STATE OF VERMONT
AGENCY OF TRANSPORTATION

PRELIMINARY INFORMATION SHEET (CULVERT)

Version
LRFD

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DETAIL SHEETS

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FINAL HYDRAULIC REPORT

HYDROLOGIC DATA

Date: May 2015

DRAINAGE AREA : 5.2 sq. mi.
CHARACTER OF TERRAIN : Rural, mostly wooded, small ponds
STREAM CHARACTERISTICS : Sinuous and alluvial
NATURE OF STREAMBED : Gravel and sand

PEAK FLOW DATA

Q 2.33 =	200 cfs	Q 50 =	750 cfs
Q 10 =	450 cfs	Q 100 =	900 cfs
Q 25 =	600 cfs	Q 500 =	1260 cfs

DATE OF FLOOD OF RECORD: Unknown
ESTIMATED DISCHARGE: Unknown
WATER SURFACE ELEV.: Unknown
NATURAL STREAM VELOCITY : @ Q50 = 10.8 fps
ICE CONDITIONS : Light to moderate
DEBRIS: Light
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: 2% HEADWATERS:
UNIFORM: X
IMMEDIATELY ABOVE SITE:

EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE: Concrete t-beam
YEAR BUILT: 1929
CLEAR SPAN(NORMAL TO STREAM): 22'
VERTICAL CLEARANCE ABOVE STREAMBED: 6'
WATERWAY OF FULL OPENING: 100 sq. ft.
DISPOSITION OF STRUCTURE: Remove and replace
TYPE OF MATERIAL UNDER SUBSTRUCTURE: See borings

WATER SURFACE ELEVATIONS AT:

Q2.33 =	313.8'	VELOCITY =	5.4 fps
Q10 =	316.0'	"	5.7 fps
Q25 =	316.4'	"	7.1 fps
Q50 =	317.0'	"	7.7 fps
Q100 =	318.5'	"	8.5 fps

LONG TERM STREAMBED CHANGES: None noted

IS THE ROADWAY OVERTOPPED BELOW Q100: Yes
FREQUENCY: Q100
RELIEF ELEVATION: 317.6'
DISCHARGE OVER ROAD @Q100: 55 cfs

UPSTREAM STRUCTURE

TOWN: Richmond DISTANCE: 4400'
HIGHWAY # : TH 12 STRUCTURE #: 16
CLEAR SPAN: 12.3' CLEAR HEIGHT: 7.8'
YEAR BUILT: 1969 FULL WATERWAY:
STRUCTURE TYPE: CGMPPA

DOWNSTREAM STRUCTURE

TOWN: Richmond DISTANCE: 1500'
HIGHWAY # : I-89 STRUCTURE #: 53-1
CLEAR SPAN: 18' CLEAR HEIGHT: 11'
YEAR BUILT: 1964 FULL WATERWAY: 198 sq. ft.
STRUCTURE TYPE: Concrete box

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

PROPOSED STRUCTURE

STRUCTURE TYPE: Rigid Frame

CLEAR SPAN(NORMAL TO STREAM): 23'
VERTICAL CLEARANCE ABOVE STREAMBED: 8'
WATERWAY OF FULL OPENING: 185 sq. ft.

WATER SURFACE ELEVATIONS AT:

Q2.33 =	313.8'	VELOCITY=	5.4 fps
Q10 =	315.4'	"	7.4 fps
Q25 =	316.1'	"	7.8 fps
Q50 =	316.8'	"	8.2 fps
Q100 =	318.0'	"	9.1 fps

IS THE ROADWAY OVERTOPPED BELOW Q100: No
FREQUENCY: N/A
RELIEF ELEVATION: 317.7'
DISCHARGE OVER ROAD @Q100: N/A

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 318.4' (on upstream side)
VERTICAL CLEARANCE: @ Q50 = 1.6'

SCOUR: Minimum required depth for foundation design is 6' below streambed

REQUIRED CHANNEL PROTECTION: Stone Fill Type III

PERMIT INFORMATION

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

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: None required
CLEAR SPAN (NORMAL TO STREAM):
VERTICAL CLEARANCE ABOVE STREAMBED:
WATERWAY AREA OF FULL OPENING:

ADDITIONAL INFORMATION

The hydraulics for this site were calculated without any backwater from the Winooski River.

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:	23.00 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:	---
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:	---
12. REINFORCING STEEL	f_y:	60 KSI
13. STRUCTURAL STEEL AASHTO M270	f_y:	---
14. NOMINAL BEARING RESISTANCE OF SOIL	q_n:	---
15. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD)	ϕ:	---
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:	---
20. BASIC WIND SPEED	V_{3s}:	---
21. MINIMUM GROUND SNOW LOAD	p_g:	---
22. SEISMIC DATA PGA: 0	S_s:	---
	S_1:	---
23.		
24.		---
25.		---
26.		---

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2016	3500	410	63	1.8	310
2036	3700	430	63	2.8	510

20 year ESAL for flexible pavement from 2016 to 2036 : 2286000
40 year ESAL for flexible pavement from 2016 to 2056 : 5501000
Design Speed : 50 mph

AS BUILT "REBAR" DETAIL

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

FRAME DESIGN CRITERIA

1. PROPOSED FRAME IS A PRECAST CONCRETE STRUCTURE (25'-0" X 0'-0" X 0'-0" RIGID FRAME).
2. FRAME ENDS ARE SKEWED BY AN ANGLE OF 20°
3. FRAME WILL BE SET AT A SLOPE OF 0.25 IN. ON 1 FT.
4. FRAME WILL NOT REQUIRE FISH PASSAGE ACCOMODATIONS
5. FRAME CONSTRUCTION WILL NOT REQUIRE A TEMPORARY PIPE

PROJECT NAME: **RICHMOND**
PROJECT NUMBER: **BF 0284(28)**

FILE NAME: s13c070pi.dgn
PROJECT LEADER: R. S. YOUNG
DESIGNED BY: W. LAMMER
PRELIMINARY INFORMATION SHEET

PLOT DATE: 06-OCT-2016
DRAWN BY: W. LAMMER
CHECKED BY: S. COLEY