PRELIMINARY DESIGN REPORT

Stanley Brook Bridge
Bridge #5570

State Route 3
Over
Stanley Brook

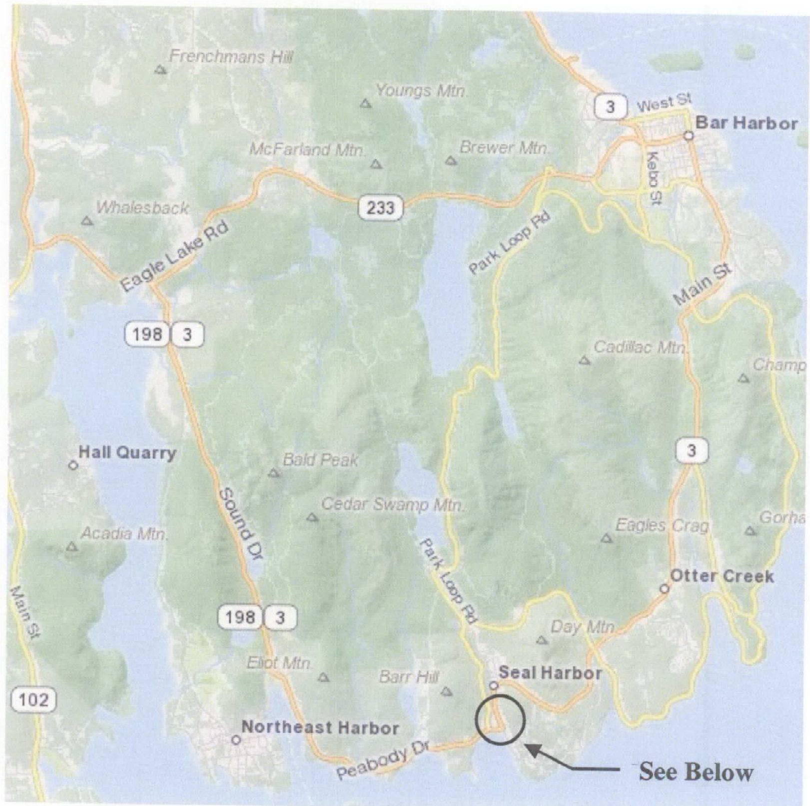
Mount Desert, Maine

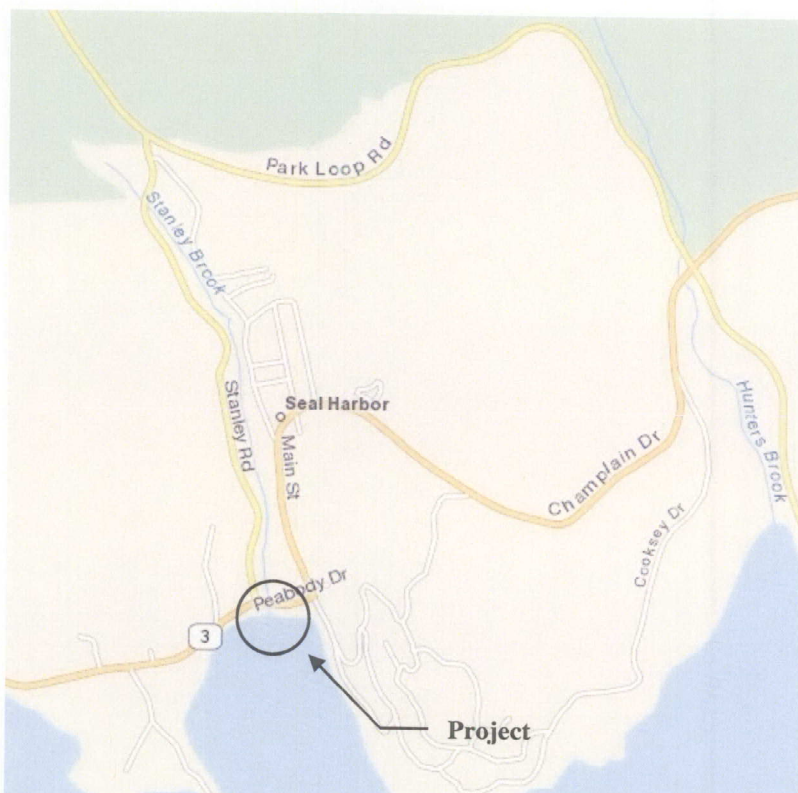
PIN 016718.00

MAINEDOT
Maine Department of Transportation

LOCATION MAP

Mount Desert, Maine
Stanley Brook Bridge
Bridge No. 5570
PIN 016718.00





Latitude: 44°17'46.4" N Longitude: 68°14'28.8" W

The hydrologic analysis for Stanley Brook Bridge (#5570) in Mount Desert on State Route 3 over Stanley Brook can be separated into two categories: stream flow and tidal flow. The drainage basin characteristics of Stanley Brook were provided by the Maine Department of Transportation Environmental Office - Hydrology Section (MDOT). The flows were computed using the 1999 U.S.G.S. full regression equation. Other sources of data were also reviewed including:

- Report by Vanasse Hangen Brustlin, Inc. (VHB) issued in November of 2009 to Acadia National Park regarding mitigation of scour and erosion on Stanley Brook and its Bridges
- Report by the Mount Desert Island Water Quality Coalition issued in May of 2006 titled "The Stanley Brook Watershed Survey Report"
- Flow data provided by biologists from Acadia National Park

The one piece of information taken from the two reports and used for comparison to the data provided by MDOT was the watershed area of Stanley Brook in which all sources were approximately the same. The flow data provided by Acadia National Park represented flows measured monthly on a set schedule between May and October in the years 2007 and 2009. These flows were not used due to the fact that the data points were taken approximately 1280 feet upstream from the bridge on a set schedule with no particular storm event associated with them. Therefore, only the flows associated with the 1999 U.S.G.S. full regression equation have been used in design. The following is a summary of the flow data used in design:

Drainage Area = 1.52 mi^2

Ordinary High Water ($Q_{1.1}$) = 45.5 cfs

10 Year Flood (Q_{10}) = 252.8 cfs

Design Discharge (Q_{50}) = 419.8 cfs

Check Discharge (Q_{100}) = 502.2 cfs

Q_{500} = 718.0 cfs

Tidal information was obtained through three sources:

- Flood Insurance Study for the town of Mount Desert issued in 1990
- U.S.G.S report titled "Coastal Flood of February 7, 1978 in Maine, Massachusetts, and New Hampshire" issued in 1979
- Tide data available through the National Oceanic and Atmospheric Administration (NOAA) website

The data from all three sources were fairly similar. The Flood Insurance Study and the U.S.G.S. report focused on record events which was useful for determining record high tide levels. The Flood Insurance Study provided an estimate of the 100-year coastal flood stillwater elevation and maximum wave elevation in Seal Harbor of 10.7 feet and 14 feet respectively (NGVD). Adjusted to NAVD using -0.650 feet at the bridge site, these elevations are 10.05 feet and 13.35 feet. The U.S.G.S. report of the coastal flood in 1978 contains actual observed high water marks all along the Massachusetts, New Hampshire, and Maine coastline. The closest observation to the bridge site was in Southwest Harbor, reading 9.54 feet NGVD or 8.89 feet NAVD.

Average and record tidal elevations were also taken from the NOAA website based on a reference station in Bar Harbor, Maine. These elevations were then adjusted to NAVD and Southwest Harbor (nearest substation to bridge site) using corrections factors provided by NOAA. The following elevations are adjusted to NAVD and Southwest Harbor:

Mean Higher High Water (MHHW) = 5.17 ft

Mean High Water (MHW) = 4.77 ft

Mean Low Water (MLW) = -5.32 ft

Mean Lower Low Water (MLLW) = -5.68 ft

Highest on Record = 9.82 ft (February 7, 1978)

Lowest on Record = -8.52 ft (January 20, 1984)

Highest Predicted for 2010 = 8.17 ft (Occurred January 2, 2010)

Adjustment to Southwest Harbor = x0.96 High Tide Levels
x0.95 Low Tide Levels

Additional information was gathered by speaking to local residents, town representatives, Acadia National Park representatives and the bridge manager. There were mixed reports on whether or not the road has ever overtopped. Bruce Connery of Acadia National Park stated that he has never seen it overtop, but has heard that it has at least twice within the last year and a half. When the road does overtop, he has heard that it is caused by a blockage of the bridge opening from sand being driven up the beach from strong tides. He said that the bridge opening can get blocked up to 80-90% with sand. Stuart Burr, a local resident and representative of the Mount Desert Water District stated that he has seen waves wash onto the road at the site. The bridge manager, town director of public works, and Paul Slack, a local resident and a representative of the Mount Desert Water District have all stated that they have never seen the road overtop at the bridge site.

