

## Baseline Assessment – Stream Attributes

### Reach S-A11a Braid 2 (Pipeline ROW) Intermittent Spread A Harrison County, West Virginia

Data	Included
Photos	✓
SWVM Form	✓
FCI Calculator and HGM Form	NA – Slope is <4%
RBP Physical Characteristics Form	✓
Water Quality Data	N/A - No Flow
RBP Habitat Form	✓
RBP Benthic Form	✓
Benthic Identification Sheet	N/A - No Flow
Wolman Pebble Count	✓
Reference Reach Software Pebble Count Data	✓
Longitudinal Profile and Cross Sections	✓

**Spread A Stream S-A11a-Braid-2 (Pipeline ROW) Harrison County**



Photo Type: DS, US View  
Location, Orientation, Photographer Initials: Downstream Edge of ROW, Upstream View, AJE  
Lat: 39.33541 Long: -80.52236



Photo Type: DS, DS View  
Location, Orientation, Photographer Initials: Downstream Edge of ROW, Downstream View, AJE  
Lat: 39.33541 Long: -80.52236

# Spread A Stream S-A11a-Braid-2 (Pipeline ROW) Harrison County



Photo Type: US View at Center  
Location, Orientation, Photographer Initials: Center ROW, Upstream View, AJE  
Lat: 39.33541 Long: -80.52236



Photo Type: DS View at Center  
Location, Orientation, Photographer Initials: ROW Center, Downstream View, AJE  
Lat: 39.33541 Long: -80.52236

# Spread A Stream S-A11a-Braid-2 (Pipeline ROW) Harrison County



Photo Type: US, US View  
Location, Orientation, Photographer Initials: Upstream Edge of ROW, Upstream View, AJE  
Lat: 39.33541 Long: -80.52236



Photo Type: US, DS View  
Location, Orientation, Photographer Initials: Upstream Edge of ROW, Downstream View, AJE  
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# 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 _____

<b>WEATHER CONDITIONS</b>	Now _____ storm (heavy rain) rain (steady rain) showers (intermittent) _____% cloud cover clear/sunny _____%	Past 24 hours _____ Has there been a heavy rain in the last 7 days? Yes No Air Temperature _____ °C Other _____
<b>SITE LOCATION/MAP</b>	Draw a map of the site and indicate the areas sampled (or attach a photograph) <div style="text-align: center;"> </div>	
<b>STREAM CHARACTERIZATION</b>	Stream Subsystem Perennial Intermittent Tidal Stream Origin Glacial Spring-fed Non-glacial montane Mixture of origins Swamp and bog Other _____	Stream Type Coldwater Warmwater Catchment Area _____ km <sup>2</sup>

# PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

<b>WATERSHED FEATURES</b>	<b>Predominant Surrounding Landuse</b> Forest Field/Pasture Agricultural Residential Commercial Industrial Other _____	<b>Local Watershed NPS Pollution</b> No evidence <input type="checkbox"/> Some potential sources Obvious sources <b>Local Watershed Erosion</b> None      Moderate      Heavy
<b>RIPARIAN VEGETATION (18 meter buffer)</b>	<b>Indicate the dominant type and record the dominant species present</b> Trees      Shrubs      Grasses      Herbaceous Dominant species present _____	
<b>INSTREAM FEATURES</b>	Estimated Reach Length _____ m Estimated Stream Width _____ m Sampling Reach Area _____ m <sup>2</sup> Area in km <sup>2</sup> (m <sup>2</sup> x1000) _____ km <sup>2</sup> Estimated Stream Depth _____ m Surface Velocity _____ m/sec (at thalweg)	<b>Canopy Cover</b> Partly open      Partly shaded      Shaded <b>High Water Mark</b> _____ m <b>Proportion of Reach Represented by Stream Morphology Types</b> Riffle _____%      Run _____% Pool _____% <b>Channelized</b> Yes      No <b>Dam Present</b> Yes      No
<b>LARGE WOODY DEBRIS</b>	LWD _____ m <sup>2</sup> Density of LWD _____ m <sup>2</sup> /km <sup>2</sup> (LWD/ reach area)	
<b>AQUATIC VEGETATION</b>	<b>Indicate the dominant type and record the dominant species present</b> Rooted emergent      Rooted submergent      Rooted floating      Free floating Floating Algae      Attached Algae Dominant species present _____ Portion of the reach with aquatic vegetation ____ %	
<b>WATER QUALITY (DS, US)</b>	Temperature _____ °C Specific Conductance _____ Dissolved Oxygen _____ pH _____ Turbidity _____ WQ Instrument Used _____	<b>Water Odors</b> Normal/None      Sewage Petroleum      Chemical Fishy      Other _____ <b>Water Surface Oils</b> Slick      Sheen      Globs      Flecks None      Other _____ <b>Turbidity (if not measured)</b> Clear <input type="checkbox"/> Slightly turbid      Turbid Opaque      Stained      Other _____
<b>SEDIMENT/SUBSTRATE</b>	<b>Odors</b> Normal      Sewage      Petroleum Chemical      Anaerobic      None Other _____ <b>Oils</b> Absent      Slight      Moderate      Profuse <b>Deposits</b> Sludge      Sawdust      Paper fiber      Sand Relict shells      Other _____ <b>Looking at stones which are not deeply embedded, are the undersides black in color?</b> 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	<b>1. Epifaunal Substrate/ Available Cover</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Embeddedness</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>3. Velocity/Depth Regime</b>	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).
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	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.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	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.
	<b>SCORE</b>	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					
<b>6. Channel Alteration</b>	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.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>7. Frequency of Riffles (or bends)</b>	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.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>8. Bank Stability (score each bank)</b>	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			
<b>9. Vegetative Protection (score each bank)</b>	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			
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	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

