SEEDING AND MATTING IN WETTEST LOCATIONS WITH SPACING NO CLOSER THAN 24" O.C.

3. RANDOM DISTRIBUTION OF SPECIES SHALL OCCUR WITH NO LESS THAN 3 SPECIES PER 100 SQUARE FEET.

LANDSCAPE NOTI

1. THE LANDSCAPE CONTRACTOR SHALL UTILIZE THE E&S AND LANDSCAPE PLANS (AND TECHNICAL SPECIFICATIONS) IN THE IMPLEMENTATION OF THE LANDSCAPE WORK FOR THIS PROJECT.
2. ALL DISTURBED AREAS SHALL BE SEDED, SODDED, MULCHED OR LANDSCAPED UNLESS INDICATED OTHERWISE. REFER TO LANDSCAPE PLANS AND/OR EROSION AND SEDIMENT CONTROL PLAN FOR SEEDING LIMITS.
3. PROTECT STRUCTURES, UTILITIES, PAVED SURFACES AND OTHER EXISTING IMPROVEMENTS INCLUDING LAWNS/VEGETATED AREAS AND PLANT MATERIAL FROM DAMAGE DURING CONSTRUCTION. CONTRACTOR SHALL REPAIR, RESTORE AND REPLACE DAMAGED MATERIALS IN KIND OR AS APPROVED BY THE OWNER.
4. PRECAUTIONS SHALL BE TAKEN DURING CONSTRUCTION TO ENSURE THE PROTECTION OF ALL EXISTING TREES TO REMAIN. THESE EFFORTS SHALL ENSURE THAT EQUIPMENT DOES NOT DAMAGE TREE TRUNKS OR BRANCHES, ROOT ZONES ARE NOT COMPACTED BY VEHICLES OR CONSTRUCTION MATERIAL, AND THAT GRADE LEVEL WITHIN THE DRIP LINE OF EXISTING TREES IS NOT CHANGED UNLESS APPROVED OTHERWISE.
5. CONTRACTOR SHALL VERIFY FINISHED GRADES ARE MET/PROPER DRAINAGE SHALL OCCUR PRIOR TO LAYOUT OF PLANT MATERIAL AND PLANTING. LANDSTUDIES, INC. SHALL BE CONTACTED TO APPROVE FINAL GRADES PRIOR TO PLANTING.
6. TREES INDIVIDUALLY MARKED FOR REMOVAL ON THE DEMOLITION PLAN (SHEET 4) WITH AN INDIVIDUAL TREE SYMBOL AND BOLD "X", SHALL BE REPLACED BY THE PROPOSED TREES LISTED IN THE PLANT SCHEDULE, UTILIZING DIFFERENT SPECIES THAN THOSE REMOVED. THIS DOES NOT INCLUDE GENERAL CLEARING EXTENTS DOWNSTREAM. IF A TREE PROPOSED FOR REMOVAL CAN BE SPARED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER, AND REPLACEMENT OF THAT SPECIFIC TREE WILL NOT BE REQUIRED. THE BID PACKAGE ASSUMES ALL 11 MARKED TREES REQUIRE REPLACEMENT FOR CONSISTENCY IN BIDS, BUT THE CONTRACTOR WILL BE REQUIRED TO ONLY PLANT AS MANY REPLACEMENT TREES AS ARE REMOVED DURING CONSTRUCTION.
7. ALL PLANT MATERIAL AND PROPOSED PLANTING LOCATIONS SHALL BE REVIEWED BY LANDSTUDIES, INC. PRIOR TO INSTALLATION AND MAY BE SUBJECT TO REJECTION BASED ON THE STANDARDS OUTLINED IN THIS PLAN OR RELOCATION BASED ON FIELD CONDITIONS. THE CONTRACTOR SHALL NOTIFY LANDSTUDIES, INC. OF PROPOSED PLANTING DATE A MINIMUM OF TWO (2) WEEKS PRIOR TO THE PROPOSED PLANTING. PLANTINGS INSTALLED PRIOR TO INSPECTION BY LANDSTUDIES, INC. MAY BE REJECTED AND SUBJECT TO