STATE OF VERMONT
AGENCY OF TRANSPORTATION

PRELIMINARY INFORMATION SHEET (CULVERT)

Version **LRFD**

INDEX OF SHEETS

PLAN SHEETS

STANDARDS LIST

DETAIL SHEETS

FINAL HYDRAULIC REPORT

HYDROLOGIC DATA

Date: Nov. 2015

DRAINAGE AREA : 1.8 sq. mi.
CHARACTER OF TERRAIN : Hilly to mountainous, mostly forested
STREAM CHARACTERISTICS : Alluvial, sinuous
NATURE OF STREAMBED : Cobbles, gravel and a few boulders

PEAK FLOW DATA - ANNUAL EXCEEDANCE PROBABILITY (AEP)

43% =	100 cfs	2% =	375 cfs
10% =	225 cfs	1% =	450 cfs
4% =	300 cfs	0.2% =	625 cfs

DATE OF FLOOD OF RECORD: unknown
ESTIMATED DISCHARGE: unknown
WATER SURFACE ELEV.: unknown
NATURAL STREAM VELOCITY : @ 2% AEP = 10.0 fps
ICE CONDITIONS : Moderate
DEBRIS: Moderate
DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? Yes
IS ORDINARY RISE RAPID? Yes
IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? No
IF YES, DESCRIBE:

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

EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE: Concrete slab bridge widened with concrete box
YEAR BUILT: Built in 1938
CLEAR SPAN(NORMAL TO STREAM): 9'
VERTICAL CLEARANCE ABOVE STREAMBED: 4'
WATERWAY OF FULL OPENING: 36 sq. ft.
DISPOSITION OF STRUCTURE: Remove
TYPE OF MATERIAL UNDER SUBSTRUCTURE: unknown

WATER SURFACE ELEVATIONS AT:

43% AEP =	906.6'	VELOCITY =	9.0 fps
10% AEP =	908.3'	"	12.3 fps
4% AEP =	909.0'	"	13.2 fps
2% AEP =	909.4'	"	13.4 fps
1% AEP =	909.7'	"	14.0 fps

LONG TERM STREAMBED CHANGES: unknown

IS THE ROADWAY OVERTOPPED BELOW 1% AEP: Not enough survey to determine
FREQUENCY:
RELIEF ELEVATION:
DISCHARGE OVER ROAD @ 1% AEP:

UPSTREAM STRUCTURE

TOWN: Waterford — DISTANCE: 1500'
HIGHWAY # : I93 — STRUCTURE #:
CLEAR SPAN: 7.0' — CLEAR HEIGHT: 7.0'
YEAR BUILT: 1982 — FULL WATERWAY: 38.5 sq. ft.
STRUCTURE TYPE: Corrugated metal pipe

DOWNSTREAM STRUCTURE

TOWN: Waterford — DISTANCE: 500'
HIGHWAY # : VT 18 — STRUCTURE #: 6
CLEAR SPAN: 14' — CLEAR HEIGHT: 6'
YEAR BUILT: 1938 — FULL WATERWAY: 84 sq. ft.
STRUCTURE TYPE: Concrete slab bridge

LRFR LOAD RATING FACTORS

LOADING LEVELS	TRUCK						
	H-20	HL-93	3S2	6 AXLE	3A. STR.	4A. STR.	5A. SEMI
TONNAGE	20	36	36	66	30	34.5	38
INVENTORY							
POSTING							
OPERATING							
COMMENTS:	TABLE TO BE COMPLETED BY CONTRACTOR'S DESIGNER						

AS BUILT "REBAR" DETAIL

LEVEL I	LEVEL II	LEVEL III
TYPE:	TYPE:	TYPE:
GRADE:	GRADE:	GRADE:

CULVERT DESIGN CRITERIA

1. PROPOSED CULVERT IS A PRECAST CONCRETE STRUCTURE (16'-0" X 8'-0" X 52' BOX).
2. CULVERT END IS NOT SKEWED UPSTREAM; SKEWED DOWNSTREAM. ENDS PLUMB.
3. CULVERT WILL BE SET AT A SLOPE OF 4.08 IN. ON 10 FT.