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

### 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						

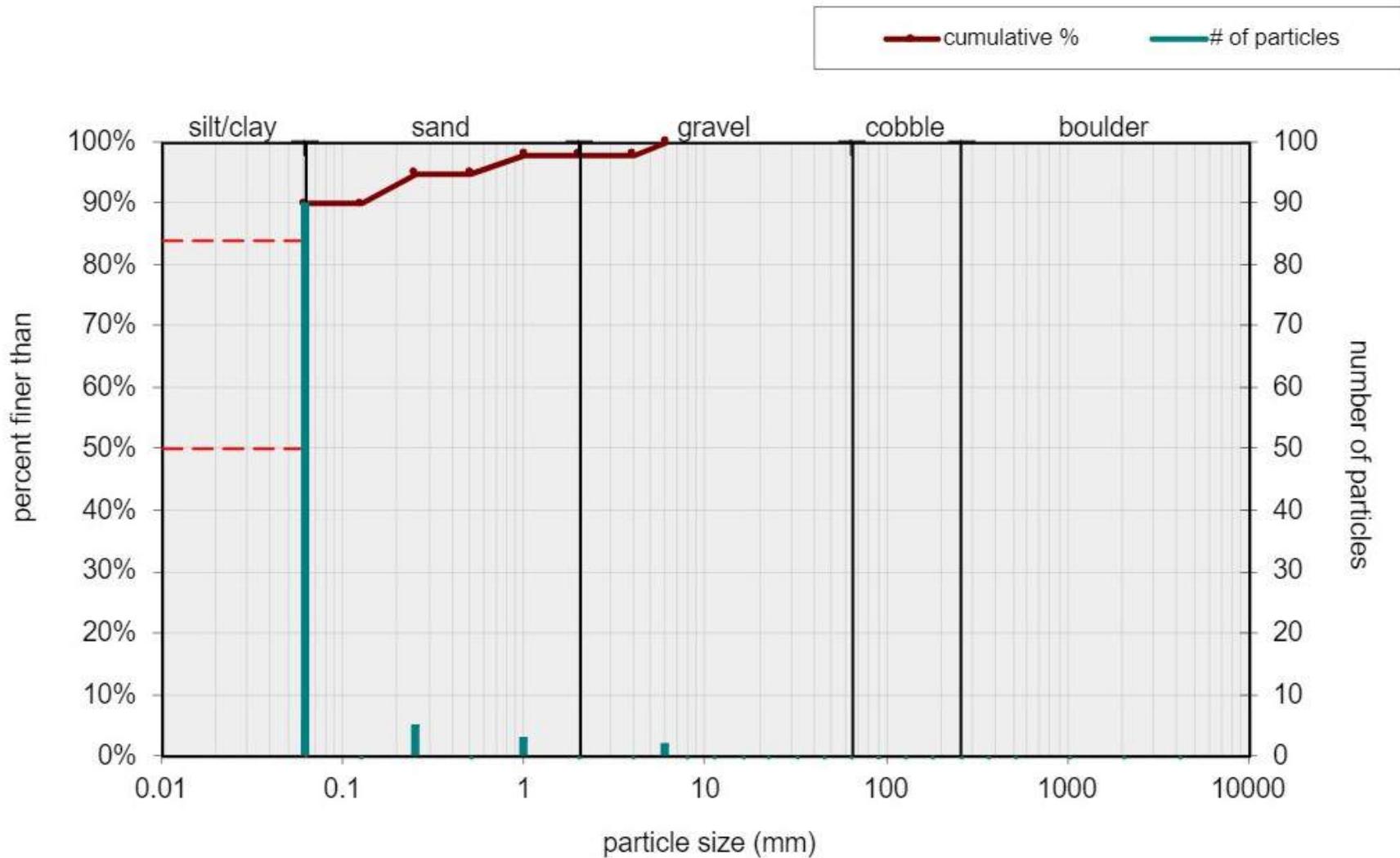
### WOLMAN PEBBLE COUNT FORM

County: Harrison  
 Stream Name: UNT to Grass Run  
 HUC Code: 05020002  
 Survey Date: 9/15/2021  
 Surveyors: AJE, ER  
 Type: Bankfull Channel

Stream ID: S-A11a Braid 2  
 Basin: West Fork  
 Impact: 22 m

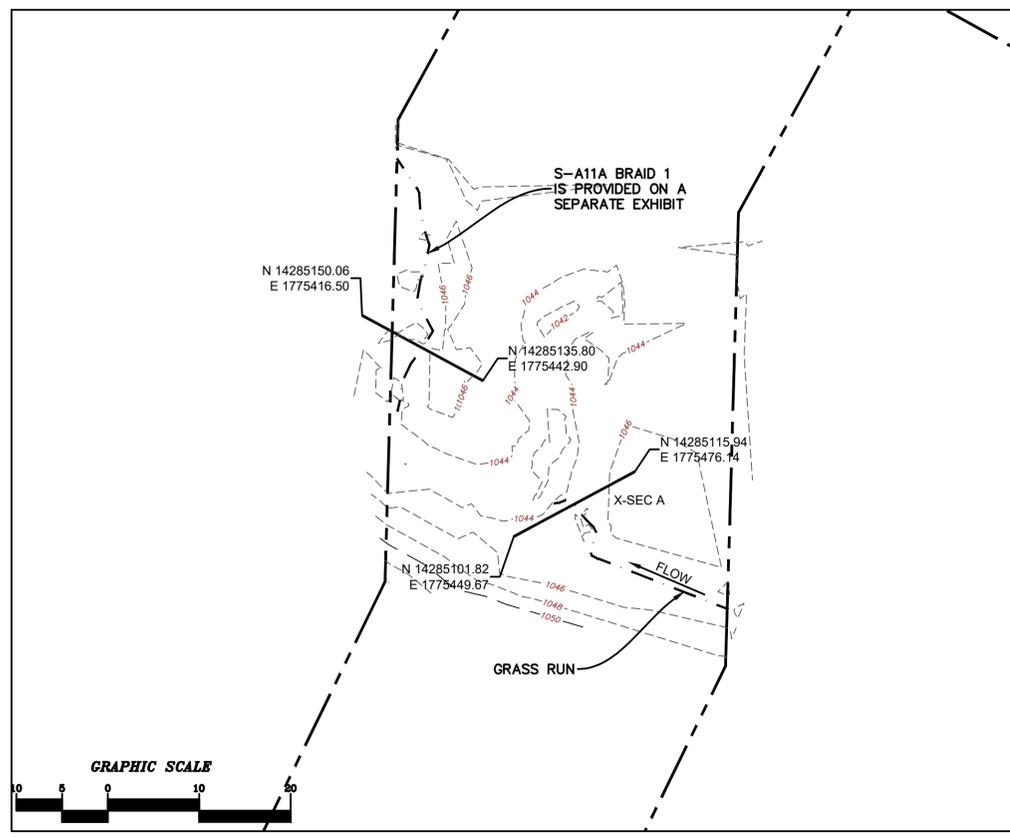
PEBBLE COUNT							
Inches	PARTICLE	Millimeters		Particle Count	Total #	Item %	% Cum
	Silt/Clay	< .062	S/C	▲ ▼	90	90.00	90.00
	Very Fine	.062-.125	S A N D	▲ ▼	0	0.00	90.00
	Fine	.125-.25		▲ ▼	5	5.00	95.00
	Medium	.25-.5		▲ ▼	0	0.00	95.00
	Coarse	.50-1.0		▲ ▼	3	3.00	98.00
.04-.08	Very Coarse	1.0-2		▲ ▼	0	0.00	98.00
.08-.16	Very Fine	2-4		G R A V E L	▲ ▼	0	0.00
.16-.22	Fine	4-5.7	▲ ▼		2	2.00	100.00
.22-.31	Fine	5.7-8	▲ ▼		0	0.00	100.00
.31-.44	Medium	8-11.3	▲ ▼		0	0.00	100.00
.44-.63	Medium	11.3-16	▲ ▼		0	0.00	100.00
.63-.89	Coarse	16-22.6	▲ ▼		0	0.00	100.00
.89-1.26	Coarse	22.6-32	▲ ▼		0	0.00	100.00
1.26-1.77	Vry Coarse	32-45	▲ ▼		0	0.00	100.00
1.77-2.5	Vry Coarse	45-64	▲ ▼		0	0.00	100.00
2.5-3.5	Small	64-90	C O B B L E		▲ ▼	0	0.00
3.5-5.0	Small	90-128		▲ ▼	0	0.00	100.00
5.0-7.1	Large	128-180		▲ ▼	0	0.00	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-A11a Braid 2, Grass Run



