APPENDIX B – CULVERT DESIGN SHEET

Oregon Department of Transportation (01/99)

CULVERT DESIGN SHEET

PROJECT	STATION	DESIGNER	DATE	SHEET OF

HYDROLOGICAL DATA

METHOD: _____

DRAINAGE AREA: _____ (acres)

STREAM SLOPE: _____ (ft/ft)

CHANNEL SHAPE: _____

DESIGN AND CHECK FLOWS / TAILWATER

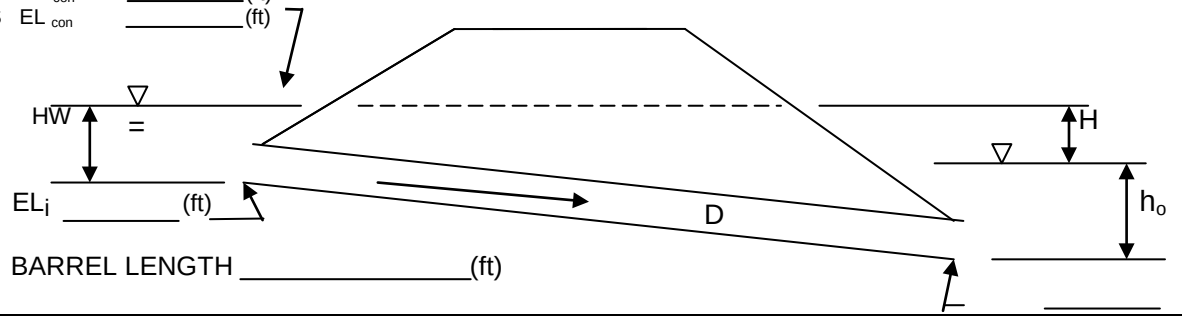
	R.I. (years)	Q (cfs)	TW (ft)
DES	_____	_____	_____
CHK	_____	_____	_____

CHECK FLOOD MAXIMUM ALLOWABLE HEADWATER ELEVATION _____ (ft)

DESIGN FLOOD MAXIMUM ALLOWABLE HEADWATER ELEVATION _____ (ft)

CHK EL_{con} _____ (ft)

DES EL_{con} _____ (ft)



TECHNICAL FOOTNOTES:

(1) USE INLET CONTROL NOMOGRAPH **(2)** $El_{hi} = HW + El_i$ **(3)** TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL

(4) h_o= TW or $\frac{d_c+D}{2}$ (WHICHEVER IS GREATER) **(5)** $H = [1+ k_e +(29n^2L / R^{1.33})](V^2/2g)$ OR USE OUTLET CONTROL NOMOGRAPH

(6) $El_{ho} = El_o + H + h_o$ **(7)** USE HIGHER OF El_{hi} or El_{ho} FOR EL_{con}

CULVERT DESCRIPTION MATERIAL – SHAPE – SIZE – ENTRANCE	FLOW PER BARREL Q/N (cfs)	HEADWATER CALCULATIONS INLET CONTROL			OUTLET CONTROL									COMMENTS
		(1) $\frac{HW}{D}$	HW (ft)	(2) EL_{hi} (ft)	(3) TW (ft)	d_c (ft)	$\frac{d_c + D}{2}$ (ft)	(4) h_o (ft)	k_e	(5) H (ft)	(6) EL_{ho} (ft)	(7) EL_{con} (ft)	V (fps)	

COMMENTS/DISCUSSION:

VARIABLE / SUBSCRIPT DEFINITIONS

D = Diameter or Rise of Barrel (ft)
D_c = Critical Depth at Culvert Outlet (ft)
EL_{con} = Control Headwater Elevation
EL_{hd} = Design Headwater Elevation (ft)
EL_{hi} = Inlet Control Headwater Elevation (ft)
EL_{ho} = Outlet Control Headwater Elevation (ft)
EL_i = Inlet Invert Elevation (ft)
EL_o = Outlet Invert Elevation (ft)
G = Acceleration of Gravity (32.2 ft/s^2)
H = Total Outlet Control Head Loss (ft)
h_o(ft) See Technical Footnote 4
HW = Inlet Control Headwater Depth (ft)
k_e = Outlet Control Entrance Loss Coefficient
N = Number of Barrels
n = Manning's Roughness Coefficient
Q = Discharge (ft^3/s)
R = Hydraulic Radius (ft)
R.I. = Recurrence Interval (Years)
TW = Tailwater Depth (ft)
V = Average Velocity in Barrel (ft/s)

INVERT ABRASION PROTECTION

☐ YES TYPE _____

☐ NO _____

CULVERT BARREL SELECTED

SIZE _____ SHAPE: _____

MATERIAL: _____ n= _____ ENTRANCE: _____