Other important information regarding the hydrology of the site includes erosion issues and future tide levels. It's been reported that the downstream channel is constantly changing shape which can be attributed to strong tides carrying sand onto the beach and flooding of Stanley Brook washing away the sandy channel. In 2008, enough of the streambed was washed away to expose the timber piles under the stone abutments. Furthermore, mean sea level is predicted to rise over the next 100 years between one to two feet. In order to deal with these issues, it would be prudent to raise the road at the bridge site and increase the bridge opening to decrease the velocities flowing through the bridge, allowing more room in case of sand buildup, and to prevent road overtopping.

Reported By: Richard E. Myers
Date: May 19, 2010

Note: Relevant data and reports are provided in the appendix of this Preliminary Design Report.

The existing bridge and proposed structures were analyzed using HEC-RAS, version 4.0, the river analysis software developed by the U.S. Army Corps of Engineers. The HEC-RAS model for this project represents a 161 foot long segment of Stanley Brook, including the bridge at the stream crossing on Route 3. Five cross-sections upstream of the bridge and four downstream make up the geometry of the stream except for the proposed culvert model which has three cross-sections upstream and two downstream. The following assumptions are consistent throughout each of the models:

- Steady flow
- Manning's "n"
  - Upstream channel = 0.025
  - Upstream overbanks = 0.04
  - Dense brush areas = 0.06
  - Developed park land = 0.037
  - Paved areas = 0.015
  - Sand dune and brush = 0.038
  - Downstream channel and beach = 0.033
- Coefficients - 0.1 contraction/0.3 expansion
- Boundary conditions
  - Upstream: critical depth
  - Downstream: normal depth based on a slope of 0.0303 ft/ft during low tide
  - Downstream: MHW elevation during high tide
- Mixed flow regime

Three different models were developed and eight different scenarios were run. Following is a list of each scenario as designated in HEC-RAS:

1. Existing bridge with typical flow during low tide
2. Existing bridge with typical flow during high tide
3. Existing bridge with peak flows during low tide
4. Existing bridge with peak flows during high tide
5. Proposed culvert with peak flows during low tide
6. Proposed culvert with peak flows during high tide
7. Proposed bridge with peak flows during low tide
8. Proposed bridge with peak flows during high tide

The existing bridge was modeled and run with typical flows in order to calibrate the model based on data from field observations. Once the model was calibrated, peak flows were run through the existing structure and proposed structures for comparison. The upstream boundary condition was set to critical depth. Normal depth would not have been appropriate here because of the lack of survey and the amount of pools in the streambed making it difficult to define an average stream slope. The downstream boundary conditions were set differently depending on the tide. Maximum velocities of the stream are anticipated at low tide and maximum headwater elevations are anticipated at high tide. Results show that there was actually little to no effect from the tide level due to the fact that at MHW, tide water does not quite reach the bridge and there is enough stream length to negate the effect from the tide.

Following is a list of assumptions made for the proposed structures. In both options, the existing road was raised two feet at its lowest point to prevent future road overtopping from record tide levels and brook flooding. The cross sections through the road crossing in HEC-RAS were adjusted to account for this profile change.

- Culvert
  - Concrete box with a skewed, chamfered inlet and flared wingwalls
  - Manning's "n" = 0.011 on the sides and top, 0.025 on the bottom
  - Level and buried 1'-0"
  - Entrance loss coefficient = 0.5
  - Exit loss coefficient = 1.0

- Bridge
  - 38'-0" single span
  - 21" voided slab superstructure with 3" of pavement
  - 1.75:1 embankment in front of abutments down to streambed
  - Channel cross section was opened up through the bridge structure to account for removal of deposited sand and placement of the riprap embankments

Headwater elevations and stream velocities are reported in the table below for peak flows for each of the three structures. The results shown are exactly the same for low and high tide boundary conditions for the two bridge structures. The culvert structure has slightly different velocities at low and high tide; therefore, the worse case is shown below. Note that the velocities are reported from the second cross section downstream from each structure because this is where velocities are typically at a maximum due to a transition in flow from subcritical to supercritical.

The preliminary culvert size was governed by stream velocity. The first culvert analyzed was a 20' x 6' box which resulted in velocities near 18 fps. The goal was to try and get velocities near 15 fps which led to a proposed box culvert size of 26' x 6'. The opening was then changed to 7 feet tall to allow more vertical clearance in case of sand buildup in front of the culvert. The bankfull width of the channel is approximately 13 feet; therefore, the 26 foot wide box culvert satisfies the criteria of providing 1.2 times bankfull width per Maine PGP.

Initially, the proposed bridge structure was analyzed assuming the streambed cross section through the bridge would be returned to existing conditions; however, the existing bridge opening is partially blocked by sand deposits. Since the span length will be increased and new riprap side-slopes will be constructed, the sand deposits will be removed during construction and not be replaced. Furthermore, the calculated velocities were high assuming the streambed cross section through the bridge was returned to existing conditions; therefore, the goal was to remove the sand deposits and widen the opening to decrease the velocities. If sand is carried into the bridge opening in the future, it is assumed that during peak flows, the sand will be washed away and the opening returned to normal.

SUMMARY

		Existing Structure	Proposed Culvert	Proposed Bridge
Unit		19' Span	26' Span x 7' Rise Concrete Box	38' Span
	Area of Opening (s.f.)	64.34	156.00	138.63
	Headwater El. Q1.1	5.80	4.67	5.30
	Headwater El. Q10	7.66	6.35	6.75
ft	Headwater El. Q25	8.06	6.72	7.11
	Headwater El. Q50	8.50	6.97	7.43
	Headwater El. Q100	9.99	7.22	7.69
	Headwater El. Q500	10.94	7.72	8.54
	Freeboard (or HW/D)			
	@ Q50	0.77'	0.83	4.78'
	@ Q100	0.00'	0.87	4.52'
	Discharge Vel. Q1.1	7.44	6.40	4.93
	Discharge Vel. Q10	13.00	10.58	7.48
ft/s	Discharge Vel. Q25	14.18	11.34	7.96
	Discharge Vel. Q50	15.13	11.83	8.30
	Discharge Vel. Q100	16.11	12.30	8.78
	Discharge Vel. Q500	19.08	14.28	11.97

*Elevations based on NAVD

The proposed culvert would have heavy riprap on the upstream and downstream side-slopes in order to protect against erosion from road surface runoff, stream flood water, and tidal surges. Heavy riprap aprons and deep toe walls would be used on the upstream and downstream ends of the proposed culvert as well to protect against undermining of the culvert.

The proposed bridge would have heavy riprap embankments in front of each abutment with the toe extending partially into the streambed to protect against abutment scour and streambed erosion.

Reported by: Richard E. Myers
Date: May 20, 2010

Note: Supporting calculations for Manning's "n" and output from HEC-RAS is provided in the appendix of this Preliminary Design Report.

APPENDIX D

Hydrology and Hydraulics
Data

Project Name:	Stanley Brook	**PIN:**	16718
Stream Name:	Stanley Brook	**Town:**	Mt Desert
Bridge Name:	Stanley Brook	**Bridge No.**	5570
Route No.	SR 3	**USGS Quad:**	
Analysis by:	CSH	**Date:**	2/2/2010

Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999)

Enter data in blue cells only!

	km^2	mi^2	ac	***Enter data in [mi^2]***
A	3.93	1.517	971.1	Watershed Area
W	0.07	0.026	16.6	Wetlands area (by NWI)
P_c	560500	4906750		watershed centroid (E, N; UTM 19N; meters)
County	Hancock			*choose county from drop-down menu*
pptA	45.2			mean annual precipitation (inches; by look-up)
SG	0.00			sand & gravel aquifer as decimal fraction of watershed A

Worksheet prepared by:
Charles S. Hebson, PE
Chief Hydrologist
Maine Dept. Transportation
Augusta, ME 04333-0016
207-287-1105
Charles.Hebson@maine.gov

A (km^2)	3.93
W (%)	1.71

Conf Lvl 0.67

Ret Pd	Peak Flow Estimate			
T (yr)	Lower	Q_T (m^3/s)	Upper	Q_T (ft^3/s)
1.1		1.29		45.5
2	2.17	3.09	4.40	109.1
5	3.73	5.35	7.68	189.0
10	4.94	7.16	10.38	252.8
25	6.61	9.75	14.39	344.3
50	7.95	11.89	17.79	419.8
100	9.37	14.22	21.59	502.2
500	12.91	20.33	32.02	718.0

Reference:

Hodgkins, G., 1999.
Estimating the magnitude of peak flows for streams in Maine for selected recurrence intervals
Water-Resources Investigations Report 99-4008
US Geological Survey, Augusta, Maine

$Q_T = b \times A^a \times 10^{-wW}$

Mar 19 2010 13:31

ELEVATIONS ON STATION DATUM
National Ocean Service (NOAA)

Station: 8413320
Name: BAR HARBOR, FRENCHMAN BAY, ME
Status: Accepted

T.M.: 0 W
Units: Feet
Epoch: 1983-2001

Datum	Value	Description
MHHW	14.84	Mean Higher-High Water
MHW	14.42	Mean High Water
DTL	9.16	Mean Diurnal Tide Level
MTL	9.13	Mean Tide Level
MSL	9.14	Mean Sea Level
MLW	3.85	Mean Low Water
MLLW	3.47	Mean Lower-Low Water
GT	11.37	Great Diurnal Range
MN	10.56	Mean Range of Tide
DHQ	0.43	Mean Diurnal High Water Inequality
DLQ	0.38	Mean Diurnal Low Water Inequality
HWI	3.29	Greenwich High Water Interval (in Hours)
LWI	9.51	Greenwich Low Water Interval (in Hours)
NAVD	9.45	North American Vertical Datum
Maximum	19.68	Highest Water Level on Station Datum
Max Date	19780207	Date Of Highest Water Level
Max Time	00:00	Time Of Highest Water Level
Minimum	0.93	Lowest Water Level on Station Datum
Min Date	19840120	Date Of Lowest Water Level
Min Time	18:12	Time Of Lowest Water Level

To refer Water Level Heights to a Tidal Datum, apply the desired Datum Value.