Size (mm)		Size Distribution		Type	
D16	0.062	mean	0.1	silt/clay	90%
D35	0.062	dispersion	1.0	sand	8%
D50	0.062	skewness	---	gravel	2%
D65	0.062			cobble	0%
D84	0.062			boulder	0%
D95	0.5				

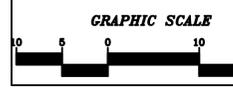
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 Plot Date: 08/27/2021 10:11:11 AM  
 Plot Scale: 1"=50'  
 Plot Size: 11.00 x 17.00  
 Plot Title: S-A11A Braid 2 - 2021.dwg



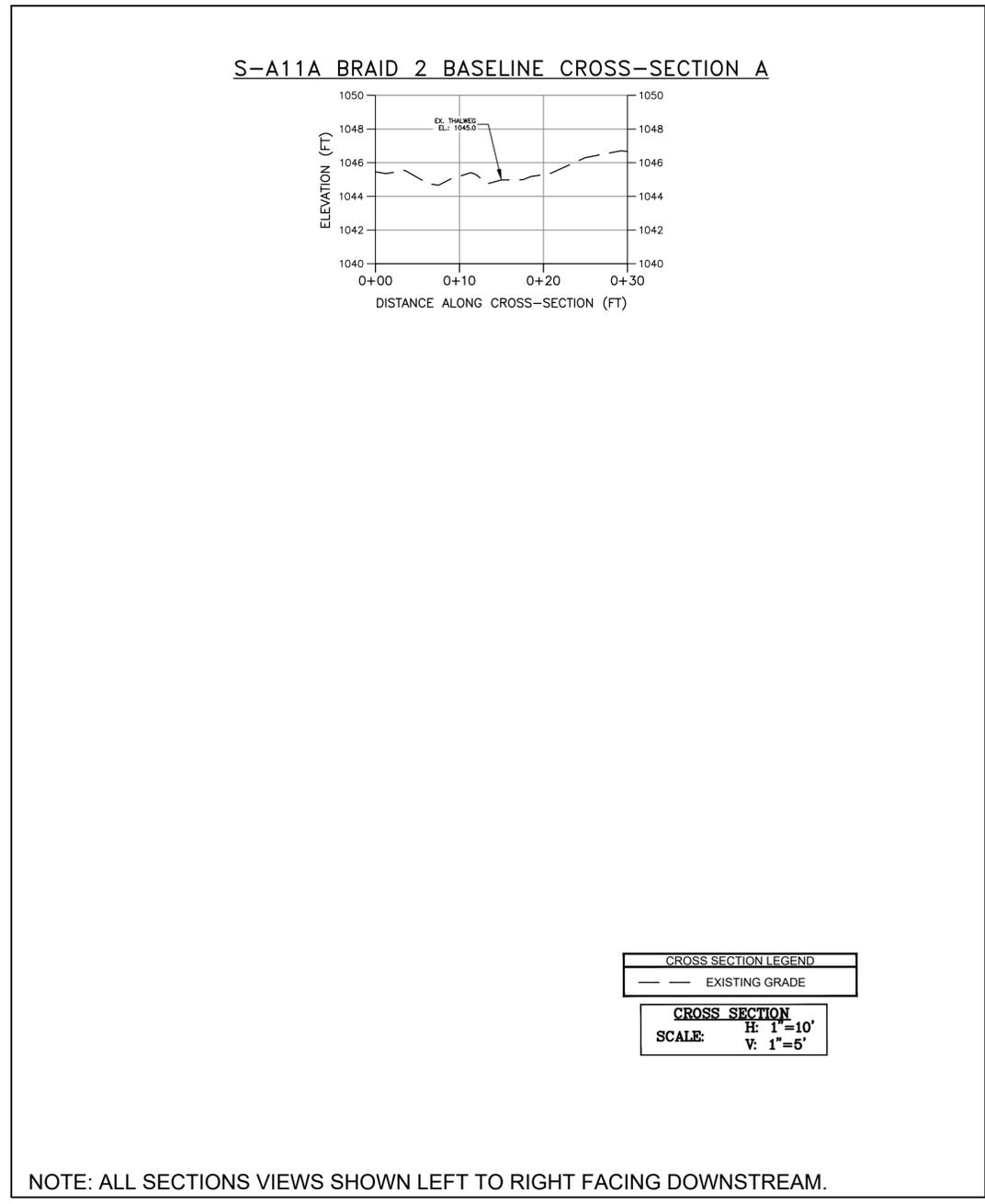
### LEGEND

- - - - - STUDY AREA (EASEMENT)  
 - - - - - EXISTING SURVEY-LOCATED THALWEG  
 1176.87 + EXISTING SURVEYED GROUND SHOT ELEVATION

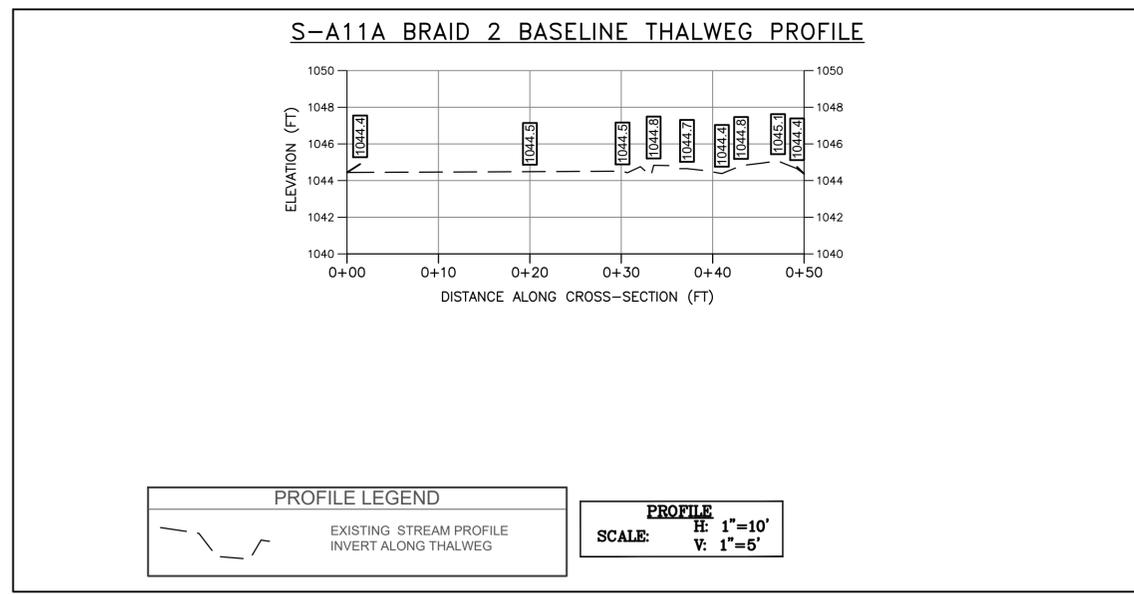
- SURVEY NOTES:**
- THIS MAP HAS BEEN ORIENTED TO NAD 1983 UTM ZONE 17N, AND VERTICALLY TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), USING REAL TIME DGPS. FIELD LOCATIONS WERE COMPLETED ON AUGUST 24, 2021.
  - EASEMENT LINES SHOWN ON PLAN VIEW WERE PROVIDED BY MOUNTAIN VALLEY PIPELINE.
  - 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.



