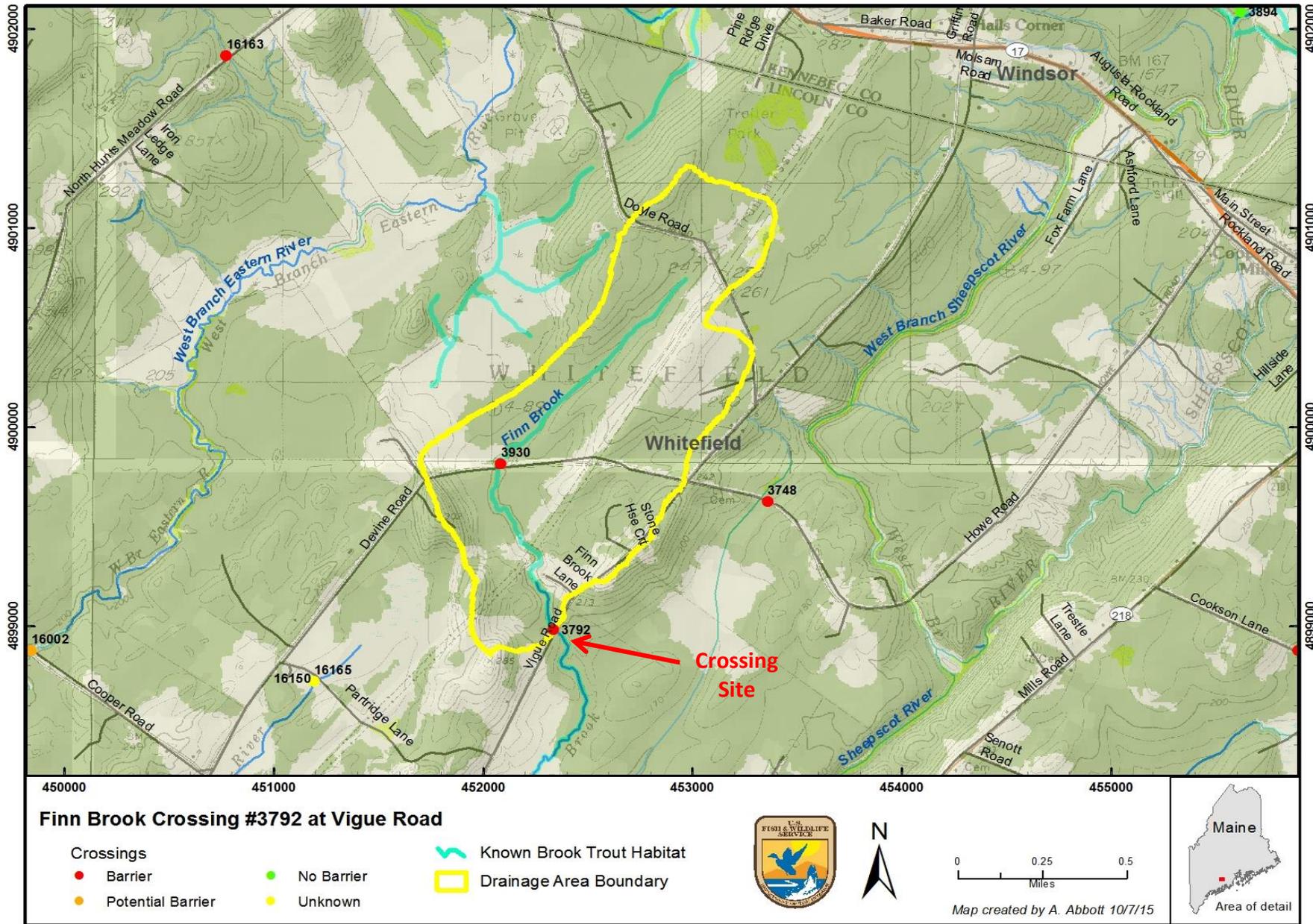
