

Baseline Assessment – Stream Attributes

Reach S-VV12 (Pipeline ROW)

Perennial

Spread B

Lewis County, West Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	N/A – Perennial stream (not shadeable, slope <4%)
RBP Physical Characteristics Form	✓
Water Quality Data	✓
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A – No benthics collected, lack of habitat
Wolman Pebble Count	✓
Reference Reach Software Pebble Count Data	✓
Longitudinal Profile and Cross Sections	✓

Spread B

S-VV12 (Pipeline ROW) Lewis County



Photo Type: DS, US View

Location, Orientation, Photographer Initials: Downstream at ROW Upstream View, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: DS, DS View

Location, Orientation, Photographer Initials: Downstream at ROW Downstream View, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308

Spread B

S-VV12 (Pipeline ROW) Lewis County



Photo Type: US View at Center

Location, Orientation, Photographer Initials: On thalweg at pipe centerline Upstream View, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: DS View at Center

Location, Orientation, Photographer Initials: On thalweg at pipe centerline Downstream View, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: US, US View

Location, Orientation, Photographer Initials: Upstream at ROW Upstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: US, DS View

Location, Orientation, Photographer Initials: Upstream at ROW Downstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: Riffle, DS View
Location, Orientation, Photographer Initials: Upstream at ROW looking downstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: Riffle, US View
Location, Orientation, Photographer Initials: Upstream at ROW looking downstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308

Spread B

S-VV12 (Pipeline ROW) Lewis County



Photo Type: Pool, US View

Location, Orientation, Photographer Initials: Upstream at ROW looking downstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308



Photo Type: Pool, DS View

Location, Orientation, Photographer Initials: Upstream at ROW looking downstream, LC, KP, PL, DD
Lat: 38.903575 Long: -80.563308

**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET
(FRONT)**

STREAM NAME	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____	REASON FOR SURVEY

WEATHER CONDITIONS	<table> <tr> <td>Now</td> <td>Past 24 hours</td> <td>Has there been a heavy rain in the last 7 days? Yes No</td> </tr> <tr> <td>_____ %</td> <td>_____ %</td> <td>Air Temperature _____ °C</td> </tr> <tr> <td>storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover clear/sunny</td> <td></td> <td>Other _____</td> </tr> </table>	Now	Past 24 hours	Has there been a heavy rain in the last 7 days? Yes No	_____ %	_____ %	Air Temperature _____ °C	storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover clear/sunny		Other _____
Now	Past 24 hours	Has there been a heavy rain in the last 7 days? Yes No								
_____ %	_____ %	Air Temperature _____ °C								
storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover clear/sunny		Other _____								
SITE LOCATION/MAP	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p> <p>The diagram shows a vertical stream labeled 'S-VV12' with a downward arrow. A horizontal red arrow labeled 'Pipeline' crosses the stream. A rectangular area with vertical lines, labeled 'Timbermat', is positioned across the stream. Two horizontal yellow lines, labeled 'LOD', are drawn above and below the stream. A black arrow labeled 'North' points towards the upper left.</p>									
STREAM CHARACTERIZATION	<table> <tr> <td>Stream Subsystem Perennial Intermittent Tidal</td> <td>Stream Type Coldwater Warmwater</td> </tr> <tr> <td>Stream Origin Glacial Non-glacial montane Swamp and bog</td> <td>Catchment Area _____ km² Spring-fed Mixture of origins Other _____</td> </tr> </table>	Stream Subsystem Perennial Intermittent Tidal	Stream Type Coldwater Warmwater	Stream Origin Glacial Non-glacial montane Swamp and bog	Catchment Area _____ km ² Spring-fed Mixture of origins Other _____					
Stream Subsystem Perennial Intermittent Tidal	Stream Type Coldwater Warmwater									
Stream Origin Glacial Non-glacial montane Swamp and bog	Catchment Area _____ km ² Spring-fed Mixture of origins Other _____									