REMOVAL OR REPLACEMENT AT THE CONTRACTOR'S COST. ALL PLANT SUBSTITUTIONS SHALL BE APPROVED BY LANDSTUDIES, INC. AND THE OWNER SHOULD LANDSTUDIES DEEM APPROPRIATE. PLANT SUBSTITUTIONS MAY BE SUBJECT TO MUNICIPAL APPROVAL AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY REQUIRED APPROVAL. THE INTENT OF LANDSCAPE DESIGN IS TO PRIMARILY USE PLANTS NATIVE TO THE PIEDMONT REGION OF THE CHESAPEAKE BAY WATERSHED.
8. BOTANICAL NAMES SHALL TAKE PRECEDENCE OVER COMMON NAMES FOR ANY AND ALL PLANT MATERIAL.
9. REQUIREMENTS FOR PLANT MATERIAL INCLUDING BUT NOT LIMITED TO MEASUREMENT, BRANCHING, GRADING, QUALITY, BALLING AND BURLAPPING, SHALL CONFORM TO THE STANDARDS RECOMMENDATIONS AND STANDARDS LISTED IN THE AMERICAN STANDARD FOR NURSERY STOCK, ANSI Z60.1, CURRENT EDITION AS AMENDED, PUBLISHED BY AMERICANHORT (FORMALLY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION OR ANLA.)
10. ALL PLANTINGS AND PLANTING PROCEDURES INCLUDING STAKING AND GUYING OF TREES SHALL CONFORM TO GOOD NURSERY AND LANDSCAPE PRACTICE AND THE STANDARDS SET FORTH BY THE AMERICAN ASSOCIATION OF NURSERYMAN.
11. UNLESS OTHERWISE SPECIFIED, ALL PLANT MATERIAL SHALL BE TYPICAL OF THEIR SPECIES AND VARIETY, HAVE NORMAL GROWTH HABITS, HAVE WELL DEVELOPED BRANCHES, BE DENSELY FOLIATED, VIGOROUS IN GROWTH, AND POSSESS HEALTHY ROOT SYSTEMS. ALL PLANT MATERIAL SHALL BE FREE OF DISEASE, INSECTS, INSECT EGGS AND LARVAE. PROVIDE SINGLE TRUNK STANDARD TREES UNLESS NOTED OTHERWISE.
12. ALL CONTAINER GROWN NURSERY STOCK SHALL BE HEALTHY, VIGOROUS, WELL ROOTED, AND ESTABLISHED IN THE CONTAINER IN WHICH IT IS GROWING. CONTAINER GROWN NURSERY STOCK SHALL HAVE A WELL-ESTABLISHED ROOT SYSTEM REACHING THE SIDES OF THE CONTAINER TO MAINTAIN A FIRM BALL WHEN THE CONTAINER IS REMOVED, BUT SHALL NOT HAVE EXCESSIVE ROOT GROWTH ENCIRCLING THE INSIDE OF THE CONTAINER
13. ALL PLANTS TO BE NURSERY GROWN IN A CLIMATE SIMILAR TO THAT OF THE PROJECT.
14. CONTRACTOR SHALL VERIFY ALL PLANT COUNTS AND LOCATIONS PRIOR TO ORDERING MATERIALS. LANDSTUDIES AND THE OWNER ACCEPT NO RESPONSIBILITY FOR TYPOGRAPHICAL ERRORS OR QUANTITY MISCOUNTS. THE CONTRACTOR IS RESPONSIBLE TO INSTALL ALL PLANTINGS AS INDICATED/REQUIRED AND SHALL NOTIFY LANDSTUDIES OF ANY DISCREPANCIES PRIOR TO THE START OF WORK.