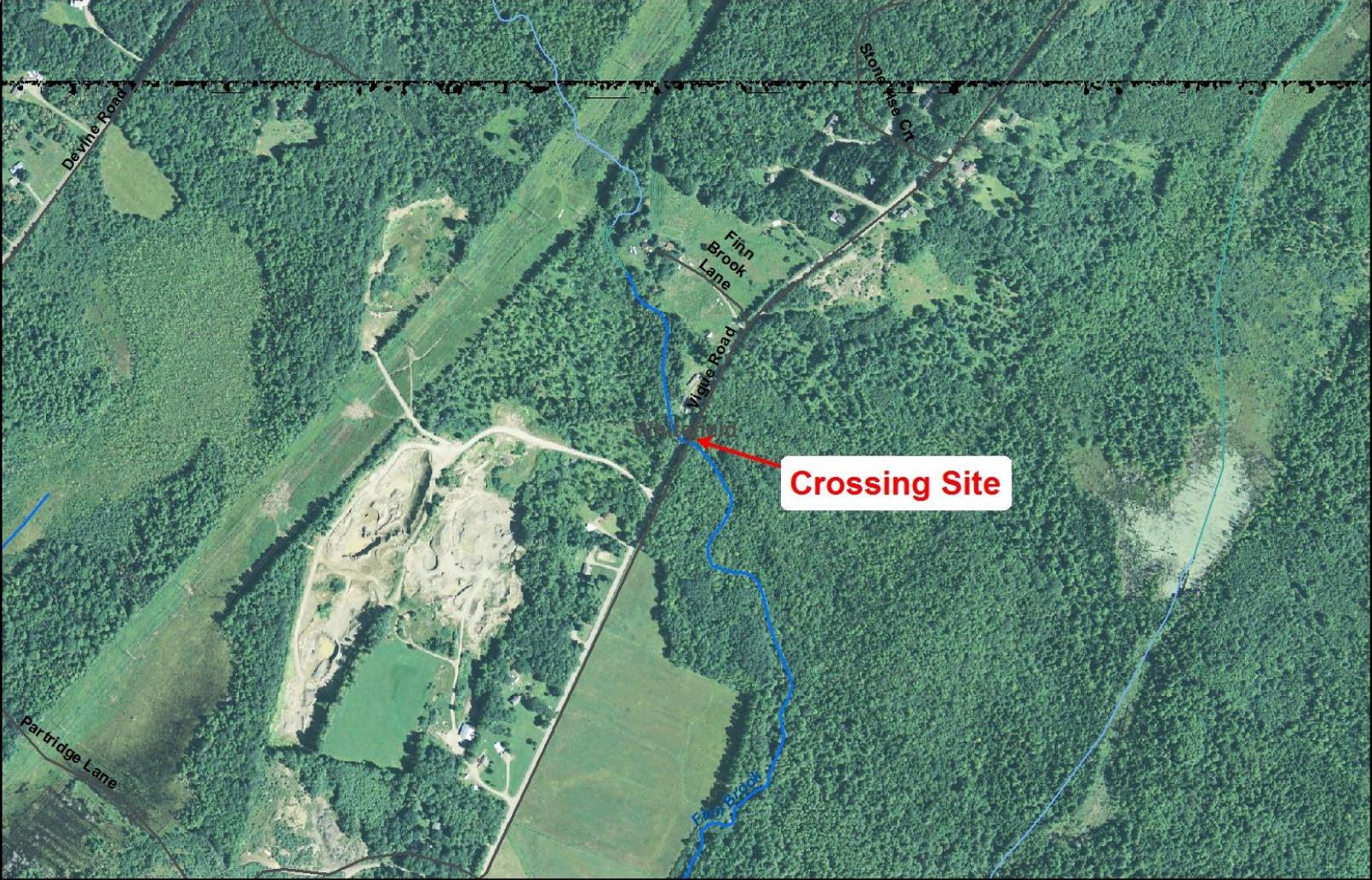