Click HERE for further station information including New Epoch products.

Richard Fontaine
Glenn Hodgkins

COASTAL FLOOD OF FEBRUARY 7, 1978 IN MAINE, MASSACHUSETTS, AND NEW HAMPSHIRE

U. S. GEOLOGICAL SURVEY

WATER - RESOURCES INVESTIGATIONS 79-61

PREPARED IN COOPERATION WITH THE
U. S. ARMY CORPS OF ENGINEERS AND THE
MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

Table I.—Flood data in Maine, New Hampshire, and Massachusetts (Continued)

Site No.	Elevation (ft)	Description
9	9.97	Lat 44°37'10", long 67°48'35", Harrington, Maine, good ice line marked by a USGS high-water-mark disk (elev 11.39 ft) in northwest side of office building on right side of door casing on rear door, about 3 in above sill. Building is located on Water Street between street and small stream about 100 ft below second culvert on right bank. Tidal surge.
10	9.70	Lat 44°35'48", long 67°55'34", Cherryfield, Maine, excellent ice and debris line marked by a USGS high-water-mark disk (elev 10.48 ft) in base of triple elm on right bank of Narraguagus River about 150 ft downstream from U.S. Route 1 bridge and across road from Tracy's Motel on left bank of small brook. Tidal surge.
11	10.10	Lat 44°31'53", long 67°52'58", Milbridge, Maine, junction of U.S. Route 1 and Wyman Road, excellent wet line in barn transferred to a USGS high-water-mark disk (elev 9.91 ft) in southeast corner of storage barn (attachment to main barn) across road from Wyman Canning Co. office. Tidal surge.
12	9.91	Lat 44°23'36", long 68°05'08", Winter Harbor, Maine; 0.1 mi west of State Route 186 in Henry Cove, good debris line marked by a USGS high-water-mark disk (elev 9.57 ft) in northwest corner of 20- by 20-ft shed across road from town garage, just west and across road from gas station. Tidal surge.
13	9.54	Lat 44°16'31", long 68°18'47", Southwest Harbor, Maine, good ice line marked by a USGS high-water-mark disk (elev 8.23 ft) in top timber curb of U.S. Coast Guard pier. Marker is just right of the most right-hand parking space for U.S. Coast Guard Cutter Brindle, just below concrete deck of pier. Tidal surge.
14	11.53	Lat 44°32'25", long 68°25'34", Ellsworth, Maine, on Water Street on left bank of Union River, about 0.1 mi downstream from U.S. Route 1, excellent debris and wash line marked by a USGS high-water-mark disk (elev 10.90 ft) in base of elm tree behind body shop of Morrison Chevrolet. Tidal surge.
15	11.42	Lat 44°24'47", long 68°35'14", Blue Hill, Maine, on left downstream side of Mill Stream, about 100 ft below culvert on State Route 176, excellent wet line in building transferred to a nail (elev 9.42 ft) driven in side of shop building of Babson and Duffy Plumbing and Heating, located 2 ft from left side of door as you enter building; oil slick on third clapboard from bottom of building. Tidal surge.

NGVD of '29

STANLEY BROOK BRIDGE - MOUNT DESERT BR. # 5570

NOTES: <u>FLOOD INSURANCE STUDY</u>

TOWN OF MOUNT DESERT

AUG. 2, 1990

- PRINCIPAL FLOOD **PROBLEMS**: COASTAL FLOODING FROM COASTAL STORMS + HURRICANES.

- THERE ARE NO KNOWN SEVERE INLAND OR COASTAL FLOODING PROBLEMS i.e., DEVELOPMENT HAS BEEN MOSTLY ABOVE THE STORM TIDE LEVELS. THE ONLY OBJECTS TAKING DAMAGE FROM COASTAL STORMS ARE BOATS, SHORELINE PROTECTION, & MARINAS.

- SHORELINE EROSION HOWEVER IS A CONCERN

- THE STORM TIDE OF RECORD IN THE VICINITY OF THE TOWN WAS RECORDED ON MARCH 16, 1976. AT THE NATIONAL OCEAN SERVICE (NOS) TIDE GAGE IN BAR HARBOR; elevation WAS 10.3'. THE SECOND HIGHEST READING WAS 10' RECORDED ON APRIL 5, 1977. THESE CORRESPOND TO A RETURN PERIOD OF 40 & 20 YEARS RESPECTIVELY. THESE ELEVATIONS ONLY REPRESENT STILLWATER LEVELS OF THE OCEAN AND DO NOT INCLUDE WAVE EFFECTS.

- SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN :	10-yr	50-yr	100-yr.	500-yr
(ENTIRE COMMUNITY)	9.6'	10.4'	10.7'	11.5'

- AGAIN, STILLWATER ELEVATIONS DO NOT INCLUDE WAVE EFFECTS. THEREFORE, TO DETERMINE A WAVE ELEVATION, i.e. "WAVE RUNUP", A METHODOLOGY DEVELOPED BY STONE AND WEBSTER ENGINEERING CORP. (SWEC) FOR FEMA WAS USED. RESULTS ARE PROVIDED AS A MAXIMUM WAVE ELEVATION FOR 100-yr EVENTS.

- SEAL HARBOR FALLS RIGHT ON A TRANSECT WHERE WAVE CALCS WERE PERFORMED. RESULTS:

STILLWATER 100-yr ELEV.	MAXIMUM WAVE-ELEV. 100 yr.
10.7' (NGVD)	14' (NGVD)

PRELIM. BY REM DATE 3/29/10 PROJ. NO. 16718.00 FILE NO. ____ OF ____
FINAL CHK. BY ____ DATE ____ LOCATION MOUNT DESERT SH. NO. ____ OF ____
ITEM NO. ____ SUBJECT MANNING'S "n"

MANNING'S "n" DETERMINATION

• CHANNEL

SAND CHANNEL (TAKEN FROM CHOW, 1964)

→ LOWER FLOW REGIME = 0.016

- ASSUMES 0.28 mm SAND

- ASSUMES PLANE BED ROUGHNESS

→ UPPER FLOW REGIME = 0.016

- ASSUMES 0.28 mm SAND

- ASSUMES SOME ANTIDUNES

- RANGE IS 0.014 - 0.022 ∴ ASSUME 0.016 FOR SIMPLICITY

→ FOLLOWING PROCEDURE IN USGS PAPER 2339;

$n = (n_b + n_1 + n_2 + n_3 + n_4)m$

n_b = BASE VALUE FOR STRAIGHT, UNIFORM, SMOOTH CHANNEL

→ IF ASSUME 0.28 mm SAND, n_b = 0.016 (TABLE 1)

n_1 = ADJUSTMENT FOR CHANNEL IRREGULARITIES

→ KNOWING DEPTH OF FLOW IS TYPICALLY SHALLOW, WHICH INCREASES EFFECT OF ROUGHNESS...

