Attachment 8b
2014 Waterways Field Study: New V6 Crossings Report

Project Note

Project: Alaska Stand Alone Pipeline/ASAP		**Project No:**	**138575**
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Revision History

Rev	Date	Comments	Approval
A	09/23/2014	Draft Deliverable	
B	10/10/2014	Baker Revisions	

1. Trip/Fieldwork Purpose

Michael Baker, Jr., Inc. (Baker) conducted a field program in the summer of 2014 to assess selected stream crossings along the Alaska Stand Alone Pipeline (ASAP) Project right of way (ROW). The purpose of the site visits was to gather physical data and observations at pipeline stream crossing locations in support of the project Environmental Impact Statement, ROW applications, preliminary design, and Class 3 cost estimate. Prior to field deployment, selected sites were identified using several data sets including past field studies, aerial imagery, Digital Elevation Models, and spatial data sets such as Alaska Department of Fish and Game Anadromous Fish Catalog. Selected crossing sites were assigned one of three classifications: Validation, Minor, and Detailed. All of the classified sites were to be visited during the 2014 field season. If a potential channel crossing was not substantiated by available data, a hydraulic point of interest (HPOI) was identified for in-field verification. A total of 244 stream crossings and 99 HPOI sites were assessed during the 2014 field program. Approximately 40 of the validation sites were conducted together by Baker and ASRC Energy Services (AES) in a joint effort with AES' fish studies. Survbase, a land surveyor company, supported Baker in conducting detailed studies at 9 stream crossings. Air support was provided to Baker by Jayhawk Air Helicopter Company for access to remote stream crossings. The field assessment classifications are outlined below.

1.1 Validation

Validation field studies are for stream crossings lacking sufficient field-based data to support stream classification or crossing mode selection. For crossings lacking a defined channel, either a "No Channel Validation" assessment or an HPOI was assigned. A general crossing assessment was performed on defined channels, and this data will be used for permitting support and validation of predetermined stream classifications. A channel migration assessment was performed if channel migration is a concern or could result in increased construction or design difficulty.

1.2 Detailed/Minor Detailed

Minor crossings required the collection of additional data for hydraulic modeling and/or design of local erosion control measures but do not require extensive survey of channel bathymetry, and did not require the support of a professional land surveyor. This study may have included a single cross section survey of channel bathymetry on streams that are uniform, or for which a simplified local erosion control measure is required. This study also applied to channels with low water, and/or moderate scour potential. Direct discharge measurements were also collected at select locations to support subsequent hydraulic model development and validation.

1.3 Detailed Survey

Detailed Survey studies are similar to the Minor crossing studies, but required extensive bathymetric surveys for more detailed hydraulic modeling and design of large-scale erosion control measures. These studies were performed with professional land surveyors on channels having complex hydraulics, or where extensive armoring structures are necessary.

In addition to field assessment studies, Baker also completed a baseline inventory of stream-fish assemblages and associated aquatic and riparian habitat characteristics at proposed stream crossing locations. Field methods were selected to focus on the collection of those data germane to the understanding of environmental considerations necessary to inform timing, location and mode of stream crossing plans. The personnel and schedule for the 2014 field assessment and fish studies are included in Table 1.

Table 1 2014 Field Assessment and Personnel Schedule

Crew	Study	Baker Personnel	# of Sites	Dates in Field	Supporting Contractor
1	Baker-AES Validation	Michael Ulmgren Michael Townshend	ST_: 41 HPOI_: 3	07/22-08/03/2014	AES
2	Validation Campaign 1	Mwasi Mwamba Josh Moffi	ST_: 77 HPOI_:69	07/18-08/03/2014	Jayhawk Air
3	Validation Campaign 2	Michael Townshend Jonathan Kirsch	ST_: 73 HPOI_: 26	08/06-08/17/2014	Jayhawk Air
4	Detailed/Minor Detailed	Mark McBroom Colin McKernan Guy Wade	ST_: 44 HPOI_: 1	7/15- 7/31/2014	Jayhawk Air
5	Detailed Survey	Garrett Yager Michael Ulmgren	ST_: 9 HPOI_: 0	08/07-08/17/2014	SurvBase

2. Field Activities

Field crew 1 billeted at select hotels, lodges, and camps selected by AES. Field crews 2, 3, and 4 predominantly worked and traveled by way of recreational vehicles (RVs). This approach to billeting and travel expedited daily access to sites and extended the useful work day by limiting morning and evening travel to established lodging. Periodically these crews would stay in a hotel or RV park to gain access to showers and laundry facilities. Crew 5 travelled with the surveyors and billeted at a lodge closest to the study site.