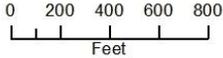
Site Map - Drainage Area



Site Map - Orthophoto



Vigre Road Finn Brook Crossing #3792



Map created by A. Abbott 3/16/16



Sample Supplemental Documents

Inlet Photo



Outlet Photo



Upstream Photo

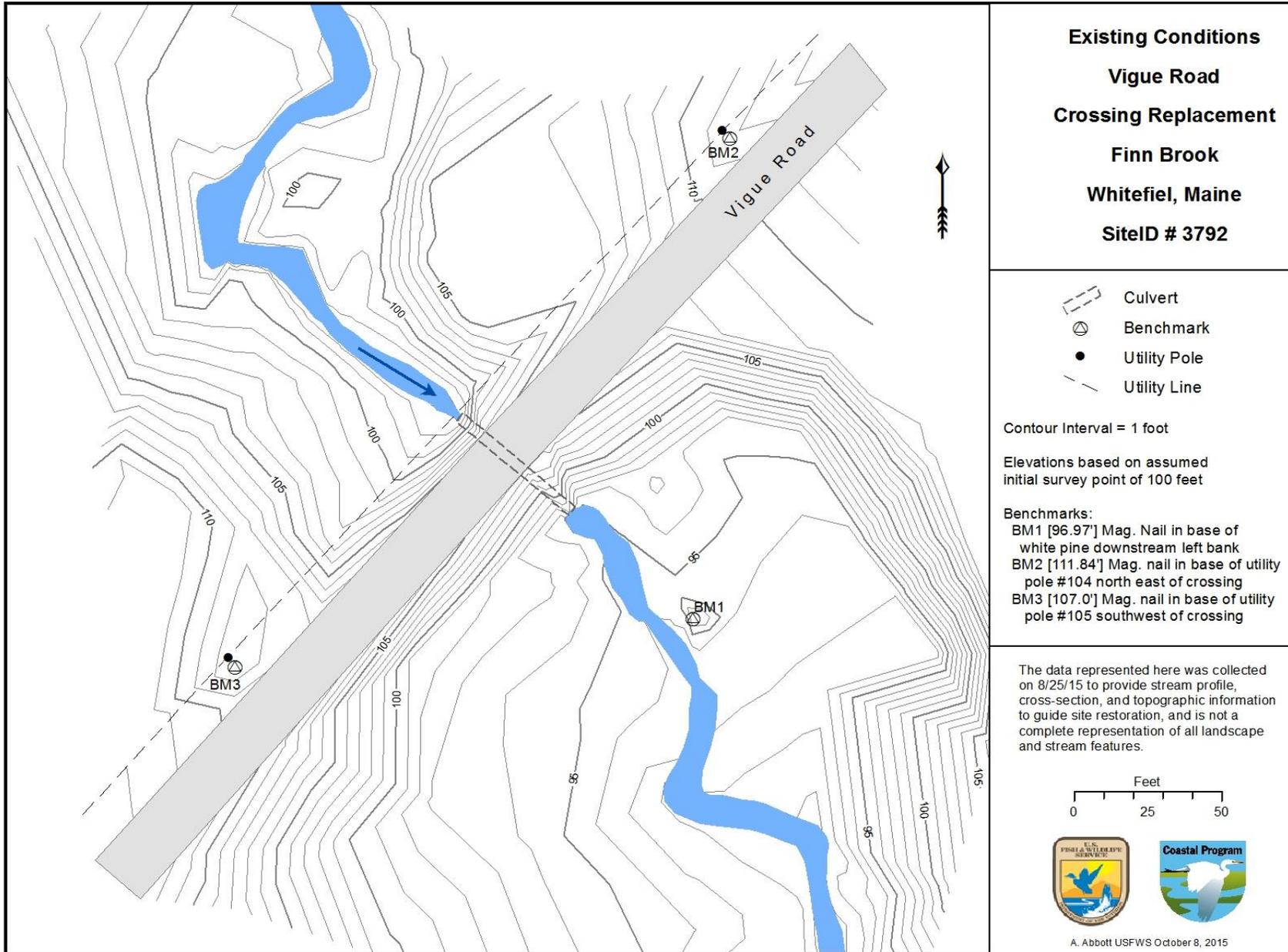


Downstream Photo

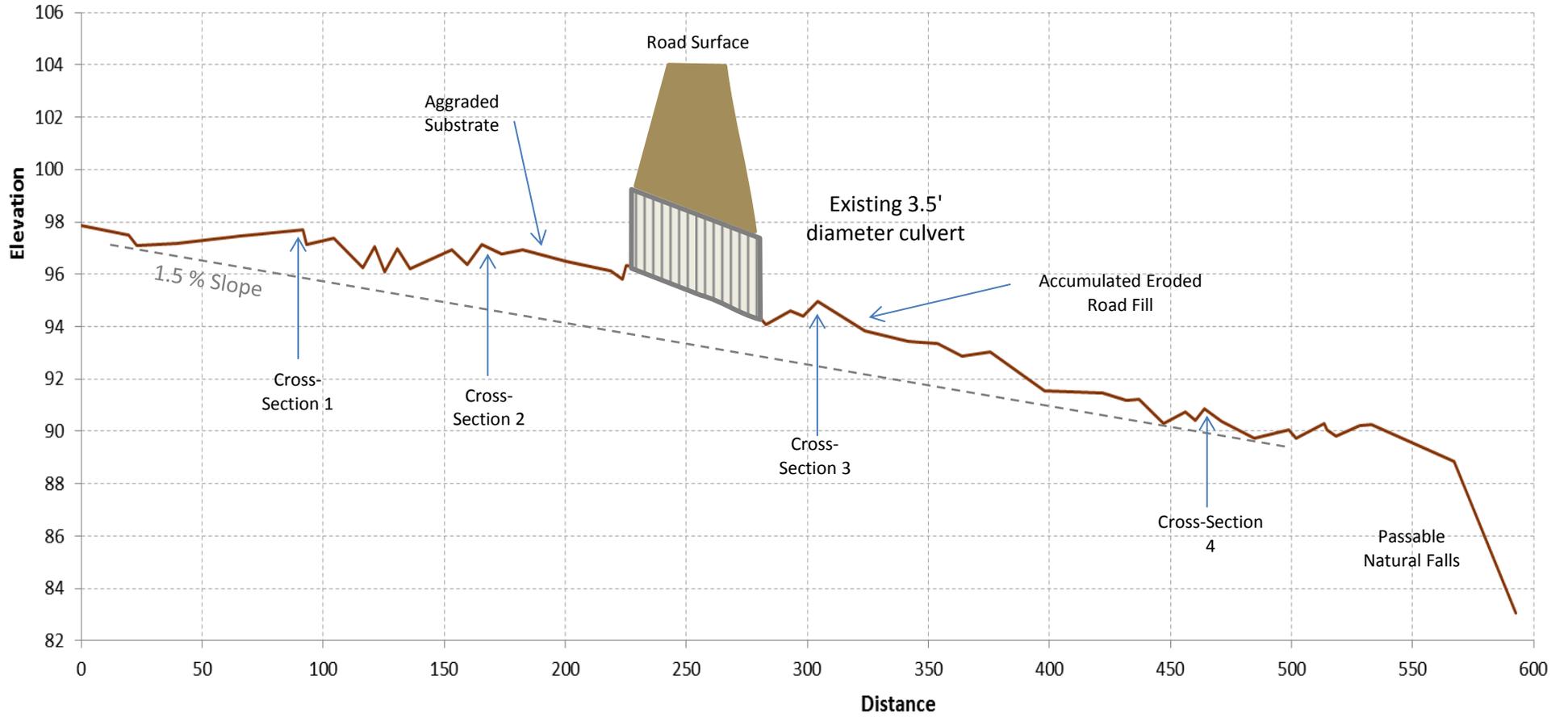


All photos taken 8/25/15

Site Topography - Existing Conditions



Longitudinal Profile - Existing Conditions



Notes:

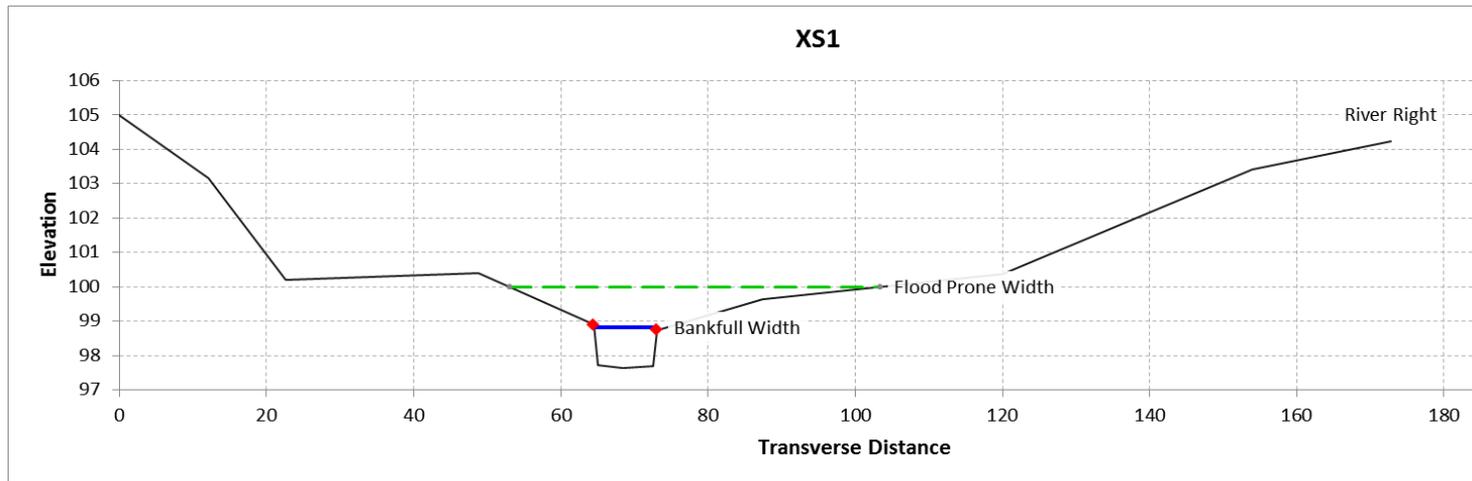
Existing slope and scour depths controlled by undersized road crossing frequently restricting flow and causing aggradation of stream substrate and eroded road fill. This view is vertically exaggerated, reflecting the different scales of units for elevation and distance.

Cross-Section 1 - Reference Reach Upstream of Crossing

Upstream from Cross-Section 1



Downstream from Cross-Section 1



Bankfull Width:	8.58
Bankfull Depth:	1.17
Bankfull XS Area:	9.11
Bankfull Wetted Perimeter:	9.92
Bankfull Hydraulic Radius:	0.92
Bankfull Hydraulic Depth:	1.06
Bankfull Width:Depth Ratio:	7.3
Entrenchment Ratio:	5.9

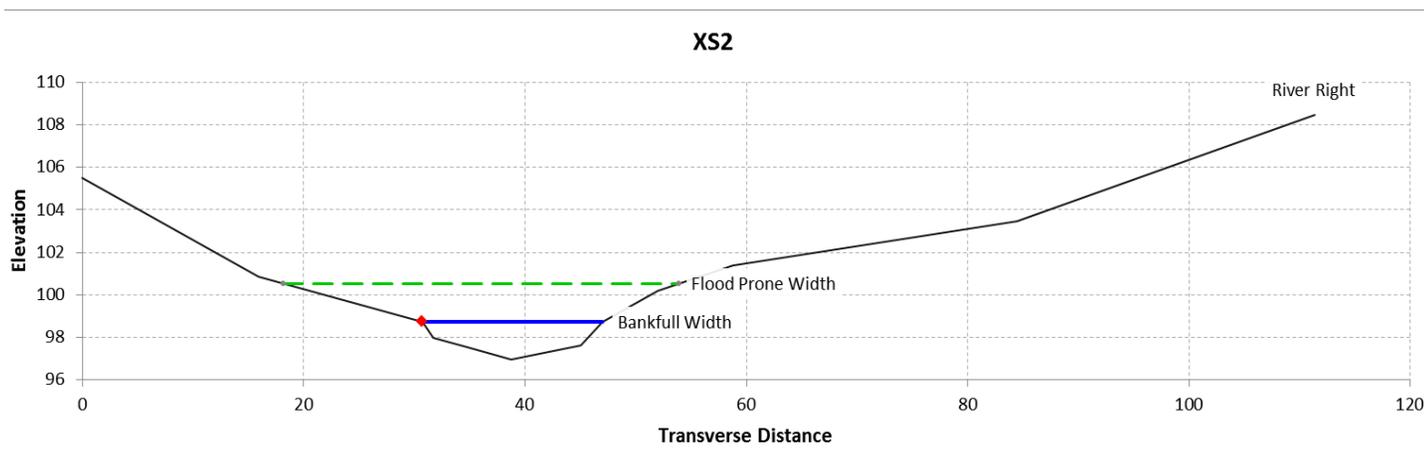
Note: This reach is very flat, and stream form is affected by woody material.

