STATE OF VERMONT
AGENCY OF TRANSPORTATION

PRELIMINARY INFORMATION SHEET

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FINAL HYDRAULIC REPORT

HYDROLOGIC DATA

Date: May 2, 2007

DRAINAGE AREA : 4.6 sq. mi.
CHARACTER OF TERRAIN : Mostly forested and mountainous drainage basin.
STREAM CHARACTERISTICS : Steep, sinuous, narrow, confined and armored channel at site.
NATURE OF STREAMBED : Gravel, cobbles and boulders.

PEAK FLOW DATA

Q 2.33 =	250cfs	Q 50 =	840 cfs
Q 10 =	520 cfs	Q 100 =	1000 cfs
Q 25 =	700 cfs	Q 500 =	4900 cfs

DATE OF FLOOD OF RECORD Unknown
ESTIMATED DISCHARGE: Unknown
WATER SURFACE ELEV.: Unknown
NATURAL STREAM VELOCITY : @ Q50 = 16.4 fps
ICE CONDITIONS : Moderate
DEBRIS: Moderate
DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? No
IS ORDINARY RISE RAPID? Yes
IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? Yes
IF YES, DESCRIBE: There are two flood control dams upstream that reduce flood flows to the project site.

WATERSHED STORAGE: 1% HEADWATERS:
UNIFORM: X
IMMEDIATELY ABOVE SITE:

EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE: Corrugated galvanized metal plate pipe arch
YEAR BUILT: 1966
CLEAR SPAN(NORMAL TO STREAM): 15' - 4"
VERTICAL CLEARANCE ABOVE STREAMBED: 9' - 3"
WATERWAY OF FULL OPENING: 109 sq. ft.
DISPOSITION OF STRUCTURE: Remove and replace.
TYPE OF MATERIAL UNDER SUBSTRUCTURE: Unknown

WATER SURFACE ELEVATIONS AT:

Q2.33 =	1342.2'	VELOCITY =	12.2 fps
Q10 =	1344.9'	"	13.9 fps
Q25 =	1346.3'	"	15.3 fps
Q50 =	1347.7'	"	16.0 fps
Q100 =	1348.9'	"	16.8 fps

LONG TERM STREAMBED CHANGES: There may have been up to 2' of scour or channel degradation at the culvert outlet since it was installed in 1966.

IS THE ROADWAY OVERTOPPED BELOW Q100: No
FREQUENCY: Above Q100
RELIEF ELEVATION: 1351.4'
DISCHARGE OVER ROAD @Q100: None

UPSTREAM STRUCTURE

TOWN: Ludlow DISTANCE: 900'
HIGHWAY # : Private drive STRUCTURE #:
CLEAR SPAN: 15' CLEAR HEIGHT: 8'
YEAR BUILT: unknown FULL WATERWAY: 120 sq. ft.
STRUCTURE TYPE: Timber deck on concrete abutments.

DOWNSTRUCTURE STRUCTURE

TOWN: NA - Confluence with Sanders Brook DISTANCE:
HIGHWAY # : STRUCTURE #:
CLEAR SPAN: CLEAR HEIGHT:
YEAR BUILT: FULL WATERWAY:
STRUCTURE TYPE:

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2006	2600	530	50.1	6	160
2026	3400	690	50.1	9.6	340

20 year ESAL for flexible pavement from 2006 to 2026 : 1,073,000
40 year ESAL for flexible pavement from 2026 to 2046 : 2,759,000
Design Speed : 50 mph

PROPOSED STRUCTURE

STRUCTURE TYPE: Precast concrete arch

CLEAR SPAN(NORMAL TO STREAM): 24'
VERTICAL CLEARANCE ABOVE STREAMBED: 8'
WATERWAY OF FULL OPENING: 162 sq. ft.

WATER SURFACE ELEVATIONS AT:

Q2.33 =	1341.2'	VELOCITY=	12.2 fps
Q10 =	1342.2'	"	13.3 fps
Q25 =	1342.9'	"	13.7 fps
Q50 =	1343.3'	"	14.0 fps
Q100 =	1343.7'	"	14.3 fps

IS THE ROADWAY OVERTOPPED BELOW Q100: No
FREQUENCY: Above Q100
RELIEF ELEVATION: 1351.4'
DISCHARGE OVER ROAD @Q100: None

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 1346.8' at top of arch at inlet
VERTICAL CLEARANCE: @ Q50 = 3.5' inlet, 2.6' outlet. Maximum at center of arch.

SCOUR: Contraction scour calculated as 2' at Q100, 3' at Q500, based on natural stream bed material in the arch. Grade control rock weirs in the arch may limit scour.
REQUIRED CHANNEL PROTECTION: Stone Fill, Type IV

PERMIT INFORMATION

AVERAGE DAILY FLOW:	10 cfs		DEPTH OR ELEVATION:
ORDINARY LOW WATER:	5 cfs		0.5'
ORDINARY HIGH WATER:	110 cfs		1.5'

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: No temporary bridge required. Phased construction will be used.
CLEAR SPAN (NORMAL TO STREAM):
VERTICAL CLEARANCE ABOVE STREAMBED:
WATERWAY AREA OF FULL OPENING:

ADDITIONAL INFORMATION

DESIGN CRITERIA

1. DESIGN LIVE LOAD AASHTO HL-93
2. DESIGN SPAN
3. LRFD FOR SPREAD FOOTINGS ON SOIL 6.43 ksf (12' FOOTING)
   ON LEDGE
4. ALLOWABLE LOAD FOR PILING
   TYPE
   ESTIMATED LENGTH
5. STRUCTURAL STEEL AASHTO M270M/M270 GRADE
6. REINFORCING STEEL GRADE 60
7. CONCRETE, HIGH PERFORMANCE CLASS A f'c:
   CONCRETE, HIGH PERFORMANCE CLASS B f'c:
   CONCRETE, CLASS C f'c: 3000 psi
8. DESIGN SOIL UNIT WEIGHT 140 pcf
9. FACTORED LOAD FOR SPREAD FOOTINGS ON SOIL 4.62 ksf

TRAFFIC MAINTENANCE

1. IS TRAFFIC TO BE MAINTAINED? YES
   IF YES, ON EXISTING STRUCTURE? PHASED CONSTRUCTION
   OR ON TEMPORARY BRIDGE?
   ONE OR TWO-WAY TRAVEL? TWO-WAY
2. TRAFFIC CONTROL SIGNALS REQUIRED? NO
3. ARE SIDEWALKS REQUIRED? NO
   IF SO, ON WHAT SIDE?

PROJECT NAME: LUDLOW
PROJECT NUMBER: STP ST CULV(7)

FILE NAME: s00b258excel.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: E.L.RUSTAY
PRELIMINARY INFORMATION SHEET #1

PLOT DATE: 9/11/2008
DRAWN BY: E.L.RUSTAY
CHECKED R.S.YOUNG