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FINAL HYDRAULICS REPORT



HYDROLOGIC DATA

DRAINAGE AREA = 176 km²
 CHARACTER OF TERRAIN: ROLLING (HILLS) TO LEVEL (FLOODPLAIN)
 CHARACTER & TYPE OF STREAM: PERENNIAL, NOT INCISED, SINUOUS, NOT BRAIDED, NOT ANABRANCHED
 NATURE OF STREAMBED: SILT-CLAY
 Q2.33= 33.7 m³/s Q50= 113.1 m³/s
 Q10= 72.4 m³/s Q100= 132.0 m³/s
 Q25= 91.9 m³/s Q500= 199.8 m³/s
 DATE OF FLOOD OF RECORD: NO RECORD
 WATER SURFACE ELEV: UNKNOWN ESTIMATED DISCHARGE:
 NATURAL STREAM VELOCITY @ Q50: 0.65 m/s
 ICE CONDITIONS: SLIGHT DEBRIS: SLIGHT
 DOES THE STREAM REACH MAXIMUM HIGHWATER ELEVATION RAPIDLY? NO
 IS ORDINARY RISE RAPID? NO
 IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? YES
 IF YES, DESCRIBE: THERE IS A LARGE WETLAND AREA UPSTREAM OF THE BRIDGE SITE WHICH PROVIDES SIGNIFICANT FLOOD STORAGE THEREBY REDUCING PEAK FLOWS
 WATERSHED STORAGE: 2.8% HEADWATERS: UNIFORM THROUGHOUT WATERSHED
 IMMEDIATELY ABOVE SITE: YES

EXISTING STRUCTURE

STRUCTURE TYPE: 2 SPAN MULTI-BEAM YEAR BUILT: 1936
 CLEAR SPAN (NORMAL TO STREAM): 36.5 m
 VERTICAL CLEARANCE ABOVE STREAMBED: 5.2 m
 WATERWAY OF FULL OPENING: 149.11 m²
 DISPOSITION OF STRUCTURE: REMOVE
 TYPE OF MATERIAL UNDER SUBSTRUCTURE: SILT-CLAY
 WATER SURFACE ELEV. @ Q2.33= 43.51 m VELOCITY= 0.64 m/s
 Q10= 44.55 m VELOCITY= 0.82 m/s
 Q25= 44.97 m VELOCITY= 0.88 m/s
 Q50= 45.39 m VELOCITY= 0.95 m/s
 Q100= 45.73 m VELOCITY= 1.00 m/s
 LONG TERM STREAM BED CHANGES: CHANNEL HAS SCoured OR DEGRADED 0.8m SINCE 1936 BASED ON 1936 BRIDGE PLANS
 IS THE ROADWAY OVERTOPPED BELOW THE Q100? NO FREQUENCY: N/A
 RELIEF ELEVATION: 46.86 m DISCHARGE OVER ROAD @ Q100: 0

UPSTREAM STRUCTURE: TOWN: SHOREHAM DISTANCE: 8.23 km
 HIGHWAY NO.: VT 74 STRUCTURE NO.: 2
 STRUCTURE TYPE: 3 SPAN STEEL BEAM
 CLEAR SPAN: 55.5 m CLEAR HEIGHT: 2.7 m
 YEAR BUILT: 1939 FULL WATERWAY: <149.85 m²
 DOWNSTREAM STRUCTURE: TOWN: WEYBRIDGE DISTANCE: 4.66 km
 HIGHWAY NO.: T.H. 17 STRUCTURE NO.: 10
 STRUCTURE TYPE: ROLLED BEAM
 CLEAR SPAN: 22.5 m CLEAR HEIGHT: 2.1 m
 YEAR BUILT: 1968 FULL WATERWAY: <47.25 m²