Cross-Section 2 - Reference Reach Upstream of Crossing

Upstream from Cross-Section 2



Downstream from Cross-Section 2



Bankfull Width:	16.29
Bankfull Depth:	1.79
Bankfull XS Area:	19.61
Bankfull Wetted Perimeter:	16.96
Bankfull Hydraulic Radius:	1.16
Bankfull Hydraulic Depth:	1.2
Bankfull Width:Depth Ratio:	9.1
Entrenchment Ratio:	2.2

Note: This reach is very short and relatively steep, composed of cobble and small boulders, and is similar to the top of the downstream natural falls.

Cross-Section 4 - Reference Reach Downstream of Crossing

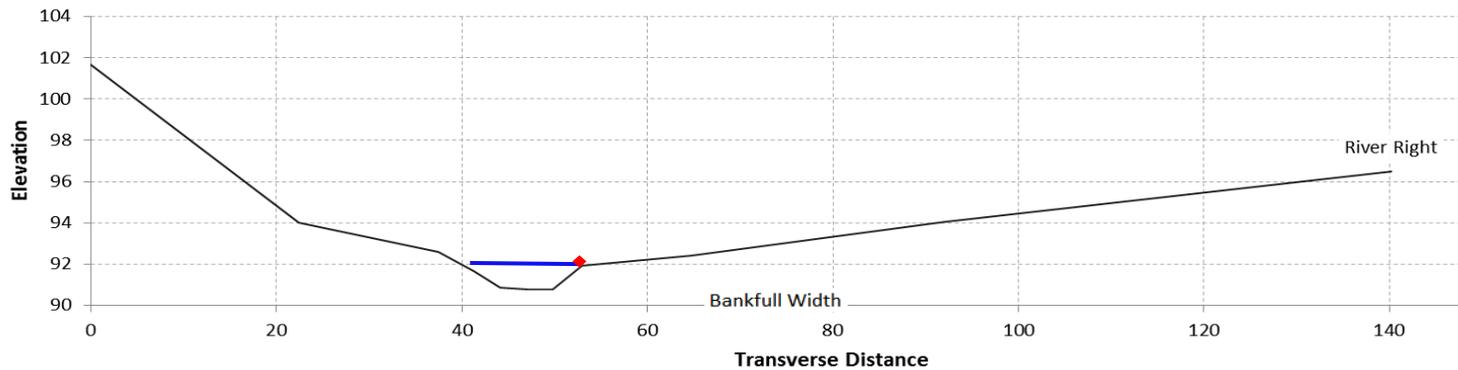
Upstream from Cross-Section 4



Downstream from Cross-Section 4



XS4



Bankfull Width: 12
 Bankfull Depth: 1.14
 Bankfull XS Area: 12.5

Note: This reach is very short and of similar slope to the overall reach, composed of cobble and sand, and appears to represent the most suitable reference reach on which to base design of the replacement crossing.