→ AND IRREGULARITIES ARE MINOR (n_1 = 0.001 - 0.005)

→ USE n_1 = 0.004

n_2 = ADJUSTMENT FOR VARIATIONS BETWEEN CROSS SECTIONS

PRELIM. BY REM DATE 3/30/10 PROJ. NO. 016718.00 FILE NO. ___ OF ___
FINAL CHK. BY ___ DATE ___ LOCATION MT. DESERT SH. NO. ___ OF ___
ITEM NO. ___ SUBJECT MANNING'S "n"

→ ASSUME CHANGES TO THE CHANNEL SHAPE & LOCATION ARE NEGLIGIBLE

→ $n_2 = 0$

n_3 = ADJUSTMENT FOR OBSTRUCTIONS

→ THERE ARE NO OBSTRUCTIONS OTHER THAN THE BRIDGE WHICH WILL BE ACCOUNTED FOR WITH EXPANSION & CONTRACTION

→ $n_3 = 0$

n_4 = ADJUSTMENT FOR VEGETATION

→ NO VEGETATION IN MAIN CHANNEL TYPICALLY, ONLY IN THE FLOODPLAIN

→ $n_4 = 0$

m = MEANDERING ADJUSTMENT

→ NEGLECT DUE TO MINOR MEANDERING

∴ $n_c = 0.016 + 0.004$

$n_c = 0.020$

- FLOODPLAIN

THERE ARE SEVERAL DIFFERENT SURFACES IN THE FLOODPLAIN

① TALL GRASS AND WEEDS, SMALL BUSHES, FEW OBSTRUCTIONS

② LARGE DENSE BUSHES, SOME TREES

③ MOWED LAWN, SOME OBSTRUCTIONS, SCATTERED TREES

④ PAVEMENT & GRAVEL ROAD, PARKING LOT

⑤ SANDY BEACH, FEW VEGETATION & OBSTRUCTIONS

⑥ SANDY BEACH, THICK BRUSH, DUNE

PRELIM. BY REM DATE 3/30/10 PROJ. NO. 16718.00 FILE NO. ____ OF ____
FINAL CHK. BY ______ DATE ______ LOCATION MT. DESERT SH. NO. ____ OF ____
ITEM NO. ______ SUBJECT MANNING'S "n"

USE PROCEDURE FROM USGS PAPER 2339

$n = (n_b + n_1 + n_2 + n_3 + n_4)\,m$

n_2 → NEGLECT; m → NEGLECT

n_b = 0.016 FOR SAND
= 0.025 FIRM SOIL

① n_1 = 0.002 ; MINOR SURFACE IRREGULARITIES
n_3 = 0.002 ; 1 STUMP, MAYBE A BIT MORE DEBRIS
n_4 = 0.011 ; RANGE IS 0.010 - 0.025, CONSIDERING THAT VELOCITY IS CRITICAL HERE, USE THE LOWER END.

n = 0.025 + 0.002 + 0.002 + 0.011
n = 0.040

CORRESPONDS WELL W/ HYDRAULIC TEXT

② n_1 = 0.005 ; MINOR SURFACE IRREGULARITIES, BUT A BIT MORE THAN ①
n_3 = 0.004 ; FEW OBSTRUCTIONS, ACCOUNTS FOR POSSIBILITY OF DEBRIS & EXPOSED ROOTS
n_4 = 0.026 ; MEDIUM TO LARGE
n = 0.025 + 0.005 + 0.004 + 0.025
n = 0.060

CORRESPONDS WELL W/ HYDRAULIC TEXT

③ n_1 = 0.002 ; MINOR SURFACE IRREGULARITIES
n_3 = 0.005 ; TREES & LANDSCAPE BOULDERS GIVE SOME OBSTRUCTIONS
n_4 = 0.005 ; MOWED LAWN, ∴ SHORT GRASS

PRELIM. BY REM DATE 3/30/10 PROJ. NO. 16718.00 FILE NO. ____ OF ____
FINAL CHK. BY ____ DATE ____ LOCATION MT. DESERT SH. NO. ____ OF ____
ITEM NO. ____ SUBJECT MANNING'S "n"

$n = 0.025 + 0.002 + 0.005 + 0.005$

$n = 0.037$

CORRESPONDS OK W/ HYDRAULIC TEXT

(4) $n = 0.015$; TAKEN FROM HYDRAULIC TEXT, SOMEWHERE BETWEEN SMOOTH & ROUGH ASPHALT

(5) $n_1 = 0.000$; FLAT BEACH

$n_3 = 0.004$; DECENT AMOUNT OF SMALL DEBRIS SUCH AS SEAWEED

$n_4 = 0.000$; NO VEGETATION

$n = 0.016 + 0.004$

$n = 0.020$

(6) $n_1 = 0.005$; FEW RISES & DIPS, SAND DUNES

$n_3 = 0.002$; FEW OBSTRUCTIONS

$n_4 = 0.015$; DENSE BRUSH, MEDIUM

$n = 0.016 + 0.005 + 0.002 + 0.015$

$n = 0.038$

SUMMARY

CHANNEL, n_c 0.020

FLOODPLAIN, n

(1)	0.040
(2)	0.060
(3)	0.037
(4)	0.015
(5)	0.020
(6)	0.038

PRELIM. BY REM DATE 4/26/10 PROJ. NO. 16718.00 FILE NO. ____ OF ____
FINAL CHK. BY ____ DATE ____ LOCATION MT. DESERT SH. NO. ____ OF ____
ITEM NO. ____ SUBJECT MANNING'S "n"

→ CALIBRATION AFTER SEVERAL RUNS THROUGH HEC-RAS

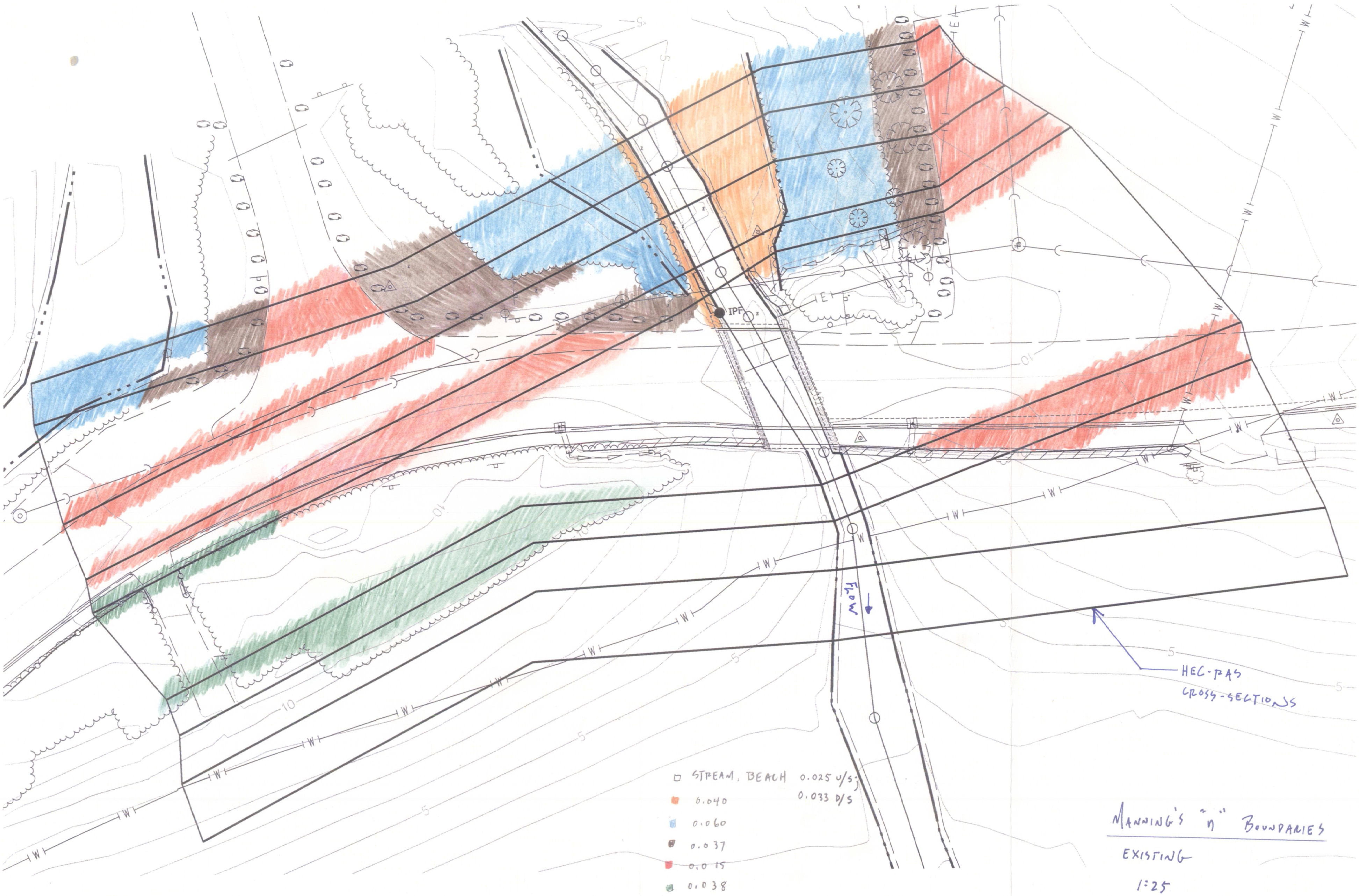
① CHANGED UPSTREAM CHANNEL "n" TO 0.025 TO PROVIDE A BIT MORE FRICTION & ACCOUNT FOR A SLIGHTLY ROUGHER STREAMBED.

② CHANGED DOWNSTREAM CHANNEL & IMMEDIATE BANKS "n" TO 0.033 TO PROVIDE MORE FRICTION & ACCOUNT FOR A ROUGHER SURFACE.

→ CLOSE TO WATER, LEFT OVERBANKS @ 0.02 WHERE IT IS MOSTLY SAND ONLY

→ RECALIBRATION

① CHANGED n = 0.020 TO n = 0.033 IN LOCATIONS D/S TO DECREASE DRAMATICAL CHANGES B/T CROSS SECTIONS. THERE WAS ACTUALLY NO EFFECT TO RESULTS.