During site visits, work was performed in teams of two or three, consisting of Baker and supporting contractor personnel. Each team conducted a Daily Toolbox Safety Meeting to discuss safety plans and potential hazards, weather, sites to visit, and possible challenges prior to heading out to the field.

Each team visited approximately three to five sites per day. Data gathered at stream crossing locations included hydraulic characteristics such as flow velocity estimates, depths, widths, and locations of existing channels and ordinary high water. General descriptions of exposed soils, vegetation, and channel morphology were also compiled. Observations related to potential constructability concerns such as existing local infrastructure, erosion and scour potential, and accessibility was recorded. Figure 1 shows a general stream crossing sketch and associated data capture, including additional data capture to support channel migration assessments.

For fish surveys, the aquatic and riparian habitat was mapped down to a mesohabitat level at each crossing location such that fish-habitat associations could be investigated. A standard suite of environmental variables were recorded describing water quality, channel morphology, stream flow, riparian vegetation communities, and other habitat variables known to be especially important for supporting fish populations. With direct, site-specific habitat characteristic observations and institutional knowledge of fish-habitat associations, a qualitative value was assigned for fish habitat within the zone of influence.

Site data was recorded on pre-printed field sheets or entered electronically into Yuma field computers. Additional notes were recorded in field notebooks. Digital data was recorded using hand held GPS units and GPS-linked cameras; some sites were sketched for additional reference.

Post field day activities included data backup, planning, and daily reporting to Baker Management. At the end of each week, the Baker Point of Contact distributed a Crew Check-In Summary Report to the Baker Management, Alyeska Security, and AGDC Management.

3. Toolbox Safety Meetings

Toolbox Safety Meetings were held daily prior to performing any fieldwork. All team members participated in the briefings. The most common safety factors and actions taken are summarized in Table 2.

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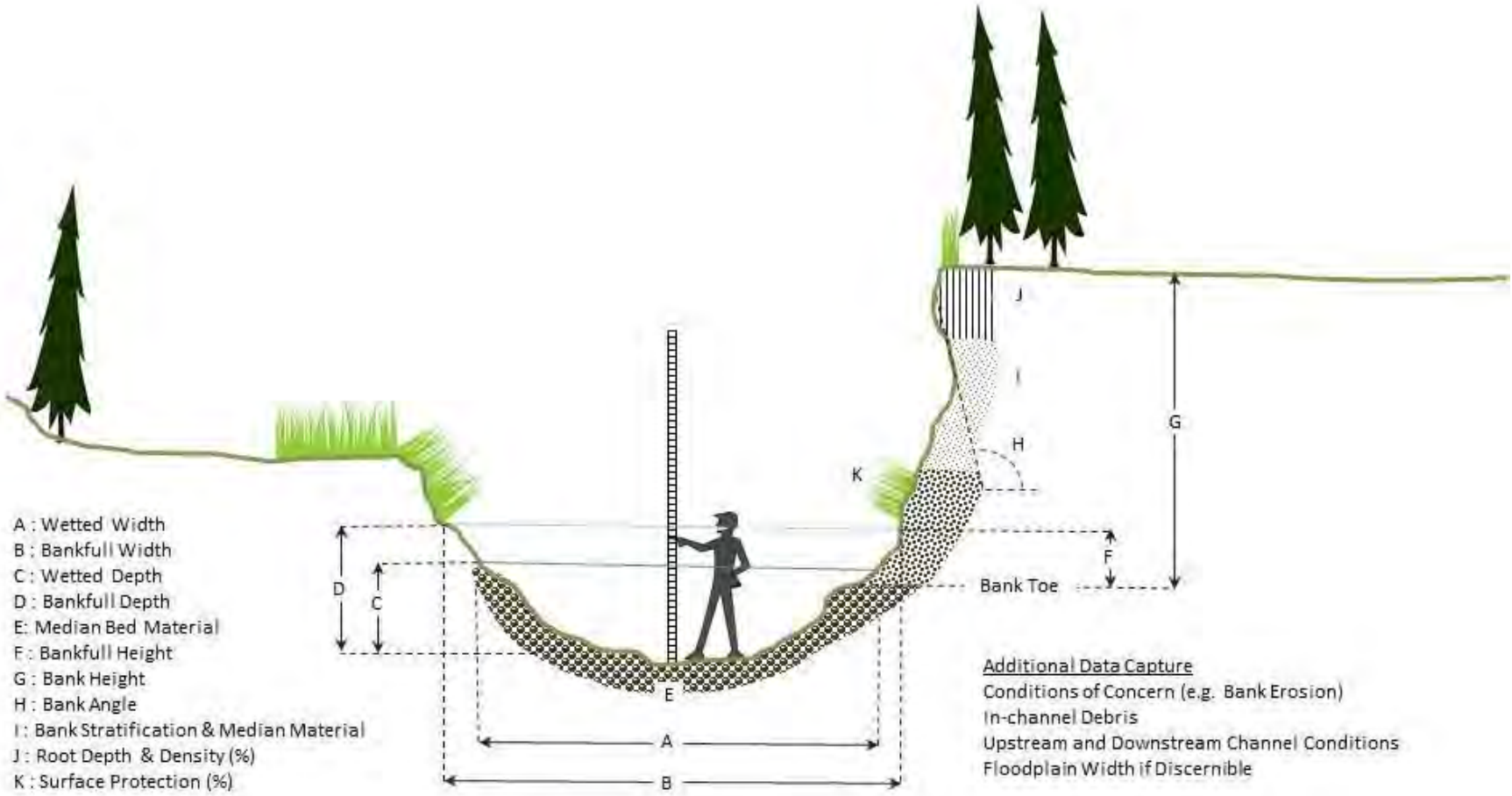