15. TREES AND SHRUBS SHALL BE PLANTED DURING APPROVED TIMES OF THE YEAR. CONTRACTOR SHALL BE RESPONSIBLE TO IDENTIFY ANY SPECIES ON THE PLANT LIST THAT REQUIRE PLANTING DURING SPECIFIC TIMES OF THE YEAR AND OBTAINING APPROVAL BY THE OWNER AND LANDSTUDIES PRIOR TO PLANTING. PLANT DURING PERIODS NORMAL FOR OPTIMUM GROWTH, AS DETERMINED BY SEASON, WEATHER CONDITIONS, AND ACCEPTED PRACTICE. DO NOT PERFORM PLANTING WHEN GROUND IS FROZEN, SNOW COVERED, OR IN AN UNSATISFACTORY CONDITION.
16. WHEN CONDITIONS DETRIMENTAL TO PLANT GROWTH ARE ENCOUNTERED SUCH RUBBLE FILL, ADVERSE DRAINAGE CONDITIONS, POOR SOILS OR OBSTRUCTIONS, NOTIFY LANDSTUDIES BEFORE PLANTING.
17. ALL PLANTING AREAS AND PLANTING PITS (LOCATED OUTSIDE OF THE FLOODPLAIN SEED MIX AREA) SHALL BE MULCHED (AS MAY BE SPECIFIED OR DETAILED) TO FILL THE ENTIRE PLANTING BED AREA OR PIT UNLESS INDICATED OTHERWISE. INDIVIDUAL PLANTS NOT LOCATED WITHIN A BED SHALL HAVE A MULCHED CIRCLE. THE SIZE OF THE MULCHED CIRCLE SHALL BE DETERMINED ACCORDING TO THE OVERALL PLANT SIZE OR CALIPER. CONSULT LANDSTUDIES FOR CLARIFICATION IF REQUIRED. NO MULCH SHALL BE APPLIED AGAINST THE FOLIAGE, STEM, OR TRUNK OF ANY PLANT. MULCH SHALL BE ORGANIC, NATURAL, SHREDDED HARDWOOD BARK, UNLESS APPROVED OTHERWISE. MULCH DEPTH SHALL BE BETWEEN 2-3 INCHES.
18. NURSE CROP SEED MIX SHALL BE SEDED IN CONJUNCTION WITH THE PERMANENT FLOODPLAIN AND OVERBANK SEED MIXES AND IN ACCORDANCE WITH THE PLANS. IN NO INSTANCE SHALL ANNUAL RYEGRASS (LOLIUM MULTIFLORUM) BE UTILIZED WITHIN THE RESTORATION EXTENTS.
19. IN THE EVENT THAT THE CONTRACTOR USES TEMPORARY OR PERMANENT SEED MIXES NOT SHOWN ON THE PLANS AND NOT APPROVED BY THE PLAN PREPARER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR COSTS TO EXTRIPATE THE UNAPPROVED VEGETATION AND ESTABLISH THE INTENDED VEGETATION AS SPECIFIED BY THE PLAN PREPARER.
20. FLOODPLAIN AND SIDE SLOPE SEEDING SHALL BE DONE IN CONJUNCTION WITH THE LINEAR PROGRESSION OF THE RESTORATION AS FINISHED GRADE IS ACHIEVED AND IMMEDIATELY PRIOR TO EROSION CONTROL BLANKET INSTALLATION. SEEDING SHALL BE DONE AT THE RATES SPECIFIED ON THE PLANS. THE CONTRACTOR SHALL HAVE THE SEEDING TAG ATTACHED TO THE SEED BAGS AND AVAILABLE FOR REVIEW AT ALL TIMES. THE CONTRACTOR SHALL FIELD MEASURE AREAS TO BE SEDED AND WEIGH SEED ONSITE PRIOR TO SEEDING TO VERIFY APPROPRIATE SEED APPLICATION RATES. THE CONTRACTOR SHALL PROVIDE A RECORD OF THE SEED WEIGHT APPLIED TO A GIVEN AREA FOR EVERY DAY SEEDING IS CONDUCTED. SEEDING AREAS SHALL BE MEASURED USING A WHEEL OR TAPE AT THE TIME OF SEEDING TO ACCURATELY DETERMINE THE AMOUNT OF SEED FOR THE AREA TO BE SEDED. SEED QUANTITY FOR SPECIFIED LIMITS TO BE SEDED SHALL BE MEASURED BY WEIGHT USING A SCALE ON SITE. THE CONTRACTOR SHALL APPLY THE SEED IN 2 PERPENDICULAR APPLICATIONS USING HALF THE SEEDING RATE PER PASS TO ENSURE EQUAL DISTRIBUTION AND FULL COVERAGE OF SEED ACROSS THE SEEDING AREAS.