IPF
FLOW
HEC-RAS
CROSS-SECTIONS
STREAM, BEACH 0.025 U/S; 0.033 D/S
0.040
0.060
0.037
0.015
0.038
MANNING'S "n" BOUNDARIES
EXISTING
1:25

Existing Bridge

HEC-RAS Plan: P3 River: Stanley Brook Reach: Stanley Brook

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Hydr Depth C
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
Stanley Brook	250.0000	Q1.1	45.50	3.68	5.84	4.48	5.87	0.000273	1.59	35.03	45.13	0.20	2.07
Stanley Brook	250.0000	Q10	252.80	3.68	7.99	6.20	8.07	0.000319	2.77	170.69	97.44	0.24	4.22
Stanley Brook	250.0000	Q25	344.30	3.68	8.60	6.56	8.68	0.000310	2.99	234.42	129.14	0.24	4.83
Stanley Brook	250.0000	Q50	419.80	3.68	9.18	6.78	9.25	0.000245	2.87	342.39	216.94	0.22	5.41
Stanley Brook	250.0000	Q100	502.20	3.68	10.02	7.02	10.06	0.000138	2.37	547.43	261.50	0.17	6.25
Stanley Brook	250.0000	Q500	718.00	3.68	10.95	7.53	10.98	0.000108	2.29	793.19	268.14	0.15	7.18
Stanley Brook	237.6875	Q1.1	45.50	3.74	5.81	4.75	5.87	0.000512	2.00	26.65	33.56	0.26	1.81
Stanley Brook	237.6875	Q10	252.80	3.74	7.97	6.45	8.07	0.000441	3.13	146.19	79.10	0.28	3.97
Stanley Brook	237.6875	Q25	344.30	3.74	8.57	6.76	8.67	0.000421	3.36	200.46	101.65	0.28	4.57
Stanley Brook	237.6875	Q50	419.80	3.74	9.16	6.99	9.24	0.000339	3.26	279.11	168.46	0.25	5.16
Stanley Brook	237.6875	Q100	502.20	3.74	10.01	7.23	10.06	0.000183	2.65	476.26	261.47	0.19	6.01
Stanley Brook	237.6875	Q500	718.00	3.74	10.94	7.72	10.98	0.000128	2.45	724.13	268.63	0.16	6.94
Stanley Brook	225.0015	Q1.1	45.50	3.85	5.81	4.67	5.86	0.000406	1.81	28.23	28.19	0.23	1.86
Stanley Brook	225.0015	Q10	252.80	3.85	7.95	6.35	8.06	0.000469	3.24	129.78	64.33	0.29	4.00
Stanley Brook	225.0015	Q25	344.30	3.85	8.54	6.72	8.67	0.000471	3.56	171.91	79.14	0.29	4.59
Stanley Brook	225.0015	Q50	419.80	3.85	9.12	6.97	9.24	0.000397	3.54	231.05	120.26	0.27	5.17
Stanley Brook	225.0015	Q100	502.20	3.85	9.99	7.22	10.05	0.000206	2.83	396.14	246.56	0.20	6.04
Stanley Brook	225.0015	Q500	718.00	3.85	10.94	7.72	10.97	0.000111	2.29	648.45	275.99	0.15	6.99
Stanley Brook	208.0015	Q1.1	45.50	3.21	5.82	4.16	5.85	0.000189	1.46	35.11	17.02	0.17	2.40
Stanley Brook	208.0015	Q10	252.80	3.21	7.90	5.70	8.05	0.000478	3.53	114.51	53.82	0.29	4.47
Stanley Brook	208.0015	Q25	344.30	3.21	8.47	6.25	8.65	0.000519	3.98	147.46	62.21	0.31	5.05
Stanley Brook	208.0015	Q50	419.80	3.21	9.05	6.88	9.22	0.000464	4.05	192.42	127.68	0.30	5.62
Stanley Brook	208.0015	Q100	502.20	3.21	9.99	7.20	10.05	0.000167	2.69	390.77	242.23	0.18	6.57
Stanley Brook	208.0015	Q500	718.00	3.21	10.94	7.88	10.97	0.000086	2.12	630.94	265.11	0.14	7.52
Stanley Brook	200.0000	Q1.1	45.50	3.64	5.80	4.51	5.85	0.000343	1.78	28.50	16.15	0.22	2.05
Stanley Brook	200.0000	Q10	252.80	3.64	7.66	6.07	8.02	0.001169	5.04	56.26	46.49	0.45	3.91
Stanley Brook	200.0000	Q25	344.30	3.64	8.06	6.57	8.61	0.001561	6.22	62.21	49.47	0.53	4.31
Stanley Brook	200.0000	Q50	419.80	3.64	8.50	6.95	9.17	0.001667	6.86	68.80	60.13	0.55	4.75
Stanley Brook	200.0000	Q100	502.20	3.64	9.99	7.34	10.04	0.000179	2.69	396.61	261.32	0.19	6.24
Stanley Brook	200.0000	Q500	718.00	3.64	10.94	9.39	10.97	0.000090	2.10	658.63	289.23	0.14	7.19
Stanley Brook	183		Bridge										
Stanley Brook	135.0013	Q1.1	45.50	4.22	5.28	5.28	5.69	0.014319	5.38	9.28	15.81	0.95	1.00
Stanley Brook	135.0013	Q10	252.80	4.22	7.00	7.00	7.81	0.008747	8.20	37.92	47.77	0.88	2.72
Stanley Brook	135.0013	Q25	344.30	4.22	7.37	7.37	8.36	0.009123	9.12	45.68	54.81	0.91	3.09
Stanley Brook	135.0013	Q50	419.80	4.22	7.65	7.65	8.78	0.009214	9.71	51.64	60.23	0.93	3.37
Stanley Brook	135.0013	Q100	502.20	4.22	7.94	7.94	9.22	0.009221	10.27	57.77	64.49	0.95	3.66
Stanley Brook	135.0013	Q500	718.00	4.22	7.95	8.62	10.53	0.018647	14.63	57.96	64.60	1.35	3.67
Stanley Brook	124.0013	Q1.1	45.50	3.96	4.60	4.85	5.37	0.053893	7.44	6.77	14.20	1.69	0.60
Stanley Brook	124.0013	Q10	252.80	3.96	5.48	6.17	7.50	0.049479	13.00	24.34	26.06	1.88	1.48
Stanley Brook	124.0013	Q25	344.30	3.96	5.73	6.50	8.03	0.048003	14.18	31.11	29.55	1.90	1.72
Stanley Brook	124.0013	Q50	419.80	3.96	5.91	6.72	8.45	0.047908	15.13	36.74	33.80	1.93	1.90
Stanley Brook	124.0013	Q100	502.20	3.96	6.06	6.91	8.86	0.048832	16.11	42.43	38.19	1.98	2.06
Stanley Brook	124.0013	Q500	718.00	3.96	6.31	7.40	10.08	0.058837	19.08	52.76	44.67	2.21	2.31
Stanley Brook	108.9979	Q1.1	45.50	3.56	4.19	4.27	4.58	0.025992	5.29	9.48	19.01	1.18	0.62
Stanley Brook	108.9979	Q10	252.80	3.56	4.95	5.41	6.37	0.037321	10.79	28.78	32.13	1.62	1.38
Stanley Brook	108.9979	Q25	344.30	3.56	5.17	5.74	6.86	0.037879	12.01	36.58	38.00	1.67	1.60
Stanley Brook	108.9979	Q50	419.80	3.56	5.31	5.94	7.22	0.039139	12.92	42.27	41.75	1.72	1.75
Stanley Brook	108.9979	Q100	502.20	3.56	5.45	6.13	7.58	0.040430	13.79	48.11	45.30	1.77	1.88
Stanley Brook	108.9979	Q500	718.00	3.56	5.70	6.55	8.48	0.046283	16.08	60.79	52.59	1.94	2.14
Stanley Brook	88.9979	Q1.1	45.50	2.82	3.34	3.49	3.83	0.055907	5.80	8.26	23.31	1.61	0.40
Stanley Brook	88.9979	Q10	252.80	2.82	3.99	4.53	5.50	0.051981	10.65	27.30	35.75	1.83	1.06
Stanley Brook	88.9979	Q25	344.30	2.82	4.18	4.76	5.99	0.051281	11.82	34.67	42.14	1.86	1.25
Stanley Brook	88.9979	Q50	419.80	2.82	4.31	4.95	6.33	0.051176	12.62	40.53	47.09	1.89	1.38
Stanley Brook	88.9979	Q100	502.20	2.82	4.43	5.14	6.67	0.051984	13.44	46.42	51.59	1.94	1.50
Stanley Brook	88.9979	Q500	718.00	2.82	4.67	5.51	7.47	0.056071	15.42	59.76	59.16	2.06	1.74

