

PRELIMINARY INFORMATION SHEET (CULVERT)

LRFD

| INDEX OF SHEETS |                                                |       |     |        |          | FINAL HYDRAULIC REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
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| PLAN SHEETS     |                                                |       |     |        |          | STANDARDS LIST                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |  |  |  |  | HYDROLOGIC DATA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  | PROPOSED STRUCTURE |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
|                 |                                                |       |     |        |          | <div><div>DRAINAGE AREA : 1.9 sq. mi.</div><div>CHARACTER OF TERRAIN : Hilly to mountainous, mostly forested, drainage basin</div><div>STREAM CHARACTERISTICS : Small perenial stream. Sinuous and semi-alluvial.</div><div>NATURE OF STREAMBED : Mostly cobbles with some gravel and boulders</div></div> <div>PEAK FLOW DATA<div><div>Q 2.33 = 150 cfs</div><div>Q 10 = 340 cfs</div><div>Q 25 = 450 cfs</div><div>Q 50 = 550 cfs</div><div>Q 100 = 650 cfs</div><div>Q 500 = 900 cfs</div></div><div>DATE OF FLOOD OF RECORD : unknown</div><div>ESTIMATED DISCHARGE : unknown</div><div>WATER SURFACE ELEV.: unknown</div><div>NATURAL STREAM VELOCITY : @ Q50 = 13.5 fps</div><div>ICE CONDITIONS : Moderate</div><div>DEBRIS: Moderate</div><div>DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? Yes</div><div>IS ORDINARY RISE RAPID? Yes</div><div>IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? No</div><div>IF YES, DESCRIBE:</div></div> <div><div>WATERSHED STORAGE: &lt; 1%</div><div>HEADWATERS:</div><div>UNIFORM: X</div><div>IMMEDIATELY ABOVE SITE:</div></div> <div>EXISTING STRUCTURE INFORMATION<div><div>STRUCTURE TYPE: Concrete box</div><div>YEAR BUILT: 1936</div><div>CLEAR SPAN(NORMAL TO STREAM): 7'</div><div>VERTICAL CLEARANCE ABOVE STREAMBED: 7'</div><div>WATERWAY OF FULL OPENING: 49 sq. ft.</div><div>DISPOSITION OF STRUCTURE: Remove</div><div>TYPE OF MATERIAL UNDER SUBSTRUCTURE: unknown</div></div><div>WATER SURFACE ELEVATIONS AT:<div><div>Q2.33 = 728.1'</div><div>Q10 = 731.0'</div><div>Q25 = 732.7'</div><div>Q50 = 734.3'</div><div>Q100 = 734.9'</div><div>VELOCITY = 14.6 fps</div><div>" 17.5 fps</div><div>" 18.6 fps</div><div>" 19.3 fps</div><div>" 19.6 fps</div></div></div><div>LONG TERM STREAMBED CHANGES: None known</div><div>IS THE ROADWAY OVERTOPPED BELOW Q100: Water overtops drive before road</div><div>FREQUENCY: Fire department drive overtopped at slightly less than Q50.</div><div>RELIEF ELEVATION: 734.0'</div><div>DISCHARGE OVER ROAD @Q100: 76 cfs over drive at Q100</div></div> |          |  |  |  |  | <div>PROPOSED STRUCTURE</div> <div>STRUCTURE TYPE: Precast concrete box with the invert buried 3' below channel bottom.</div> <div>CLEAR SPAN(NORMAL TO STREAM): 16'</div> <div>VERTICAL CLEARANCE ABOVE STREAMBED: 5'</div> <div>WATERWAY OF FULL OPENING: 80 sq. ft.</div> <div>WATER SURFACE ELEVATIONS AT:<div><div>Q2.33 = 726.1' (726.1)*</div><div>Q10 = 727.6' (727.6')</div><div>Q25 = 728.3' (728.3')</div><div>Q50 = 729.0' (730.1')</div><div>Q100 = 729.8' (731.7')</div><div>VELOCITY= 8.6 fps (8.6)*</div><div>" 12.0 fps (8.6 fps)</div><div>" 13.3 fps (9.7 fps)</div><div>" 14.5 fps (8.9 fps)</div><div>" 15.4 fps (8.1 fps)</div></div></div> <div>IS THE ROADWAY OVERTOPPED BELOW Q100: No</div> <div>FREQUENCY: Above Q100</div> <div>RELIEF ELEVATION: 734.3' over fire department drive</div> <div>DISCHARGE OVER ROAD @Q100: No overtopping of road or drive at Q100</div> <div>AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: Top of box = 729.1' at inlet</div> <div>VERTICAL CLEARANCE: @ Q50 = 0.1' at inlet (Inlet submerged with Q50 tailwater)</div> <div>SCOUR: Not applicable for a box</div> <div>REQUIRED CHANNEL PROTECTION: Stone Fill, Type III at inlet and Type IV at outlet</div> <div>PERMIT INFORMATION</div> <div>AVERAGE DAILY FLOW: 4 cfs</div> <div>ORDINARY LOW WATER: 2 cfs</div> <div>ORDINARY HIGH WATER: 65 cfs</div> <div>DEPTH OR ELEVATION: Depth = &lt; 0.5'</div> <div>Depth = 1.0'</div> <div>TEMPORARY BRIDGE REQUIREMENTS</div> <div>STRUCTURE TYPE: No temporary bridge needed.</div> <div>CLEAR SPAN (NORMAL TO STREAM):</div> <div>VERTICAL CLEARANCE ABOVE STREAMBED:</div> <div>WATERWAY AREA OF FULL OPENING:</div> <div>ADDITIONAL INFORMATION</div> <div>* Hydraulics of the new box is affected by high tailwater on Ball Mountain Brook. Water surface elevations and velocities are first listed for conditions without Ball Mountain Brook tailwater, followed by values based on equal frequency floods on both streams in ( ).<br/>The existing box is in inlet control, so is not affected by Ball Mountain Brook tailwater.</div> |  |  |  |  |  | TEMP. IN PLACE     |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