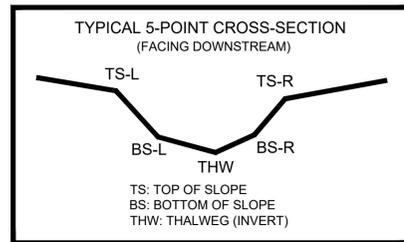
S-A11A BRAID 2



NOTE: ALL SECTIONS VIEWS SHOWN LEFT TO RIGHT FACING DOWNSTREAM.



AS-BUILT TABLE: S-A11A BRAID 2 CROSS SECTION A					
PT. LOC.	PRE-CROSSING			AS-BUILT	
	NORTHING	EASTING	ELEV.	VERT. DIFF.	HORZ. DIFF.
TS-L	14285105.5600	1775462.5940'	1044.944'		
BS-L	14285106.0000	1775463.2240'	1043.689'		
THW	14285106.8400	1775464.3130'	1044.809'		
BS-R	14285107.9000	1775465.7950'	1043.924'		
TS-R	14285108.3800	1775466.5150'	1044.987'		

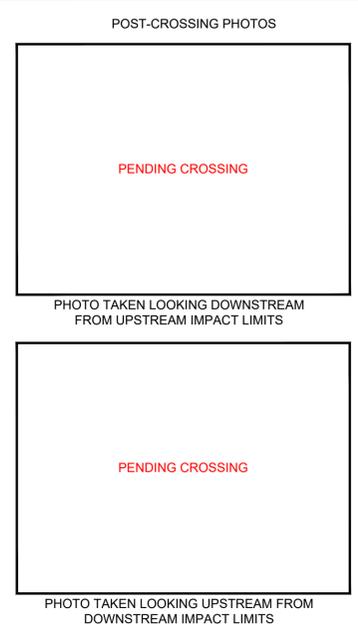


**CROSS SECTION LEGEND**

— — — — — EXISTING GRADE

**CROSS SECTION SCALE:**

H: 1"=10'  
 V: 1"=5'



PRE-CROSSING

PRELIMINARY

<b>CAD File No.</b>	JZ
<b>Drawn</b>	GH
<b>Checked</b>	DW
<b>Approved</b>	NOTED
<b>Scale:</b>	Scale:
<b>SEPT. 2021</b>	Date:
<b>1121C07157</b>	Project No.
<b>TETRA TECH, INC.</b> 661 ANDERSEN DRIVE FOSTER PLAZA 7 PITTSBURGH, PA 15220 TEL: (412) 921-7000 FAX: (412) 921-4040 E-Mail Address: WWW.TETRATECH.COM	
<b>TETRA TECH</b> www.tetratech.com	
<b>Client:</b> MOUNTAIN VALLEY PIPELINE, LLC 2200 ENERGY DRIVE, 2ND FLOOR CANONSBURG, PA 15317	
<b>Title:</b> PROFILE AND CROSS-SECTIONS BASELINE SURVEY CROSSING S-A11A BRAID 2 - GRASS RUN (MP 21.60) HARRISON COUNTY, WV	
1	Drawing No.