Proposed Culvert
Low Tide

HEC-RAS Plan: P10 River: Stanley Brook Reach: Stanley Brook

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Hydr Depth C
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
Stanley Brook	250.0000	Q1.1	45.50	3.68	5.09	4.48	5.19	0.001269	2.54	18.98	15.50	0.39	1.32
Stanley Brook	250.0000	Q10	252.80	3.68	6.92	6.20	7.16	0.001228	4.48	91.81	59.27	0.44	3.15
Stanley Brook	250.0000	Q25	344.30	3.68	7.34	6.56	7.62	0.001286	4.98	117.88	67.45	0.46	3.57
Stanley Brook	250.0000	Q50	419.80	3.68	7.63	6.78	7.94	0.001333	5.34	139.30	78.77	0.48	3.86
Stanley Brook	250.0000	Q100	502.20	3.68	7.93	7.02	8.26	0.001363	5.67	164.08	94.86	0.49	4.16
Stanley Brook	250.0000	Q500	718.00	3.68	8.62	7.53	8.98	0.001316	6.18	237.91	136.57	0.49	4.85
Stanley Brook	237.6875	Q1.1	45.50	3.74	4.86	4.75	5.14	0.006327	4.28	11.20	13.77	0.81	0.86
Stanley Brook	237.6875	Q10	252.80	3.74	6.68	6.45	7.12	0.002721	5.98	66.07	51.45	0.64	2.68
Stanley Brook	237.6875	Q25	344.30	3.74	7.15	6.76	7.58	0.002395	6.24	91.30	57.50	0.62	3.15
Stanley Brook	237.6875	Q50	419.80	3.74	7.45	6.99	7.90	0.002326	6.54	109.35	62.42	0.62	3.45
Stanley Brook	237.6875	Q100	502.20	3.74	7.74	7.23	8.22	0.002293	6.86	128.99	71.79	0.62	3.74
Stanley Brook	237.6875	Q500	718.00	3.74	8.45	7.72	8.95	0.002086	7.34	188.33	97.17	0.61	4.45
Stanley Brook	225.0015	Q1.1	45.50	3.85	4.67	4.67	5.02	0.010211	4.81	9.77	14.33	1.00	0.72
Stanley Brook	225.0015	Q10	252.80	3.85	6.35	6.35	7.05	0.004457	7.12	48.28	41.66	0.81	2.40
Stanley Brook	225.0015	Q25	344.30	3.85	6.72	6.72	7.50	0.004452	7.81	64.26	46.52	0.83	2.77
Stanley Brook	225.0015	Q50	419.80	3.85	6.97	6.97	7.82	0.004495	8.32	76.27	49.29	0.84	3.02
Stanley Brook	225.0015	Q100	502.20	3.85	7.22	7.22	8.14	0.004472	8.76	89.25	52.12	0.85	3.27
Stanley Brook	225.0015	Q500	718.00	3.85	7.72	7.72	8.85	0.004870	10.04	116.39	56.48	0.91	3.77
Stanley Brook	183	Q1.1	45.50										
Stanley Brook	183	Q10	252.80										
Stanley Brook	183	Q25	344.30										
Stanley Brook	183	Q50	419.80										
Stanley Brook	183	Q100	502.20										
Stanley Brook	183	Q500	718.00										
Stanley Brook	108.9979	Q1.1	45.50	3.56	4.27	4.27	4.56	0.016753	4.60	11.03	20.11	0.97	0.70
Stanley Brook	108.9979	Q10	252.80	3.56	5.41	5.41	5.99	0.011207	7.16	46.43	44.30	0.93	1.84
Stanley Brook	108.9979	Q25	344.30	3.56	5.74	5.74	6.34	0.009858	7.50	62.67	53.54	0.90	2.17
Stanley Brook	108.9979	Q50	419.80	3.56	5.94	5.94	6.58	0.009611	7.87	74.17	59.13	0.90	2.38
Stanley Brook	108.9979	Q100	502.20	3.56	6.13	6.13	6.82	0.009508	8.24	86.00	64.51	0.91	2.57
Stanley Brook	108.9979	Q500	718.00	3.56	6.55	6.55	7.32	0.009292	9.00	115.39	76.26	0.92	2.99
Stanley Brook	88.9979	Q1.1	45.50	2.82	3.30	3.49	3.91	0.076814	6.40	7.45	22.78	1.86	0.37
Stanley Brook	88.9979	Q10	252.80	2.82	4.00	4.53	5.48	0.050852	10.58	27.51	35.87	1.81	1.06
Stanley Brook	88.9979	Q25	344.30	2.82	4.22	4.76	5.87	0.045248	11.34	36.40	43.66	1.76	1.29
Stanley Brook	88.9979	Q50	419.80	2.82	4.38	4.95	6.13	0.042204	11.83	43.74	49.59	1.73	1.45
Stanley Brook	88.9979	Q100	502.20	2.82	4.53	5.14	6.36	0.040084	12.30	51.46	55.03	1.72	1.59
Stanley Brook	88.9979	Q500	718.00	2.82	4.85	5.51	6.87	0.036950	13.36	70.89	65.92	1.70	1.92

Proposed Culvert
High Tide

HEC-RAS Plan: P11 River: Stanley Brook Reach: Stanley Brook

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Hydr Depth C
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)
Stanley Brook	250.0000	Q1.1	45.50	3.68	5.08	4.48	5.18	0.001283	2.55	18.91	15.49	0.39	1.31
Stanley Brook	250.0000	Q10	252.80	3.68	6.92	6.20	7.16	0.001228	4.48	91.81	59.27	0.44	3.15
Stanley Brook	250.0000	Q25	344.30	3.68	7.34	6.56	7.62	0.001286	4.98	117.88	67.45	0.46	3.57
Stanley Brook	250.0000	Q50	419.80	3.68	7.63	6.78	7.94	0.001333	5.34	139.30	78.77	0.48	3.86
Stanley Brook	250.0000	Q100	502.20	3.68	7.93	7.02	8.26	0.001363	5.67	164.08	94.86	0.49	4.16
Stanley Brook	250.0000	Q500	718.00	3.68	8.62	7.53	8.98	0.001316	6.18	237.91	136.57	0.49	4.85
Stanley Brook	237.6875	Q1.1	45.50	3.74	4.84	4.75	5.13	0.006771	4.37	10.97	13.74	0.84	0.84
Stanley Brook	237.6875	Q10	252.80	3.74	6.68	6.45	7.12	0.002721	5.98	66.07	51.45	0.64	2.68
Stanley Brook	237.6875	Q25	344.30	3.74	7.15	6.76	7.58	0.002395	6.24	91.30	57.50	0.62	3.15
Stanley Brook	237.6875	Q50	419.80	3.74	7.45	6.99	7.90	0.002326	6.54	109.35	62.42	0.62	3.45
Stanley Brook	237.6875	Q100	502.20	3.74	7.74	7.23	8.22	0.002293	6.86	128.99	71.79	0.62	3.74
Stanley Brook	237.6875	Q500	718.00	3.74	8.45	7.72	8.95	0.002086	7.34	188.33	97.17	0.61	4.45
Stanley Brook	225.0015	Q1.1	45.50	3.85	4.67	4.67	5.02	0.010211	4.81	9.77	14.33	1.00	0.72
Stanley Brook	225.0015	Q10	252.80	3.85	6.35	6.35	7.05	0.004457	7.12	48.28	41.66	0.81	2.40
Stanley Brook	225.0015	Q25	344.30	3.85	6.72	6.72	7.50	0.004452	7.81	64.26	46.52	0.83	2.77
Stanley Brook	225.0015	Q50	419.80	3.85	6.97	6.97	7.82	0.004495	8.32	76.27	49.29	0.84	3.02
Stanley Brook	225.0015	Q100	502.20	3.85	7.22	7.22	8.14	0.004472	8.76	89.25	52.12	0.85	3.27
Stanley Brook	225.0015	Q500	718.00	3.85	7.72	7.72	8.85	0.004870	10.04	116.39	56.48	0.91	3.77
Stanley Brook	183	Q1.1	45.50										
Stanley Brook	183	Q10	252.80										
Stanley Brook	183	Q25	344.30										
Stanley Brook	183	Q50	419.80										
Stanley Brook	183	Q100	502.20										
Stanley Brook	183	Q500	718.00										
Stanley Brook	108.9979	Q1.1	45.50	3.56	4.73	4.27	4.81	0.002388	2.44	22.33	28.32	0.40	1.17
Stanley Brook	108.9979	Q10	252.80	3.56	5.41	5.41	5.99	0.011207	7.16	46.43	44.30	0.93	1.84
Stanley Brook	108.9979	Q25	344.30	3.56	5.74	5.74	6.34	0.009858	7.50	62.67	53.54	0.90	2.17
Stanley Brook	108.9979	Q50	419.80	3.56	5.94	5.94	6.58	0.009611	7.87	74.17	59.13	0.90	2.38
Stanley Brook	108.9979	Q100	502.20	3.56	6.13	6.13	6.82	0.009508	8.24	86.00	64.51	0.91	2.57
Stanley Brook	108.9979	Q500	718.00	3.56	6.55	6.55	7.32	0.009292	9.00	115.39	76.26	0.92	2.99
Stanley Brook	88.9979	Q1.1	45.50	2.82	4.77	3.49	4.78	0.000180	0.90	65.62	62.91	0.12	1.84
Stanley Brook	88.9979	Q10	252.80	2.82	4.77	4.53	5.06	0.005547	5.03	65.62	62.91	0.65	1.84
Stanley Brook	88.9979	Q25	344.30	2.82	4.77	4.76	5.31	0.010289	6.85	65.62	62.91	0.89	1.84
Stanley Brook	88.9979	Q50	419.80	2.82	4.77	4.95	5.57	0.015296	8.35	65.62	62.91	1.09	1.84
Stanley Brook	88.9979	Q100	502.20	2.82	4.77	5.14	5.92	0.021891	9.99	65.62	62.91	1.30	1.84
Stanley Brook	88.9979	Q500	718.00	2.82	4.77	5.51	7.12	0.044746	14.28	65.62	62.91	1.86	1.84