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

WATERSHED FEATURES	Predominant Surrounding Landuse Forest Field/Pasture Agricultural Residential Commercial Industrial Other _____	Local Watershed NPS Pollution No evidence <input type="checkbox"/> Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present Trees Shrubs Grasses Herbaceous Dominant species present _____	
INSTREAM FEATURES	Estimated Reach Length _____ m Estimated Stream Width _____ m Sampling Reach Area _____ m ² Area in km ² (m ² x1000) _____ km ² Estimated Stream Depth _____ m Surface Velocity _____ m/sec (at thalweg)	Canopy Cover Partly open Partly shaded Shaded High Water Mark _____ m Proportion of Reach Represented by Stream Morphology Types Riffle _____ % Run _____ % Pool _____ % Channelized Yes No Dam Present Yes No
LARGE WOODY DEBRIS	LWD _____ m ² Density of LWD _____ m ² /km ² (LWD/ reach area)	
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present Rooted emergent Rooted submergent Rooted floating Free floating Floating Algae Attached Algae Dominant species present _____ Portion of the reach with aquatic vegetation _____ %	
WATER QUALITY (DS, US)	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____	Water Odors Normal/None Sewage Petroleum Chemical Fishy Other _____ Water Surface Oils Slick Sheen Globs Flecks None Other _____ Turbidity (if not measured) Clear <input type="checkbox"/> Slightly turbid Turbid Opaque Stained Other _____
SEDIMENT/SUBSTRATE	Odors Normal Sewage Petroleum Chemical Anaerobic None Other _____ Oils Absent Slight Moderate Profuse Deposits Sludge Sawdust Paper fiber Sand Relict shells Other _____ Looking at stones which are not deeply embedded, are the undersides black in color? Yes No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

HABITAT ASSESSMENT FIELD DATA SHEET - HG - USE ON ALL STREAMS (FRONT)

STREAM NAME		LOCATION	
STATION # _____ RIVERMILE _____		STREAM CLASS	
LAT _____ LONG _____		RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ AM PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).			
		40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).			
		20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.			
		Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.			
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.			
		Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.			
		Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.			
		Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.			
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)				
	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).				
	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).				
	Dominated by 1 velocity/depth regime (usually slow-deep).				
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.				
	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.				
	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.				
	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.				
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.				
	Water fills >75% of the available channel; or <25% of channel substrate is exposed.				
	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.				
	Very little water in channel and mostly present as standing pools.				
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
Note: determine left or right side by facing downstream.																					
SCORE ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0			
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0			
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE ____ (LB)	Left Bank	10	9			8	7	6			5	4	3			2	1	0			
SCORE ____ (RB)	Right Bank	10	9			8	7	6			5	4	3			2	1	0			

Total Score _____

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

STREAM NAME	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS	LOT NUMBER	
FORM COMPLETED BY	DATE _____ TIME _____	REASON FOR SURVEY

HABITAT TYPES	Indicate the percentage of each habitat type present Cobble _____% Snags _____% Vegetated Banks _____% Sand _____% Submerged Macrophytes _____% Other (_____) _____%
SAMPLE COLLECTION	Gear used D-frame kick-net Other _____ How were the samples collected? wading from bank from boat Indicate the number of jabs/kicks taken in each habitat type. Cobble _____ Snags _____ Vegetated Banks _____ Sand _____ Submerged Macrophytes _____ Other (_____) _____
GENERAL COMMENTS	

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algae	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3= Abundant (>10 organisms), 4 = Dominant (>50 organisms)