|                 |                                                |       |     |        |          | DESIGN VALUES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
|                 |                                                |       |     |        |          | <div><div>1. DESIGN LIVE LOAD HL-93</div><div>2. FUTURE PAVEMENT dp: 3.0 INCH</div><div>3. CULVERT OPENING D: 16.00 FT</div><div>4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS) Δ: ---</div><div>5. PRESTRESSING STRAND fy: ---</div><div>6. PRESTRESSED CONCRETE STRENGTH f'c: ---</div><div>7. PRESTRESSED CONCRETE RELEASE STRENGTH f'cl: ---</div><div>8. CONCRETE, HIGH PERFORMANCE CLASS AA f'c: ---</div><div>9. CONCRETE, HIGH PERFORMANCE CLASS A f'c: ---</div><div>10. CONCRETE, HIGH PERFORMANCE CLASS B f'c: ---</div><div>11. CONCRETE, CLASS C f'c: ---</div><div>12. REINFORCING STEEL fy: 60 KSI</div><div>13. STRUCTURAL STEEL AASHTO M270 fy: ---</div><div>14. SOIL UNIT WEIGHT γ: 0.140 KCF</div><div>15. NOMINAL BEARING RESISTANCE OF SOIL qn: 4.0 KSF</div><div>16. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD) φ: ---</div><div>17. NOMINAL BEARING RESISTANCE OF ROCK qn: 10.0 KSF</div><div>18. ROCK BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD) φ: ---</div><div>19. NOMINAL AXIAL PILE RESISTANCE qp: ---</div><div>20. PILE YIELD STRENGTH ASTM A572 fy: ---</div><div>21. PILE SIZE ---</div><div>22. EST. PILE LENGTH Lp: ---</div><div>23. PILE RESISTANCE FACTOR φ: ---</div><div>24. LATERAL PILE DEFLECTION Δ: ---</div><div>25. BASIC WIND SPEED V3s: ---</div><div>26. MINIMUM GROUND SNOW LOAD pg: ---</div><div>27. SEISMIC DATA PGA: --- Ss: --- S1: ---</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
|                 |                                                |       |     |        |          | LRFR LOAD RATING FACTORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
|                 |                                                |       |     |        |          | <table><thead><tr><th rowspan="2">LOADING LEVELS</th><th colspan="7">TRUCK</th></tr><tr><th>H-20</th><th>HL-93</th><th>3S2</th><th>6 AXLE</th><th>3A. STR.</th><th>4A. STR.</th><th>5A. SEMI</th></tr></thead><tbody><tr><td>TONNAGE</td><td>20</td><td>36</td><td>36</td><td>66</td><td>30</td><td>34.5</td><td>38</td></tr><tr><td>INVENTORY</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>POSTING</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>OPERATING</td><td colspan="7">TABLE TO BE COMPLETED BY CONTRACTOR'S DESIGNER</td></tr><tr><td>COMMENTS:</td><td colspan="7"></td></tr></tbody></table> <div>CULVERT DESIGN CRITERIA<div>1. PROPOSED CULVERT IS A PRECAST CONCRETE STRUCTURE (16'-0" X 8'-0" X 85'-0" BOX).</div><div>2. CULVERT ENDS ARE SKEWED BY AN ANGLE OF VARIES*</div><div>3. CULVERT WILL BE SET AT A SLOPE OF 12.00 IN. ON 26 FT.</div><div>4. CULVERT WILL NOT REQUIRE FISH PASSAGE ACCOMMODATIONS</div><div>5. CULVERT CONSTRUCTION WILL NOT REQUIRE A TEMPORARY PIPE</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  | 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 | TABLE TO BE COMPLETED BY CONTRACTOR'S DESIGNER |  |  |  |  |  |  | COMMENTS: |  |  |  |  |  |  |  |
| 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       | TABLE TO BE COMPLETED BY CONTRACTOR'S DESIGNER |       |     |        |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |
| COMMENTS:       |                                                |       |     |        |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |                    |       |  |  |  |  |  |  |      |       |     |        |          |          |          |         |    |    |    |    |    |      |    |           |  |  |  |  |  |  |  |         |  |  |  |  |  |  |  |           |                                                |  |  |  |  |  |  |           |  |  |  |  |  |  |  |