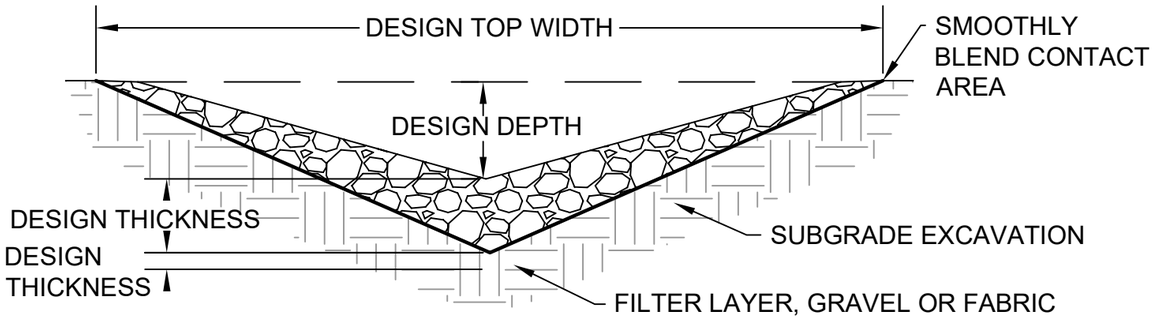
DATE:

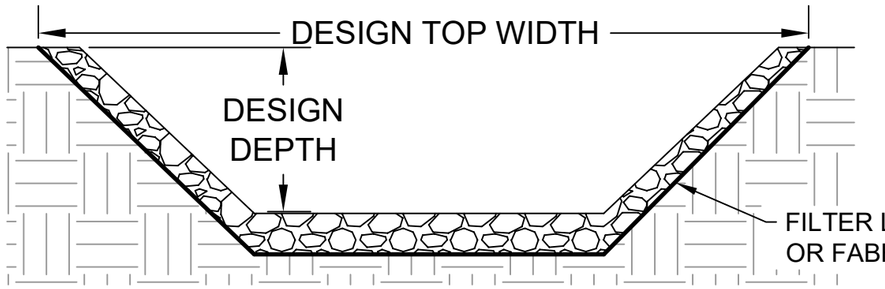
PAGE:

Channel Lining Thickness	
Material	**Minimum Thickness**
Concrete	4 inches
Rock Riprap	1.5 times maximum stone diameter
Flagstone	4 inches including mortar

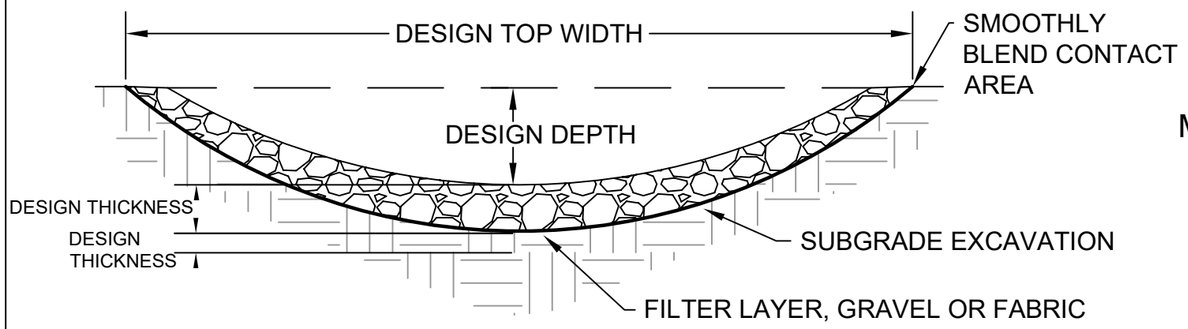
V-SHAPED RIPRAP CHANNEL



TRAPEZOIDAL RIPRAP CHANNEL



PARABOLIC-SHAPED RIPRAP CHANNEL



NOTES:

1. Clear the foundation area of trees, stumps, roots, loose rock, and other objectionable material.
2. Excavate the cross section to the lines and grades of the foundation of the liner as shown on the plans. Bring over-excavated areas to grade by increasing the thickness of the liner or by backfilling with moist soil compacted to the density of the surrounding material.
3. Concrete linings:
   - Place concrete linings to the thickness shown on the plans and finish them in a workmanlike manner.
   - Take adequate precautions to protect freshly placed concrete from extreme temperatures to ensure proper curing.
   - Ensure that subgrade is moist when concrete is poured.
   - Install foundation drains or weep holes where needed to protect against uplift and piping.
   - Provide transverse(contraction) joints to control cracking at approximately 20-feet intervals.
   - Install expansion joints at intervals not to exceed 100 feet.
4. Rock riprap linings should be installed per the standards and specifications outlined on following sheets.
5. Place filters, bedding's, and foundation drains to line and grade in the manner specified. Place filter and bedding materials immediately after slope preparation.
6. For synthetic filter fabrics, overlap the downstream edge by at least 12 inches with the upstream edge which is buried a minimum 12 inches in a trench. Space anchor pins every 3 feet along the overlap.
7. Spread granular materials in a uniform layer. When more than one gradation is required, spread the layers so there is minimal mixing.
8. Filter material should consist of a least 3 inches of material on all sides of the drain pipe. The drain pipe conduit should be a minimum of 4 inches in diameter.
9. Perform all channel construction to keep erosion and water pollution to a minimum. Immediately vegetate all disturbed areas or otherwise protect them against soil erosion.

MAINTENANCE:

1. Inspect channels at least weekly and after each rainfall of 1.0 inch or greater and make repairs promptly. Give special attention to the outlet and inlet sections and other points where concentrated flow enters.
2. Carefully check stability at road crossings, looking for indication of piping, scour holes, or bank failures. Make any repairs immediately.
3. Maintain all vegetation adjacent to the channel in a healthy, vigorous condition.

NORTH CAROLINA Department of Environmental Quality

RIPRAP AND PAVED CHANNELS

Effective Date: 9/1/2023
In accordance with the 2013 Design Manual Updates