Proposed Bridge

HEC-RAS Plan: P7 River: Stanley Brook Reach: Stanley Brook

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Hydr Depth C (ft)
Stanley Brook	250.0000	Q1.1	45.50	3.68	5.38	4.48	5.44	0.000646	2.07	23.57	15.99	0.29	1.61
Stanley Brook	250.0000	Q10	252.80	3.68	7.05	6.20	7.25	0.001028	4.20	99.18	60.83	0.41	3.28
Stanley Brook	250.0000	Q25	344.30	3.68	7.52	6.56	7.75	0.001030	4.60	130.55	74.33	0.42	3.75
Stanley Brook	250.0000	Q50	419.80	3.68	7.91	6.78	8.14	0.000973	4.78	162.31	93.41	0.41	4.14
Stanley Brook	250.0000	Q100	502.20	3.68	8.27	7.02	8.51	0.000927	4.93	198.01	104.22	0.41	4.50
Stanley Brook	250.0000	Q500	718.00	3.68	9.27	7.53	9.46	0.000647	4.71	362.46	219.85	0.35	5.50
Stanley Brook	237.6875	Q1.1	45.50	3.74	5.31	4.75	5.43	0.001532	2.78	17.59	14.65	0.43	1.31
Stanley Brook	237.6875	Q10	252.80	3.74	6.90	6.45	7.22	0.001879	5.24	77.73	54.33	0.54	2.90
Stanley Brook	237.6875	Q25	344.30	3.74	7.41	6.76	7.73	0.001659	5.48	106.63	61.01	0.52	3.41
Stanley Brook	237.6875	Q50	419.80	3.74	7.81	6.99	8.12	0.001478	5.57	133.77	73.90	0.50	3.81
Stanley Brook	237.6875	Q100	502.20	3.74	8.17	7.23	8.48	0.001392	5.74	162.35	86.47	0.50	4.17
Stanley Brook	237.6875	Q500	718.00	3.74	9.19	7.72	9.44	0.000958	5.51	284.81	180.20	0.43	5.19
Stanley Brook	225.0015	Q1.1	45.50	3.85	5.31	4.67	5.40	0.001184	2.51	19.35	15.62	0.38	1.36
Stanley Brook	225.0015	Q10	252.80	3.85	6.82	6.35	7.19	0.002032	5.41	69.22	47.69	0.56	2.87
Stanley Brook	225.0015	Q25	344.30	3.85	7.30	6.72	7.69	0.001895	5.79	93.29	52.98	0.56	3.35
Stanley Brook	225.0015	Q50	419.80	3.85	7.70	6.97	8.09	0.001704	5.92	115.27	56.36	0.54	3.75
Stanley Brook	225.0015	Q100	502.20	3.85	8.03	7.22	8.45	0.001684	6.23	135.47	66.36	0.54	4.08
Stanley Brook	225.0015	Q500	718.00	3.85	9.04	7.72	9.41	0.001252	6.22	221.82	118.65	0.49	5.09
Stanley Brook	208.0015	Q1.1	45.50	3.21	5.33	4.16	5.38	0.000414	1.86	27.04	16.06	0.24	1.90
Stanley Brook	208.0015	Q10	252.80	3.21	6.71	5.70	7.15	0.001833	5.62	59.39	39.33	0.55	3.28
Stanley Brook	208.0015	Q25	344.30	3.21	7.05	6.25	7.64	0.002221	6.61	73.65	43.23	0.61	3.63
Stanley Brook	208.0015	Q50	419.80	3.21	7.39	6.88	8.03	0.002246	7.06	88.85	47.24	0.62	3.97
Stanley Brook	208.0015	Q100	502.20	3.21	7.66	7.20	8.39	0.002416	7.64	101.87	50.69	0.65	4.23
Stanley Brook	208.0015	Q500	718.00	3.21	8.66	7.88	9.35	0.001915	7.84	159.81	67.34	0.60	5.24
Stanley Brook	200.0000	Q1.1	45.50	4.15	5.30	4.75	5.37	0.001152	2.21	22.49	22.24	0.36	1.15
Stanley Brook	200.0000	Q10	252.80	4.15	6.75	5.97	7.11	0.002033	5.07	60.03	42.02	0.55	2.60
Stanley Brook	200.0000	Q25	344.30	4.15	7.11	6.36	7.59	0.002357	5.94	70.96	45.35	0.61	2.96
Stanley Brook	200.0000	Q50	419.80	4.15	7.43	6.71	7.99	0.002386	6.41	81.20	47.66	0.62	3.28
Stanley Brook	200.0000	Q100	502.20	4.15	7.69	6.98	8.35	0.002583	7.01	89.44	49.43	0.66	3.54
Stanley Brook	200.0000	Q500	718.00	4.15	8.54	7.63	9.32	0.002371	7.76	117.20	67.33	0.65	4.39
Stanley Brook	183		Bridge										
Stanley Brook	135.0013	Q1.1	45.50	4.15	5.18	4.72	5.25	0.002382	2.24	21.69	24.20	0.39	1.03
Stanley Brook	135.0013	Q10	252.80	4.15	6.58	5.87	6.85	0.003087	4.52	62.53	40.12	0.51	2.43
Stanley Brook	135.0013	Q25	344.30	4.15	6.82	6.18	7.23	0.003990	5.48	70.53	44.08	0.59	2.67
Stanley Brook	135.0013	Q50	419.80	4.15	6.94	6.42	7.48	0.005009	6.32	74.40	46.59	0.67	2.79
Stanley Brook	135.0013	Q100	502.20	4.15	6.17	6.66	7.90	0.024494	11.27	49.75	35.42	1.40	2.02
Stanley Brook	135.0013	Q500	718.00	4.15	6.56	7.23	8.82	0.025562	12.95	61.99	39.92	1.47	2.41
Stanley Brook	124.0013	Q1.1	45.50	3.96	4.85	4.85	5.17	0.014998	4.93	10.65	17.36	0.94	0.85
Stanley Brook	124.0013	Q10	252.80	3.96	6.17	6.17	6.76	0.009845	7.48	46.70	41.18	0.90	2.17
Stanley Brook	124.0013	Q25	344.30	3.96	6.50	6.50	7.14	0.009231	7.96	61.55	49.23	0.89	2.50
Stanley Brook	124.0013	Q50	419.80	3.96	6.72	6.72	7.39	0.008955	8.30	73.09	54.65	0.89	2.72
Stanley Brook	124.0013	Q100	502.20	3.96	6.91	6.91	7.64	0.009174	8.78	83.62	59.23	0.91	2.90
Stanley Brook	124.0013	Q500	718.00	3.96	6.99	7.40	8.33	0.016435	11.97	88.53	61.76	1.22	2.98
Stanley Brook	108.9979	Q1.1	45.50	3.56	4.09	4.27	4.68	0.048501	6.44	7.68	17.83	1.57	0.52
Stanley Brook	108.9979	Q10	252.80	3.56	4.99	5.41	6.30	0.033421	10.40	30.07	33.18	1.54	1.42
Stanley Brook	108.9979	Q25	344.30	3.56	5.26	5.74	6.68	0.029970	11.08	40.14	40.39	1.50	1.69
Stanley Brook	108.9979	Q50	419.80	3.56	5.44	5.94	6.94	0.028352	11.54	48.05	45.26	1.48	1.88
Stanley Brook	108.9979	Q100	502.20	3.56	5.62	6.13	7.18	0.026952	11.97	56.71	50.48	1.47	2.06
Stanley Brook	108.9979	Q500	718.00	3.56	5.98	6.55	7.75	0.026276	13.13	76.21	60.09	1.49	2.41
Stanley Brook	88.9979	Q1.1	45.50	2.82	3.39	3.49	3.77	0.037717	5.14	9.39	24.03	1.35	0.45
Stanley Brook	88.9979	Q10	252.80	2.82	4.00	4.53	5.48	0.050423	10.55	27.60	35.92	1.80	1.07
Stanley Brook	88.9979	Q25	344.30	2.82	4.21	4.76	5.92	0.047525	11.52	35.71	43.06	1.80	1.27
Stanley Brook	88.9979	Q50	419.80	2.82	4.35	4.95	6.20	0.045709	12.15	42.38	48.55	1.80	1.42
Stanley Brook	88.9979	Q100	502.20	2.82	4.49	5.14	6.47	0.044165	12.71	49.53	53.82	1.80	1.56
Stanley Brook	88.9979	Q500	718.00	2.82	4.79	5.51	7.05	0.042530	14.03	67.00	63.75	1.81	1.86

APPENDIX E

Miscellaneous

November 17, 2009
11:00 AM
Overcast, Chilly
40° F

Site Visit Notes

Mount Desert - Stanley Brook Bridge (#5570)

PIN 016718.00

Present: Rich Myers
Mike W.
Mike M.
Ron O.
Jim Vekasi - Acadia National Park, Chief of Maintenance
Bruce Connery - Acadia National Park, Fish Monitoring

- Fairly high tide at 11:00 AM

- Park gate at Stanley Road closes from 12/1 - 4/15

- Using park roads would be ok as far as the park is concerned if a proposal is given and accepted by them. However town would also need to be on board. Probably not going to happen though because clearance under a bridge on Stanley Road is 10'-4" worse case.