21. PROPOSED UPLAND (AREAS OUTSIDE OF THE FLOODPLAIN FOOTPRINT AND SIDE SLOPES) SEEDING AND ESTABLISHMENT IS A CRITICAL COMPONENT OF ACHIEVING PERMANENT STABILIZATION AND VEGETATION COVER IN ACCORDANCE WITH THE PERMANENT CONTROL MEASURES ON THE NOTES SHEET. THESE NOTES INCLUDE DIFFERING GUIDANCE FOR DISTURBED AND OTHERWISE UNDISTURBED AREAS. PRIOR TO SEEDING OPERATIONS, PROVIDE A SEED SUBMITTAL AND SEED TAG TO THE PROJECT DESIGNER FOR APPROVAL.
22. DISTURBED UPLAND AREAS WITHIN THE LIMIT OF DISTURBANCE MAY BE SEDED IN CONJUNCTION WITH THE CONSTRUCTION PROGRESSION AS FINISHED GRADE IS ACHIEVED AND TEMPORARY CONTROL MEASURES IMPLEMENTED AS LONG AS NO FURTHER DISTURBANCE IS REQUIRED. ANY AREAS THAT BECOME RE-DISTURBED SHALL BE RE-SEDED IN ACCORDANCE WITH PLANS. THE FOLLOWING STEPS APPLY TO DISTURBED AREAS OUTSIDE OF THE FLOODPLAIN FOOTPRINT AND SIDE SLOPES.
 - 22.a. LOOSEN SUBGRADE TO A MINIMUM DEPTH OF 4 INCHES. REMOVE STONES LARGER THAN 1.5" IN ANY DIMENSION AND STICKS, ROOTS, RUBBISH, AND OTHER EXTRANEOUS MATTER AND LEGALLY DISPOSE OF THEM AS APPROVED BY THE OWNER.
 - 22.b. FINISH GRADE PLANTING AREAS TO A SMOOTH, UNIFORM SURFACE PLANE WITH LOOSE, UNIFORMLY FINE TEXTURE. GRADE TO WITHIN PLUS OR MINUS ONE-HALF INCH (1/2") OF FINISH ELEVATION. REMOVE RIDGES, AND FILL DEPRESSIONS TO MEET FINISH GRADES. LIMIT FINISH GRADING TO AREAS THAT CAN BE SEDED WITHIN 48 HOURS OR PRIOR TO ANY FORECASTED RAINFALL EVENTS.
 - 22.c. LOOSEN TOP 2" OF SOIL WITH A POWER-DRIVEN PRE-SEEDER TO PREPARE A SUITABLE SEED BED.
 - 22.d. BEFORE SEEDING, OBTAIN PROJECT DESIGNERS ACCEPTANCE OF FINISH GRADING. RESTORE SEEDING AREA IF ERODED OR OTHERWISE DISTURBED AFTER FINISH GRADING.
 - 22.e. DO NOT BROADCAST SEED WHEN WIND VELOCITY EXCEEDS 10 MPH. EVENLY DISTRIBUTE SEED BY SOWING EQUAL QUANTITIES IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER.
 - 22.f. BROADCAST SEED AT THE TOTAL RATE SPECIFIED ON THE DRAWINGS PRIOR TO INSTALLATION OF STABILIZATION MEASURES. ALTERNATIVE SEEDING METHODS SHALL BE APPROVED BY PROJECT DESIGNER.
 - 22.g. FOR AREAS OUTSIDE OF THE GRADING FOOTPRINT, IMMEDIATELY AFTER SEEDING, ROLL SEDED AREA WITH A LAWN ROLLER TO ENSURE SEED TO SOIL CONTACT AND FIRM SEED BED.
 - 22.h. PROTECT SEDED AREAS WITH STABILIZATION MEASURES INDICATED ON THE DRAWINGS.