Figure 1 Stream Crossing Data Capture

Table 2 Daily Toolbox Safety Meeting Common Topics

Common Safety Factor	Hazard	Action Taken
Helicopter	Main rotor; tail rotor; engine noise; inflight maneuvering	Equipment were positioned horizontally vs. vertically; avoiding walking towards the tail rotor; wearing headsets; securing lose objects, fastening seatbelts inside the aircraft; pilot communication
Wildlife	Encounters; attacks	Site recon; avoiding encounters; proper handling of deterrents (bear sprays) and firearms
Personal Injury	Injuries to body systems; hypothermia; dehydration	Conducting a risk assessment; wearing proper Personal Protective Equipment such as safety glasses, gloves, personal floatation device; packing extra warm clothes for colder weather; staying hydrated
Attitude / Behavior	Complacency	Staying vigilant; conducting pre- and post-field assessments

4. Challenges

As with all surveys, the crews encountered a few challenges while conducting fieldwork. Although not exhaustive, Table 3 encompasses some of the most common challenges that hindered or limited data collection. Detailed accounts of the challenges are also described in the field sheets and field books.

Table 3 Data Collection Challenges

Challenge	Consequence
Landing site difficulty	Unable to collect data.
Deep water	Unsafe for crews.
Equipment failure (i.e. boat failure)	Unable to collect discharge measurement data.
No clear view during aerial surveys	Unable to collect aerial stream data.
Unapproved site access	Unable to collect ground data at site
Inclement Weather	Air support unavailable; rainfall resulted in high water in some streams.

5. Summary

Brief results for each field study team are outlined below.

5.1 Baker-AES

Townshend and Ulmgren along with AES collected data from 44 sites between Talkeetna and Deadhorse. Many of the sites were highly vegetated indicating low migration potential. At a few sites, severe bank erosion indicated high migration potential and warranted additional assessment and data capture. Several sites had little to no flow either because of wetland characteristics or historic beaver complexes.

5.2 Validation C1

Mwamba and Moffi visited 146 sites from Fairbanks to Deadhorse. The sites predominantly have steep, vegetated banks with turbulent stream flows. Some crossings were dry or located on a wetland so no physical data was obtained. Instead, photos were taken to capture the upstream and downstream conditions. Data collection was challenging at some sites because of land access restrictions, limited

landing zones, and dense vegetation making sites inaccessible by foot within a reasonable period of time. These sites were assessed from the air when feasible.

5.3 Validation C2

Kirsch and Townshend collected data from 99 sites between Fairbanks and Willow. Many of the sites were low flow with sturdy bed and bank material however some sites had significant bank erosion indicating migration potential. At some sites, data collection was hindered because of fast and deep flows. As with Validation C1 crew, the Validation C2 crew also conducted aerial surveys at some sites because of limited safe landing sites, timely access, and permit restrictions.

5.4 Detailed/Minor Detailed Crew

McBroom, McKernan, and Wade collected stream crossing and fish habitat data from 45 sites between Willow and Deadhorse. Most of the sites were larger channels with unique scour, migration or fish habitat concerns. Two of the Detailed/Minor Detailed sites were inaccessible to this crew, but assessments were performed by other crews who either had helicopter support or were granted access via private land.

5.5 Detailed Survey

Yager and Ulmgren along with Survbase conducted detailed surveys of 9 Detailed stream crossing sites. Baker is currently waiting for the SurvBase data. Yager's crew experienced equipment failure of the Z-boat. Ulmgren's crew was deployed a few days later to complete the survey following equipment repairs.