- No future road work is scheduled at this time.

- New stormwater system on Rt. 3 that is causing bank erosion upstream from the bridge was installed sometime in the early 90s

- Beach is occupied by approximately 300 people on a busy, summer afternoon.

- Adjacent parking lot is owned by the town.

- The "Village Improvement Association" is an independent town group that takes care of the beach. They rake the beach every morning?!

- Bruce recommended getting in touch with Joe Zylewski from UMaine (?). He is in charge of the fish monitoring system. (Got his contact info. from Ben Conden)

- Fish monitoring system is most likely going to be moved soon, approximately 20' upstream. Bruce will keep us updated on this matter.

- During big flood events, southwest area of beach floods (area of heavy brush) and stays flooded for several days after.

- August is the best month for working near the ocean (due to tide levels and frequency of storms?)

- Note that the park and beach stay very busy until about the 3rd week of October. There has been a lot of growth in the area over the past several years.

- See pictures: Water reaches as high as bottom of beams. Also noted that it reaches about 16” above tree stump upstream on overbank.

Phone Conversation

March, 2010

From: Rich Myers
MaineDOT

To: Dave Cole
MaineDOT
Bridge Manager

Subject: History of Stanley Brook Bridge in Mount Desert

- Discussed past maintenance issues:
    - When the fish monitoring system was installed, the downstream channel was bulldozed from its usual S-shape to a straight channel out to sea. This action is likely the cause of abutment scour that occurred in 2008 which was later repaired by our maintenance team.
    - There has been a little riprap work in the past as well.
    - Natural shape of downstream channel is the S-shape.
    - Dave did not think road overtops.

Phone Conversation

March 31, 2010

From: Rich Myers
Maine DOT

To: Bruce Connery
Wildlife Biologist
Acadia National Park
207-288-8726

Subject: Flood history of Stanley Brook Bridge, fish monitoring system, and detour options.

- Discussed typical water elevations of Stanley Brook:
  - Tidal influence stretches about 100 m upstream of bridge during normal tides and about 200 m potentially during really high, storm tides.
  - Beyond tidal influence, typical water depths are from 16"-18". Deep pools reach depths of 32"-40".
  - Within reach of tidal influence, stream depths are typically around 36"-48" during high tide and about 20" during low tide. During low tide, there is basically little effect to the water depth upstream of bridge.
  - Deep pools, particularly one about 60-70 m upstream of bridge, can get as deep as 60" during high tide. During low tide, the pool is around 36" deep. There are also some large, angular stones here as well indicating that the hole may be due to a previous structure.

- Discussed flood water elevations near the bridge due to Stanley Brook and coastal flooding:
  - After heavy rainfall and during high tide, the water depth reaches about 18" above eastern floodplain just upstream of bridge. This occurs about once or twice a year. In 2009 for example, it occurred in June and August.

- Discussed whether or not the road at the bridge has ever been overtopped with water:
  - He has never seen it overtop, but has heard that it has at least twice within the last year and a half.
  - When the road does overtop, he has heard that it is caused by a blockage of the bridge opening from sand being driven up the beach from strong tides. He said that the bridge opening can get blocked up to 80-90% with sand.

- Discussed whether or not the fish monitoring system has been moved:
  - The system has not been moved and they are essentially waiting to see what the plan is for the bridge project to determine the best course of action.

- Discussed potential detour options:
  - Stanley Brook Road has been used in the past, including during the winter. The National Park plowed the road during that time.

- Use of Jordan Pond Road will likely receive resistance from the locals as it has in the past.
- Fish work window: it may be possible to get data from Bruce proving that fish passage should not be an issue during the standard work window. The fish are usually further upstream by mid-July due to water temperature.

Myers, Richard E

From: Mann, Alexander
Sent: Monday, April 12, 2010 4:26 PM
To: Myers, Richard E
Subject: Stanley Brook site visit
Attachments: P1010007.JPG; P1010008.JPG; P1010009.JPG; P1010010.JPG; P1010011.JPG; P1010012.JPG

Rich

I made it down to the bridge site at Seal Harbor, Stanley Brook Bridge. I took measurements? (using a pop level and six foot folding rule).

Several important details that came out of my measurements

1) The 3.7' elevation on the plans is approximately the same as the 10.41 tide data elevation. Tidal water did not make it under the bridge on this day (it was about 8" below the water level at the bridge). → ? PREDICTED WAS 10.0' @ SOUTHWEST HARBOR (NOAA)
2) Several High tide data points were noted 1/31/2010 (for Bar Harbor) was 14', and 1/29/2010 (for Bar Harbor) was 17.97' → DATUM? I THINK THESE DATES ARE WRONG, DATUM IS STATION DATUM
3) The sea weed strand line is at or near plan elevation 10'.
4) I would recommend having the finished grade of the road at least 10' elevation, and if possible 11' or higher, using the elevations from the plans.
5) The bridge opening is about half full of sand and gravel.
6) EXPLAIN – ok. The flood plain above the bridge is about 18" above the water level at the bridge (elev. 5.8' plans, or 12.5' tide data benchmark).
7) The tidal flow velocities through the bridge would not be very large until the water started covering the flood plain (5.8' elev. using plan elevation data).

Attached are several photos of the site that I took at the time of the High Tide (10:35 on 4/12/2010). Let me know if you have any questions.

Alex Mann

(1) NOAA WEBSITE : TIDE RANGE : HIGH YESTERDAY WAS 10.41' IN SEAL HARBOR ↳ PREDICTED.

→ AT HIGH TIDE, WATER LINE WAS @ ABOUT 3.7' ON PLANS

(2) REPORTED 14' & 17.97' ON 1/31/2010 & 1/29/2010 RESPECTIVELY

NOAA MAINE TIDE DATA → NOT SURE WHAT DATUM

WATER LEVEL @ BRIDGE (ELEV.) — TIDE ELEV. (PREDICTED) = 8"

1'-2" OF WATER DEPTH @ 1 ABUTMENT

(6) DIFF. IN ELEV. OF FLOODPLAIN & WATER SURFACE @ BRIDGE ≈ 18"

PRELIMINARY COST ESTIMATE

PROJECT: Mount Desert - Stanley Brook Bridge, Bridge # 5570 Alternative #2 - Bridge Replacement Precast butted concrete voided slabs Stub integral abutments on piles Route 3 across bridge - Closed during construction Detour using state, park, and local roads Deck Area: 38' Span x 39' Wide = 1482 S.F.	**PIN: 16718.00** **Estimated by: REM**

SUPERSTRUCTURE:	1482 SF	x $130	=	$193,000
ABUTMENTS:	1482 SF	x $141	=	$209,000
PIERS: N/A	0 SF	x $0		$0
COFFERDAMS:	1 LS			$150,000
STRUCTURAL EXCAVATION & BORROW:	840 CY	x $26	=	$22,000
RIPRAP:	950 CY	x $55	=	$53,000
EXISTING BRIDGE REMOVAL:	684 SF	x $58	=	$40,000
DETOUR AND/OR TEMPORARY BRIDGE: N/A	0 SF	x $0		$0
REHABILITATION CONTINGENCIES: N/A		0%	=	$0
MISCELLANEOUS (TCP'S, FIELD OFFICE, ETC.):		8%	=	$54,000
MOBILIZATION:		8%	=	$54,000
		STRUCTURE SUBTOTAL	=	**$775,000**
APPROACHES:	600 LF	x $500	=	$300,000
MISCELLANEOUS:		8%	=	$24,000
MOBILIZATION:		8%	=	$24,000
		APPROACHES SUBTOTAL	=	**$350,000**
		TOTAL CONSTRUCTION COST	=	**$1,130,000**
PRELIMINARY ENGINEERING:		11.5%	=	$130,000
RIGHT OF WAY:			=	$15,000
CONSTRUCTION ENGINEERING:		11.1%	=	$125,000
OTHER:			=	$0
		TOTAL PROJECT COST	=	**$1,400,000**