

PROJECT: <u>Example Problem</u> <u>Nomograph</u>			STATION: <u>Test</u> SHEET <u>1</u> OF <u>1</u>			CULVERT DESIGN FORM														
HYDROLOGICAL DATA <input checked="" type="checkbox"/> METHOD: <u>USGS</u> <input type="checkbox"/> DRAINAGE AREA: _____ <input type="checkbox"/> STREAM SLOPE: _____ <input type="checkbox"/> CHANNEL SHAPE: _____ <input type="checkbox"/> ROUTING: _____ <input type="checkbox"/> OTHER: _____			DESIGN FLOWS/TAIWATER <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;"><u>R.I. (YEARS)</u></td> <td style="width: 33%; text-align: center;"><u>FLOW (m³/s)</u></td> <td style="width: 33%; text-align: center;"><u>TW (m)</u></td> </tr> <tr> <td style="text-align: center;"><u>50</u></td> <td style="text-align: center;"><u>3.78</u></td> <td style="text-align: center;"><u>0.94</u></td> </tr> <tr> <td style="text-align: center;"><u>100</u></td> <td style="text-align: center;"><u>4.20</u></td> <td style="text-align: center;"><u>0.99</u></td> </tr> </table>									<u>R.I. (YEARS)</u>	<u>FLOW (m³/s)</u>	<u>TW (m)</u>	<u>50</u>	<u>3.78</u>	<u>0.94</u>	<u>100</u>	<u>4.20</u>	<u>0.99</u>
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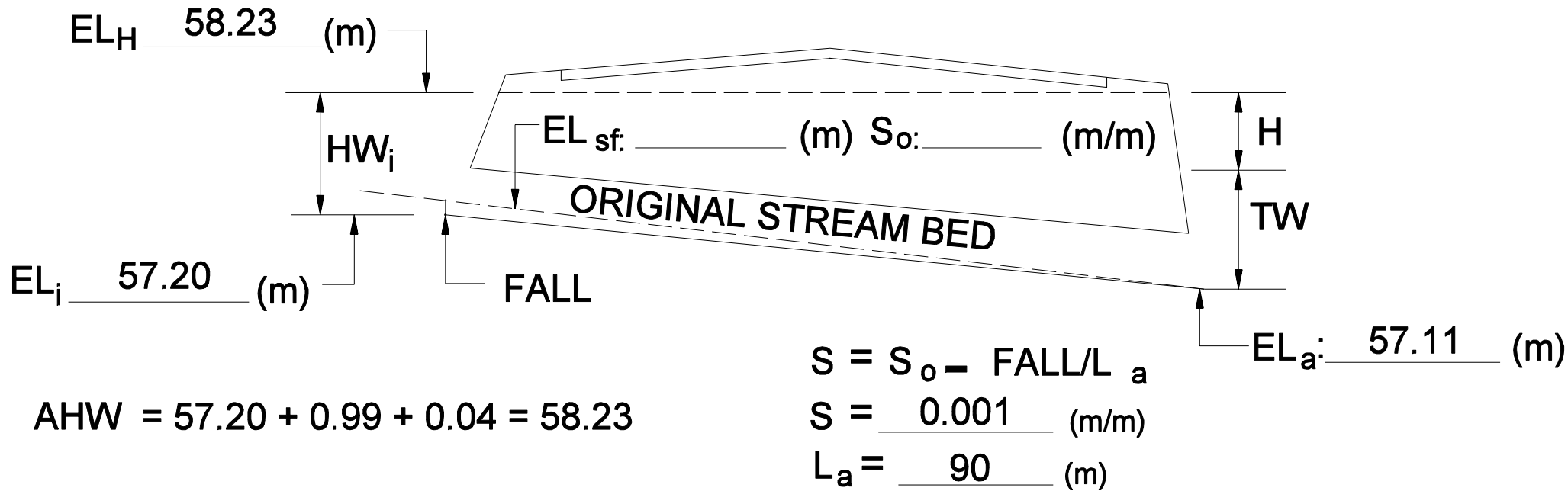
CULVERT DESCRIPTION: MATERIAL-SHAPE-SIZE-ENTRANCE	TOTAL FLOW Q (m ³ /s)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS											CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
			INLET CONTROL				OUTLET CONTROL									
			HW _i /D (2)	HW _i (3)	FALL (4)	EL _{hi} (5)	TW (6)	d _c	$\frac{d_c + D}{2}$	h _o (7)	k _e	H (8)	EL _{ho} (9)			
Trial 1: Single RCP or CMP 1500 mm	4.2	4.2	1.16	1.74	-	58.94		No	Good							Case 4
Trial 2: Single Deformed Conc. 2495 x 1585	4.2	4.2	0.75	1.19	-	58.39		No	Good							Case 4
Trial 2: Single CSP-A 1800 x 1200	4.2	4.2	1.55	1.86	-	59.06		No	Good							Case 4
Trial 3: RCB 3300 x 1200	4.2	4.2	0.71	0.85	-	58.05	0.99	0.52	0.86	0.99	0.5	0.12	58.22	58.22	1.29	Looks OK

TECHNICAL FOOTNOTES: (1) USE Q/NB FOR BOX CULVERTS (2) HW _i /D = HW/D OR HW _i /D FROM DESIGN CHARTS FALL = HW _i - (EL _{hd} - EL _{sf}); FALL IS ZERO FOR CULVERTS ON GRADE			(3) EL _{hi} = HW _i + EL _i (INVERT OF INLET CONTROL SECTION) (4) TW BASED ON DOWNSTREAM CONTROL OR FLOW DEPTH IN CHANNEL			(6) h _o = TW or (d _c + D)/2 (WHICHEVER IS GREATER) (7) H = (1 + k _e + (19.63 n ² L)/R ^{1.33}) V ² /2g (8) EL _{ho} = EL _o + H + h _o		
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SUSCRIPT DEFINITIONS: a Approximate f Culvert Face hd Design Headwater hi Headwater in Inlet Control ho Headwater in Outlet Control i Inlet Control Section o Outlet sf Streambed at Culvert Face tw Tailwater	COMMENTS/DISCUSSION: <p style="text-align: center;">This is an approximate solution because box not flowing full. Check with microcomputer HY8 for exact solution.</p>	CULVERT BARREL SELECTED: SIZE: <u>3300 x 1200</u> SHAPE: <u>RCB</u> MATERIAL: <u>Concrete</u> n: <u>0.012</u> ENTRANCE: <u>Conventional Bevel</u>
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CHART 17 AND PERFORMANCE CURVE FOR DESIGN EXAMPLE
Figure 31-7A

ROADWAY ELEVATION: 59.70 (m)



DESIGN EXAMPLE DETAILS