- - - - -

SHEET TITLE:

A rectangular signature block containing a circular professional seal. The seal has a decorative border and contains the following text:
COMMONWEALTH OF
REGISTERED
PROFESSIONAL
BENJAMIN J. EHRHART
ENGINEER
NO.
PE062219
PENNSYLVANIA

PROJECT NUMBER:	D-366.12-23
DRAWN BY:	AK
CHECKED BY:	RG
DATE:	05/31/2024
SCALE:	Custom

18
OF 18

Granite Run Phase I Restoration

Proposed BMP

Granite Run Phase 1 Stream Restoration

**BEST MANAGEMENT PRACTICE (BMP)
TYPE SELECTION**

Stream Restoration

DESCRIPTION *An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.*

WHEN SELECTING BMP TYPE "STREAM RESTORATION", PLEASE PROVIDE ANTICIPATED LENGTH OF STREAM RESTORATION TO OCCUR

1,558 FT

BMP REMOVAL EFFICIENCY FOR EACH POLLUTANT TYPE (%)

POLLUTANT TYPE	Total Nitrogen (TN)	Total Phosphorus (TP)	Total Suspended Solids, Sediments (TSS)
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0.075 (lbs/ft/yr)	0.068 (lbs/ft/yr)	44.88 (lbs/ft/yr)
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ESTIMATED DRAINAGE AREA TO SELECTED BMP TYPE (Acres)

ESTIMATED POLLUTANT LOADING FROM ESTIMATED DRAINAGE AREA (lbs/year)

N/A	N/A	N/A
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**LAND COVER DESCRIPTION
LAND COVER BREAKDOWN FOR DRAINAGE AREA (%)**

Developed Impervious	Developed Pervious	Undeveloped
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ESTIMATED POLLUTANT LOADING REDUCTION REMOVAL (lbs/year)

117	106	69,923
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ESTIMATED CONSTRUCTION COST OF SELECTED BMP TYPE

\$271,490

ESTIMATED CONSTRUCTION *The cost provided above for the selected BMP Type is provided as a general reference for MS4 COST DETAILS planning purposes. Actual construction costs will vary.*

The estimated construction cost assumes that Stream Restoration costs \$ 250.00 per every one (1) linear foot. It is anticipated that approximately fifty (50) linear feet (LF) will be needed to treat one (1) acre of contributory drainage area.

ADD 25% FOR PROJECT RELATED EXPENSES

\$339,363

ADDITIONAL COMMENTS: *The estimated construction cost listed above represents the cost of the proposed BMP only. Additional costs for the overall project should be considered.*

Granite Run Phase II Stream Restoration

Proposed BMP

Granite Run Phase 2 Stream Restoration

**BEST MANAGEMENT PRACTICE (BMP)
TYPE SELECTION**

Stream Restoration

DESCRIPTION *An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.*

WHEN SELECTING BMP TYPE "STREAM RESTORATION", PLEASE PROVIDE ANTICIPATED LENGTH OF STREAM RESTORATION TO OCCUR

1,392 FT

POLLUTANT TYPE	<u>Total Nitrogen</u> <u>(TN)</u>	<u>Total Phosphorus</u> <u>(TP)</u>	<u>Total Suspended Solids, Sediments (TSS)</u>
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BMP REMOVAL EFFICIENCY FOR EACH POLLUTANT TYPE (%)

	0.075 (lbs/ft/yr)	0.068 (lbs/ft/yr)	44.88 (lbs/ft/yr)
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ESTIMATED DRAINAGE AREA TO SELECTED BMP TYPE (Acres)

ESTIMATED POLLUTANT LOADING FROM ESTIMATED DRAINAGE AREA (lbs/year)

N/A	N/A	N/A
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LAND COVER DESCRIPTION
LAND COVER BREAKDOWN FOR DRAINAGE AREA (%)

<u>Developed</u> <u>Impervious</u>	<u>Developed</u> <u>Pervious</u>	<u>Undeveloped</u>

ESTIMATED POLLUTANT LOADING REDUCTION REMOVAL (lbs/year)

104	95	62,473
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ESTIMATED CONSTRUCTION COST OF SELECTED BMP TYPE

\$242,563

ESTIMATED CONSTRUCTION *The cost provided above for the selected BMP Type is provided as a general reference for MS4 COST DETAILS planning purposes. Actual construction costs will vary.*

The estimated construction cost assumes that Stream Restoration costs \$ 250.00 per every one (1) linear foot. It is anticipated that approximately fifty (50) linear feet (LF) will be needed to treat one (1) acre of contributory drainage area.

ADD 25% FOR PROJECT RELATED EXPENSES

\$303,204

ADDITIONAL COMMENTS: *The estimated construction cost listed above represents the cost of the proposed BMP only. Additional costs for the overall project should be considered.*