



NOTES:

1. Rock Riprap must meet IDOT Quality Designation ____, Grad. No. ____.
If underground outlet is installed, Quality Designation B may be used.
If underground outlet is not installed, Quality Designation A is required.
2. Geotextile (non-woven, needle punched) Minimum criteria:
 Grab tensile strength (lb) ASTM D 4632 _____ 202
 Elongation at failure (%) ASTM D 4632 _____ ≥ 50
 Trapezoidal tear strength (lb) ASTM D 4533 _____ 79
 Puncture strength (lb) ASTM D 6241 _____ 433
 Ultraviolet light (% retained strength) ASTM D 4355 _____ min 50
 Apparent opening size (AOS) ASTM D 4751 _____
 _____ max 0.22 mm (US sieve size 70)
 Permittivity sec⁻¹/ ASTM D 4491 _____ min 0.70
3. Any geotextile splices shall overlap a minimum of 18 inches, with upstream or upslope geotextile overlapping the downslope geotextile.
4. Designer should consider use of underground outlet to mitigate potential negative effects of standing water.
5. If bottom width of exit channel is less than the top width of the scour basin (L_b), riprap should be extended up the sides of the scour basin to the tail water depth.
6. Place intake outside of flow path of culvert to prevent damage to intake. Slope subgrade towards intake location to drain basin during times of low culvert flow. Type I Or II risers may be used.

LIST OF MATERIALS		
Item	Quantity	Unit
Rock Riprap		Tons
Geotextile		Sq. Yds.

Underground Outlet Yes No

BASIN DEPTH D AND RIPRAP SIZING		
Culvert Height H (Ft)	Min. Riprap Gradation (D=0.5H)	Min. Riprap Gradation (D=H)
1.5	3	3
2.0	3	3
2.5	3	3
3.0	4	3
3.5	4	3
4.0	4	3
4.5	4	3
5.0	4	3
5.5	4	3
6.0	4	3

Date _____
 Drawn M. QUINONES 4/1/14
 Designed _____
 Checked _____
 Approved _____

**CULVERT OUTLET TO
SCOUR BASIN**