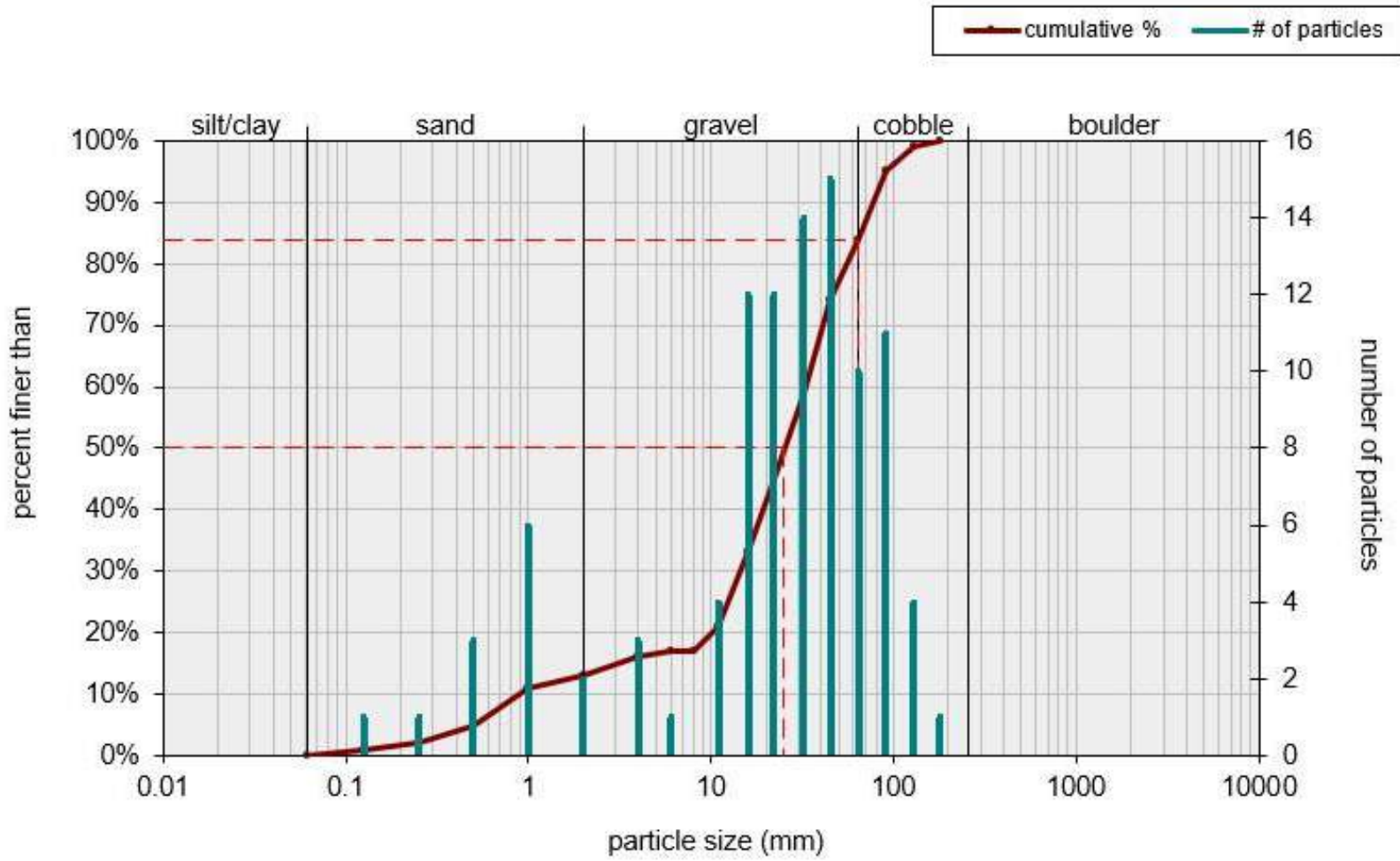
Porifera	0	1	2	3	4	Anisoptera	0	1	2	3	4	Chironomidae	0	1	2	3	4
Hydrozoa	0	1	2	3	4	Zygoptera	0	1	2	3	4	Ephemeroptera	0	1	2	3	4
Platyhelminthes	0	1	2	3	4	Hemiptera	0	1	2	3	4	Trichoptera	0	1	2	3	4
Turbellaria	0	1	2	3	4	Coleoptera	0	1	2	3	4	Other	0	1	2	3	4
Hirudinea	0	1	2	3	4	Lepidoptera	0	1	2	3	4						
Oligochaeta	0	1	2	3	4	Sialidae	0	1	2	3	4						
Isopoda	0	1	2	3	4	Corydalidae	0	1	2	3	4						
Amphipoda	0	1	2	3	4	Tipulidae	0	1	2	3	4						
Decapoda	0	1	2	3	4	Empididae	0	1	2	3	4						
Gastropoda	0	1	2	3	4	Simuliidae	0	1	2	3	4						
Bivalvia	0	1	2	3	4	Tabinidae	0	1	2	3	4						
						Culcidae	0	1	2	3	4						

WOLMAN PEBBLE COUNT FORM

County: Lewis Stream ID: S-VV12
 Stream Name: UNT to Second Big Run
 HUC Code: Basin:
 Survey Date: 8/26/2021
 Surveyors: LC, KP, PL, DD Impact Reach: 21 m
 Type: Bankfull Channel