USGS Basin and Stream Flow Statistics & Hydraulic Analysis

Attribute	Value	Units	Definition
Drainage Area	0.74	sqare miles	Area that drains to crossing
Wetlands	7.48	percent	Percentage of NWI storage
Elev	237.8	feet	Mean basin elevation
Precip	43.6	inches	Mean annual precipitation
Aquifer	14.94	percent	Percentage of land surface underlain by aquifers
X	452570	State Plane Coord.	Basin centroid E/W location
Y	4900047	State Plane Coord.	Basin centroid N/S location

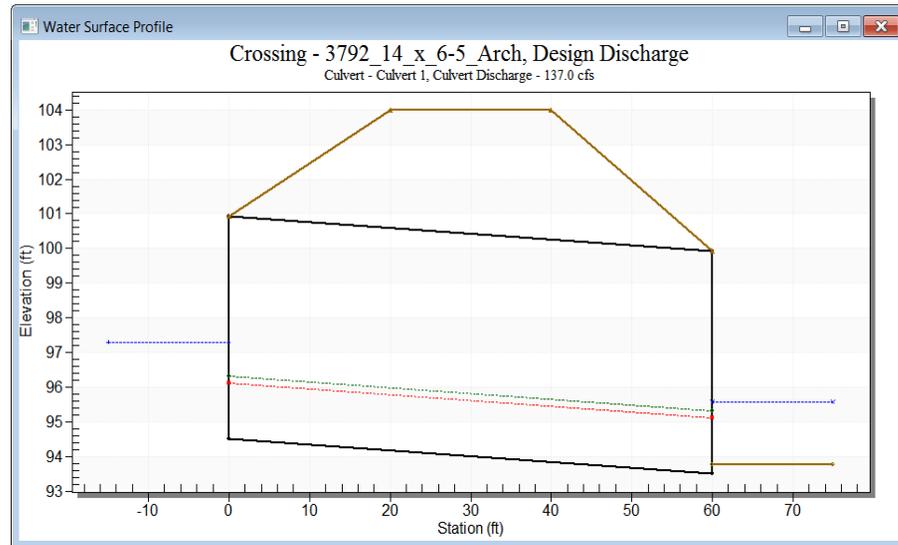
Source: USGS StreamStats version 3 Beta, 10/7/2015

Return Period	Peak Flow Estimate ¹
T (yr)	QT (ft3/s)
1.1	19
2	39
5	61
10	77
25	100
50	117
100	137
500	184

Estimated Bankfull Width ² = 8'

References:
¹ Lombard, P. & Hodgkins, G., 2015. Peak Flow Regression Equations for Small, Ungaged Streams in Maine: Comparing Map-Based to Field-Based Variables. Water-Resources Investigations Report 2015-5049. US Geological Survey, Augusta, Maine.
$Q_T = b \times A^a \times 10^{-wT}$
² Craig, S. & Koenig, S., 2010. Regional Stream Relationship Curves from Restoration Sites - Mean Bankfull Width to Catchment Area within Northern Coastal Maine Watersheds
$W_{bkf} = 8.7147 \times A^{0.3429}$

HY-8 Hydraulic Analysis Program of the U.S. Federal Highway Administration provides results for the above peak flow estimates for the proposed arch design, and indicates that the crossing as proposed will easily pass the expected 100-year (and 500-year) storm events.



Discharge Names	Total Discharge	Culvert Discharge	leadwate Elevation (ft)	Inlet Control Denth(ft)	Outlet Control Denth(ft)	Flow Type	Outlet Depth (ft)	Outlet Velocity (ft/s)
1 year	19.00	19.00	95.33	0.59	0.83	3-M1t	1.43	1.12
2 year	39.00	39.00	95.81	1.15	1.31	3-M1t	1.62	2.04
5 year	61.00	61.00	96.26	1.62	1.76	3-M1t	1.76	2.95
10 year	77.00	77.00	96.55	1.89	2.05	3-M1t	1.83	3.57
25 year	100.00	100.00	96.94	2.24	2.44	3-M1t	1.93	4.41
50 year	117.00	117.00	97.20	2.49	2.70	3-M1t	1.99	5.00
100 year	137.00	137.00	97.28	2.78~	0.00	3-M1t	2.06	5.67
500 year	184.00	184.00	98.20	3.41	3.70	3-M2t	2.19	7.17

Note that prediction errors are quite large when using regression equations to estimate flows and bankfull widths based on drainage area. It is best to account for potentially larger flows at these return intervals.

Water Control - Cofferdam, Pump & Filtration Placement