PROPOSED STRUCTURE

STRUCTURE TYPE: SINGLE SPAN MULTI-PLATE GIRDER
 CLEAR SPAN (NORMAL TO STREAM): 44.0 m
 VERTICAL CLEARANCE ABOVE STREAMBED: 5.1 m
 WATERWAY OF FULL OPENING: 147.36 m²
 WATER SURFACE ELEV. @ Q2.33= 43.51 m VELOCITY= 0.64 m/s
 Q10= 44.55 m VELOCITY= 0.82 m/s
 Q25= 44.96 m VELOCITY= 0.89 m/s
 Q50= 45.38 m VELOCITY= 0.95 m/s
 Q100= 45.72 m VELOCITY= 1.00 m/s
 IS THE ROADWAY OVERTOPPED BELOW THE Q100? NO FREQUENCY: N/A
 RELIEF ELEVATION: 47.44 m DISCHARGE OVER ROAD @ Q100: 0
 AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 46.105 m
 VERTICAL CLEARANCE @ Q50: 0.735 m (average)
 SCOUR: CONTRACTION SCOUR = 1.03 m (Q100) & 2.50 m (Q500)
 REQUIRED CHANNEL PROTECTION: TYPE 11 STONE IN FRONT OF ABUTMENTS

PERMIT INFORMATION

AVERAGE DAILY FLOW: 2.6 m³/s
 ORDINARY LOW WATER: 42.37 m DEPTH: 1.33 m
 ORDINARY HIGH WATER: 42.74 m DEPTH: 1.70 m

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: SINGLE SPAN
 CLEAR SPAN (NORMAL TO STREAM): 36.5 m (MIN)
 VERTICAL CLEARANCE ABOVE STREAM BED: 5.2 m (MIN)
 WATERWAY AREA OF FULL OPENING: 149.11 m² (MIN)

ADDITIONAL COMMENTS

DESIGN CRITERIA:
 1. DESIGN LIVE LOAD AASHTO MS22.5
 2. DESIGN SPAN 45.0 m
 3. ALLOWABLE LOAD FOR SPREAD FOOTINGS ON SOIL N/A ON LEDGE N/A
 4. ULTIMATE CAPACITY OF PILE 1912 kN TYPE HP360x132 ESTIMATED LENGTH 25-27 m (NOT INCLUDING EMBEDMENT)
 5. STRUCTURAL STEEL AASHTO GRADE M 270M/M 270 GR 345W
 6. REINFORCING STEEL GRADE 420
 7. CONCRETE, HIGH PERFORMANCE CLASS A f_c: 30 MPa
 CONCRETE, HIGH PERFORMANCE CLASS B f_c: 25 MPa

TRAFFIC MAINTENANCE:
 1. IS TRAFFIC TO BE MAINTAINED? YES IF YES, ON EXISTING STRUCTURE OR ON TEMPORARY BRIDGE X
 2. TEMPORARY BRIDGE REQUIREMENTS: ONE OR TWO WAY TWO-WAY TRAFFIC CONTROL SIGNALS REQUIRED NO
 MINIMUM

ARE SIDEWALKS REQUIRED? NO IF SO, ON WHAT SIDE?

LOAD FACTOR LOAD RATING (TONS)

LOADING LEVELS (LOAD FACTOR)	TRUCK						
	M	MS	3S2	6 AXLE	3A. STR.	4A. STR.	5A. SEMI
INVENTORY A=2.17 B=1.00	26	48					
POSTED A=1.55 B=1.40	37	67	73		64	65	71
OPERATING A=1.30 B=1.67		80	87	95	77	77	

STRENGTH RF = $\frac{0.95 F_y S_{LL+I} - M_{DL} S_{LL+I} - M_{SOIL} S_{LL+I}}{A \times M_{LL+I}}$ SERVICEABILITY RF = B $\frac{0.95 F_y S_{LL+I} - M_{DL} S_{LL+I} - M_{SOIL} S_{LL+I}}{1.67 M_{LL+I}}$

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2009	2700	300	67	10.2	310
2029	3300	370	67	13.6	500

20 year ESAL for flexible pavement from 2009 to 2029: 2,393,000
 40 year ESAL for flexible pavement from 2009 to 2049: 5,638,000
 Design speed: 50 km/h

**STATE OF VERMONT
 AGENCY OF TRANSPORTATION**

Town Of CORNWALL Bridge No. 9
 Highway No. VT ROUTE 125 Log Sta. Surv. Sta.

PRELIMINARY INFORMATION SHEET

VT ROUTE 125 OVER LEMON FAIR RIVER

Designed By Drawn By
 Checked By Date Bridge Design Supervisor Date

PROJECT CORNWALL PROJECT NO. BRS 0172(6)

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