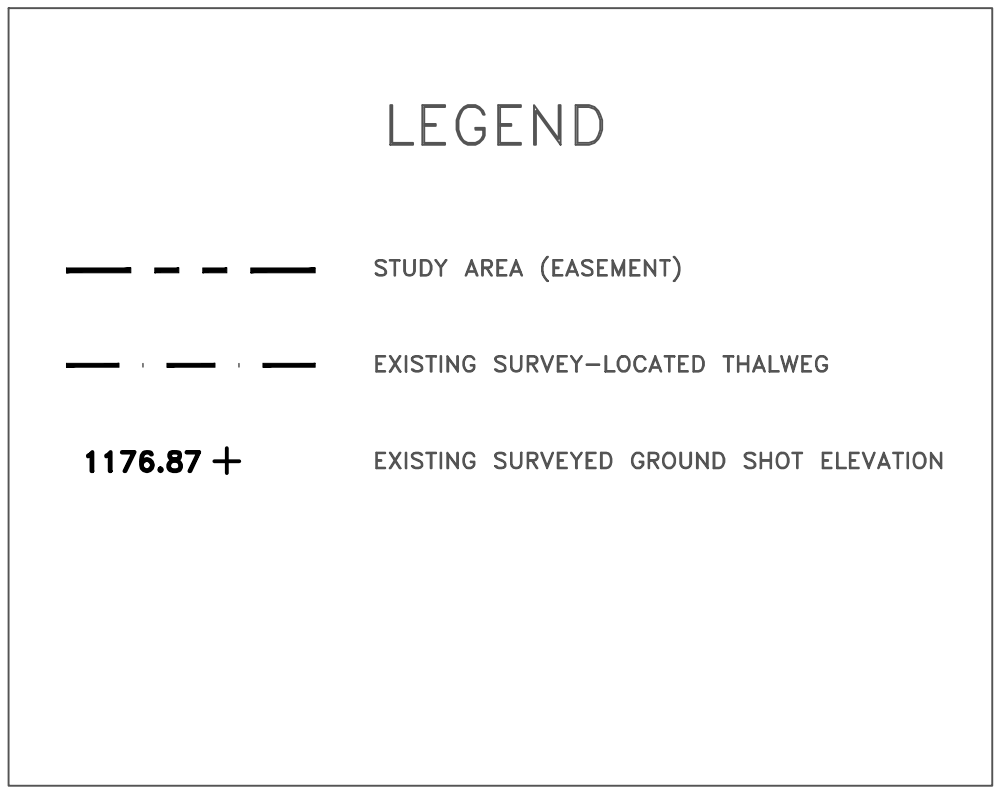
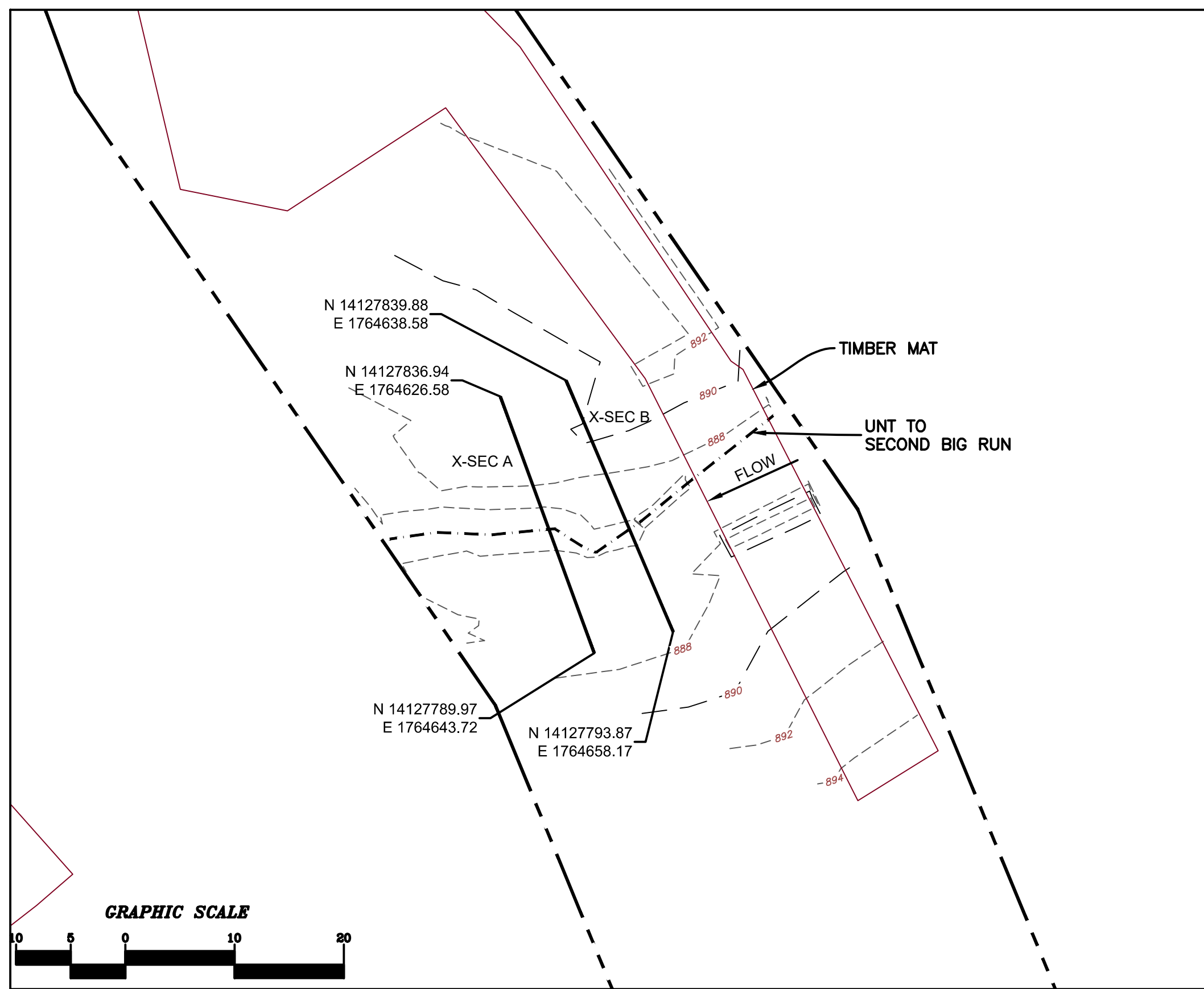
PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	▲ ▼	0	0.00	0.00
	Very Fine	.062-.125	S A N D	▲ ▼	1	1.00	1.00
	Fine	.125-.25		▲ ▼	1	1.00	2.00
	Medium	.25-.5		▲ ▼	3	3.00	5.00
	Coarse	.50-1.0		▲ ▼	6	6.00	11.00
.04-.08	Very Coarse	1.0-2		▲ ▼	2	2.00	13.00
.08-.16	Very Fine	2-4		G R A V E L	▲ ▼	3	3.00
.16-.22	Fine	4-5.7	▲ ▼		1	1.00	17.00
.22-.31	Fine	5.7-8	▲ ▼		0	0.00	17.00
.31-.44	Medium	8-11.3	▲ ▼		4	4.00	21.00
.44-.63	Medium	11.3-16	▲ ▼		12	12.00	33.00
.63-.89	Coarse	16-22.6	▲ ▼		12	12.00	45.00
.89-1.26	Coarse	22.6-32	▲ ▼		14	14.00	59.00
1.26-1.77	Vry Coarse	32-45	▲ ▼		15	15.00	74.00
1.77-2.5	Vry Coarse	45-64	▲ ▼		10	10.00	84.00
2.5-3.5	Small	64-90	C O B B L E		▲ ▼	11	11.00
3.5-5.0	Small	90-128		▲ ▼	4	4.00	99.00
5.0-7.1	Large	128-180		▲ ▼	1	1.00	100.00
7.1-10.1	Large	180-256		▲ ▼	0	0.00	100.00
10.1-14.3	Small	256-362	B O U L D E R	▲ ▼	0	0.00	100.00
14.3-20	Small	362-512		▲ ▼	0	0.00	100.00
20-40	Medium	512-1024		▲ ▼	0	0.00	100.00
40-80	Large	1024-2048		▲ ▼	0	0.00	100.00
80-160	Vry Large	2048-4096		▲ ▼	0	0.00	100.00
	Bedrock		BDRK	▲ ▼	0	0.00	100.00
				Totals:	100		
	Total Tally:						