PROPOSED STRUCTURE

STRUCTURE TYPE: Precast concrete box

CLEAR SPAN(NORMAL TO STREAM): 16'
VERTICAL CLEARANCE ABOVE STREAMBED: 5'
WATERWAY OF FULL OPENING: 80 sq. ft.

WATER SURFACE ELEVATIONS AT:

43% AEP =	906.5'	VELOCITY=	7.2 fps
10% AEP =	907.6'	"	9.8 fps
4% AEP =	908.2'	"	11.0 fps
2% AEP =	908.6'	"	11.7 fps
1% AEP =	908.9'	"	12.5 fps

IS THE ROADWAY OVERTOPPED BELOW 1% AEP: Not enough survey to determine
FREQUENCY:
RELIEF ELEVATION:
DISCHARGE OVER ROAD @ 1% AEP:

BRIDGE LOW CHORD ELEVATION: 910.0' at inlet
FREEBOARD: @ 2% AEP = 1.4' at inlet

SCOUR: Not calculated for a box.

REQUIRED CHANNEL PROTECTION: Stone Fill, Type IV on channel banks

PERMIT INFORMATION

		DEPTH OR ELEVATION:
AVERAGE DAILY FLOW:	-	
ORDINARY LOW WATER:	-	-
ORDINARY HIGH WATER:	-	-

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: No temporary bridge needed.
CLEAR SPAN (NORMAL TO STREAM):
VERTICAL CLEARANCE ABOVE STREAMBED:
WATERWAY AREA OF FULL OPENING:

ADDITIONAL INFORMATION

TRAFFIC MAINTENANCE NOTES

1. MAINTAIN TRAFFIC ON AN OFF SITE DETOUR.
2. TRAFFIC SIGNALS ARE NOT NECESSARY.
3. SIDEWALKS ARE NOT NECESSARY

DESIGN VALUES

1. DESIGN LIVE LOAD		HL-93
2. FUTURE PAVEMENT	d_p:	3.0 INCH
3. CULVERT OPENING	D:	16.00 FT
4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS)	Δ:	---
5. PRESTRESSING STRAND	f_y:	---
6. PRESTRESSED CONCRETE STRENGTH	f'_c:	---
7. PRESTRESSED CONCRETE RELEASE STRENGTH	f'_{ci}:	---
8. CONCRETE, HIGH PERFORMANCE CLASS AA	f'_c:	4.0 KSI
9. CONCRETE, HIGH PERFORMANCE CLASS A	f'_c:	4.0 KSI
10. CONCRETE, HIGH PERFORMANCE CLASS B	f'_c:	3.5 KSI
11. CONCRETE, CLASS C	f'_c:	3.0 KSI
12. REINFORCING STEEL	f_y:	60 KSI
13. STRUCTURAL STEEL AASHTO M270	f_y:	---
14. NOMINAL BEARING RESISTANCE OF SOIL	q_n:	13.3 KSF
15. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	ϕ:	0.45
16. NOMINAL BEARING RESISTANCE OF ROCK	q_n:	---
17. ROCK BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	ϕ:	---
18. PILE RESISTANCE FACTOR	ϕ:	---
19. LATERAL PILE DEFLECTION	Δ:	--- INCH
20. BASIC WIND SPEED	V_{3s}:	---
21. MINIMUM GROUND SNOW LOAD	p_g:	---
22. SEISMIC DATA PGA: 9 %g	S_s:	---
	S_1:	---
23.		---
24.		---
25.		---
26.		---

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2017	1200	140	58	27.3	280
2037	1200	140	58	37.1	380

20 year ESAL for flexible pavement from 2017 to 2037 : 1938000
40 year ESAL for flexible pavement from 2017 to 2057 : 4423000
Design Speed : 50 mph

PROJECT NAME: **WATERFORD**
PROJECT NUMBER: **BF 0225(4)**

FILE NAME: z13c268pi.dgn
PROJECT LEADER: T. LEVINS
DESIGNED BY: B. WILLIAMS
PRELIMINARY INFORMATION SHEET

PLOT DATE: 10/2/2017
DRAWN BY: B. WILLIAMS
CHECKED BY: T. LEVINS