Bankfull Channel Pebble Count, S-VV12

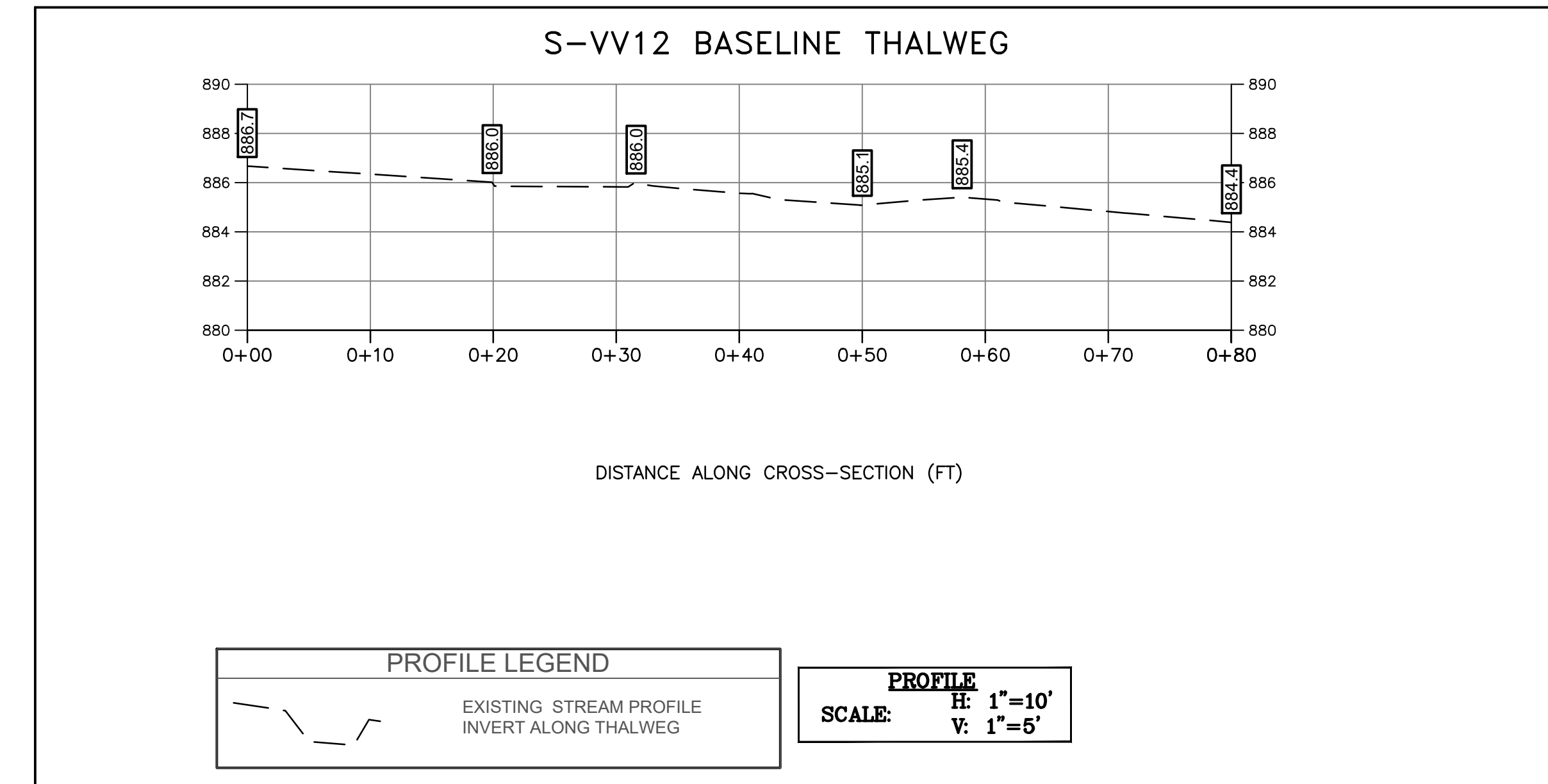


Size (mm)	Size Distribution	Type
D16	4	silt/clay 0%
D35	17	sand 13%
D50	25	gravel 71%
D65	37	cobble 16%
D84	64	boulder 0%
D95	90	

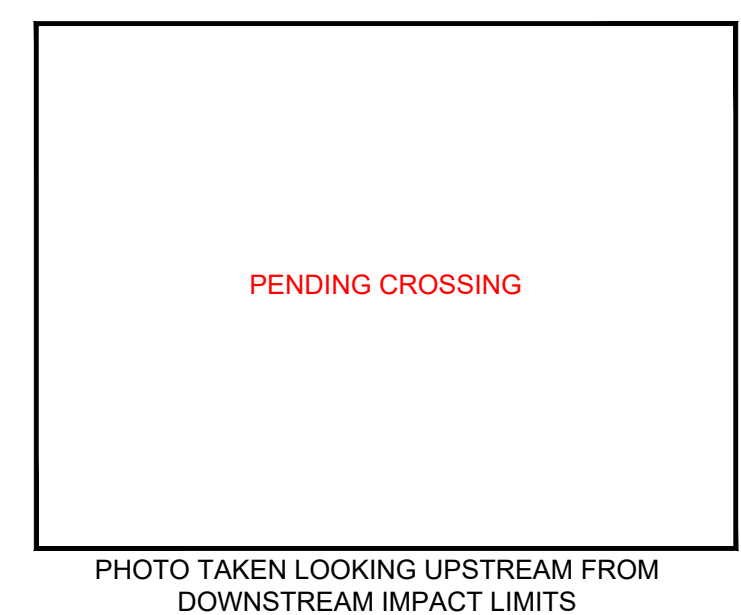
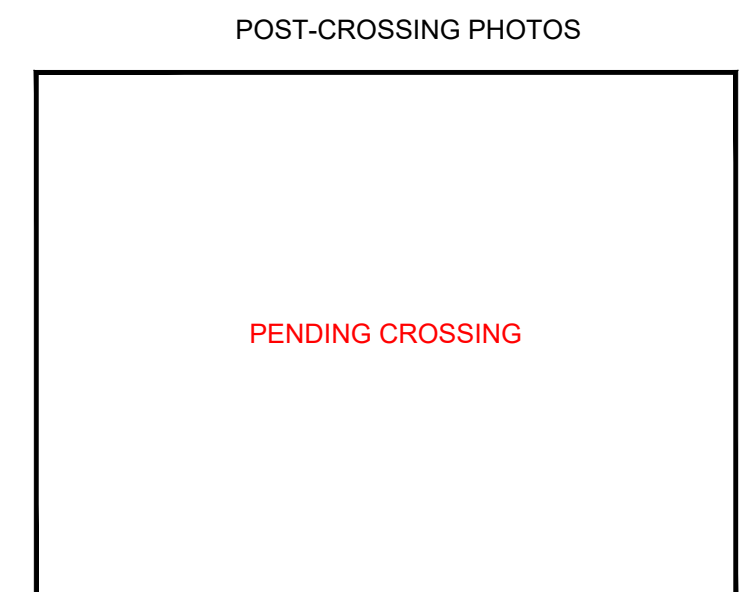
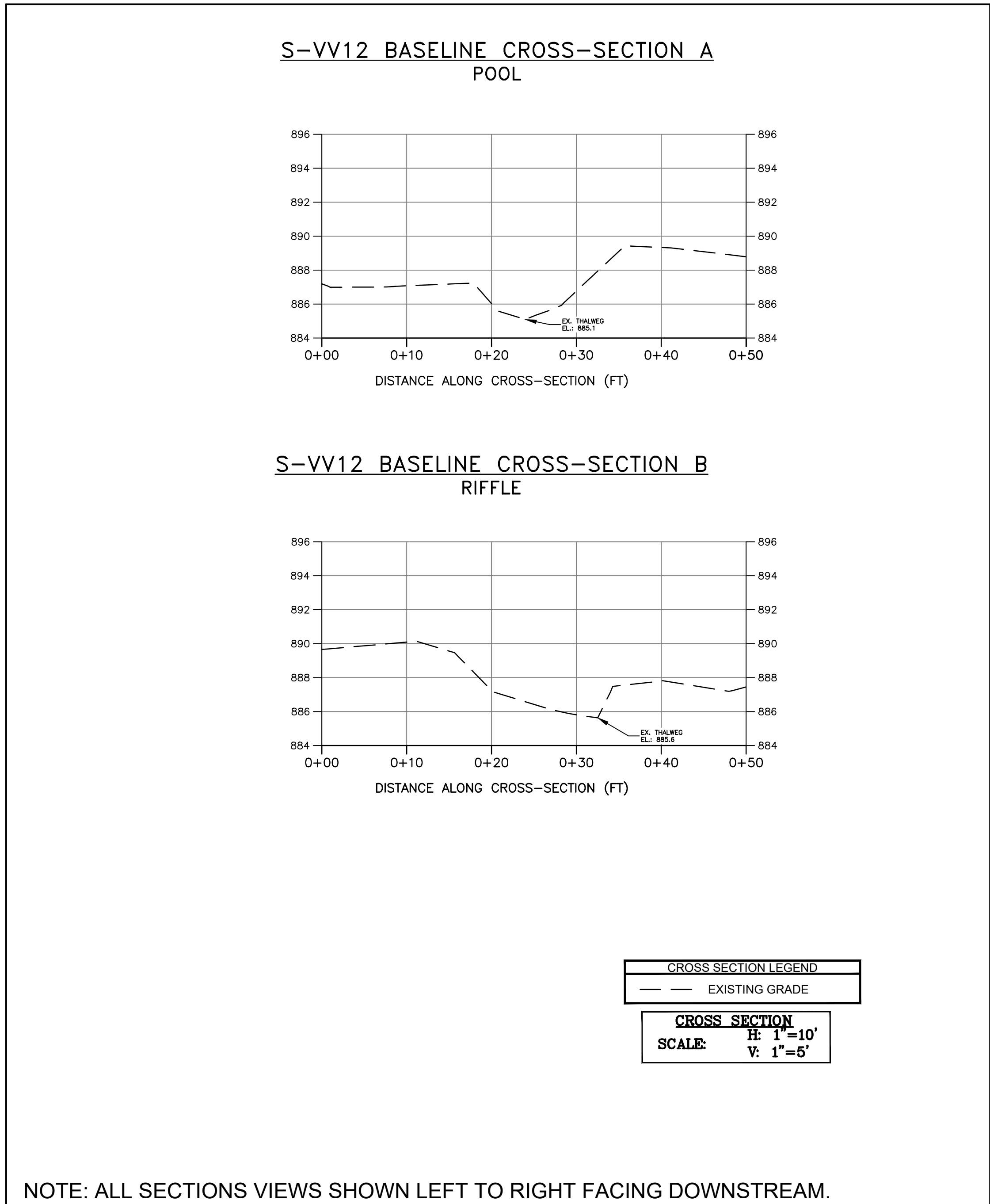
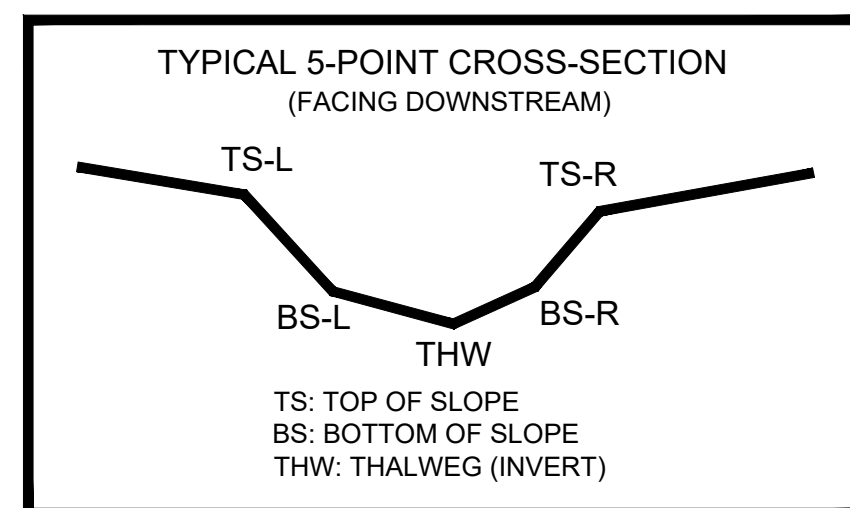
Size Distribution	
mean	16.0
dispersion	4.4
skewness	-0.18



- SURVEY NOTES:**
- THIS MAP HAS BEEN ORIENTED TO NAD 1983 UTM ZONE 17N, AND VERTICALLY TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), USING REAL TIME DGPS. FIELD LOCATIONS WERE COMPLETED ON AUGUST 27, 2021.
 - EASEMENT LINES SHOWN ON PLAN VIEW WERE PROVIDED BY MOUNTAIN VALLEY PIPELINE.
 - SURVEY POINTS FOR CROSS SECTIONS AND THALWEG PROFILES COLLECTED IN 2021 HAVE BEEN USED IN COMBINATION WITH SURVEY POINTS COLLECTED PREVIOUSLY IN 2020 IN ORDER TO GENERATE THE PRE-CROSSING SURFACE SHOWN IN PLAN. DUE TO NATURAL EROSIONAL STREAM PROCESSES THAT CAN OCCUR OVER TIME, MINOR ADJUSTMENTS TO THE PROFILE ALIGNMENTS MAY HAVE BEEN REQUIRED IN ORDER TO GENERATE A CLEAN PRE-CROSSING SURFACE.
 - ALL SECTION VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.
 - POST-CROSSING SURVEY INFORMATION SHOWN IN RED. DATA PENDING.
 - POST-CROSSING SURVEY POINTS FOR CROSS SECTIONS AND THALWEG ARE PROJECTED ONTO PRE-CROSSING SECTION AND PROFILE VIEWS FOR COMPARISON.



AS-BUILT TABLE: S-VV12 CROSS SECTION A					
PT. LOC.	PRE-CROSSING			AS-BUILT	
	NORTHING	EASTING	ELEV.	VERT. DIFF.	HORZ. DIFF.
TS-L	14127808.28	1764652.01	887.49		
BS-L	14127809.92	1764651.34	885.68		
THW	14127812.65	1764650.17	885.84		
BS-R	14127820.67	1764646.73	887.06		
TS-R	14127825.47	1764644.72	889.47		



CAD File No. JP
 Drawn GH
 Checked DW
 Approved NOTED
 Scale: SEPT. 2021
 Date: 1121C07157
 Project No.

TETRA TECH, INC.
 881 ANDERSEN DRIVE FOSTER PLAZA 7
 PITTSBURGH, PA 15220
 TEL: (412) 921-7000 FAX: (412) 921-4040
 E-Mail Address: WWW.TETRA TECH.COM

TETRA TECH
 www.tetra-tech.com

Client: MOUNTAIN VALLEY PIPELINE, LLC
 2200 ENERGY DRIVE, 2ND FLOOR
 CANONSBURG, PA 15317

Title: PROFILE AND CROSS-SECTIONS
 BASELINE SURVEY
 CROSSING S-VV12 - UNT TO SECOND BIG
 RUN (MP 61.26)
 LEWIS COUNTY, WV

1
 Drawing No.

PRELIMINARY

File: D:\Projects\Crossing\Baseline\2021\Crossing\2021-08-27 - S-VV12 THALWEG TOPO.dwg 01.25.2021 10:11:11 AM
 Plot: D:\Projects\Crossing\Baseline\2021\Crossing\2021-08-27 - S-VV12 THALWEG TOPO.dwg 01.25.2021 10:11:11 AM
 Plot Scale: 1"=10'