**Outlet Protection for Culvert #2**

Line channel to top of banks for a distance of 12.0’ downstream. Use class B erosion control stone.

**Plan**

Note: Apron to be placed level with the top surface of riprap at same elevation as sides and bottom of channel. No channel overlap or restriction in channel cross-section should exist.

**Section A-A’**

1. Excavate below channel outlet and widen channel to the required riprap thickness for each apron. Foundation to be cut to zero grade and smoothed.

2. Place filter cloth on bottom and sides of prepared foundation. All joints to overlap a minimum of 1.0’.

3. Exercise care in riprap placement to avoid damage to filter fabric.

4. Place riprap on zero grade - top of riprap to be level with existing outlet - no overfall at ends.

5. Riprap to be hard, angular, well graded class B erosion control stone.

6. Immediately after construction stabilize all disturbed areas with vegetation as shown in vegetative plan.
14. SURFACE ROUGHENING

A. 2:1 Fill Slope
   1. Place fill in lifts not to exceed 9" and compact.
   2. Leave face of fill slope loose and uncompacted—4.6" deep—
      do not back blade in final grading.
   3. Groove on contour—grooves approx. 3" deep + 12" apart.
   4. Vegetate immediately after grooving.

B. 3:1 Cut Slope
   1. Groove by discing to even surface for maintenance by mowing.
   2. Grooves approx. 1" - 2" deep and 10" apart.
   3. Vegetate immediately after discing. See vegetative plan.
VEGETATIVE PLAN

Seedbed Preparation (SP)

SP-1 Fill slopes 3:1 or steeper to be seeded with a hydraulic seeder (permanent seedings)
   1) Leave the last 4-6 inches of fill loose and uncompacted, allowing rocks, roots, large clods and other debris to remain on the slope.
   2) Roughen slope faces by making grooves 2-3 inches deep, perpendicular to the slope.
   3) Spread lime evenly over slopes at rates recommended by soil tests.

SP-2 Fill slopes 3:1 or steeper (temporary seedings)
   1) Leave a loose, uncompacted surface. Remove large clods, rocks, and debris which might hold netting above the surface.
   2) Spread lime and fertilizer evenly at rates recommended by soil tests.
   3) Incorporate amendments by roughening or grooving soil surface on the contour.

SP-3 High-maintenance turf
   1) Remove rocks and debris that could interfere with tillage and the production of a uniform seedbed.
   2) Apply lime and fertilizer at rates recommended by soil tests; spread evenly and incorporate to a depth of 2-4" with a farm disk or chisel plow.
   3) Loosen the subgrade immediately prior to spreading topsoil by disk or scarifying to a depth of at least 2 inches.
   4) Spread topsoil to a depth of 2-4 inches and cultipack.
   5) Disk or harrow and rake to produce a uniform and well-pulverized surface.
   6) Loosen surface just prior to applying seed.

SP-4 Gentle or flat slopes where topsoil is not used.
   1) Remove rocks and debris.
   2) Apply lime and fertilizer at rates recommended by soil tests; spread evenly and incorporate into the top 6" with a disk, chisel plow, or rotary tiller.
   3) Break up large clods and rake into a loose, uniform seedbed.
   4) Rake to loosen surface just prior to applying seed.
Seeding Methods (SM)

SM-1 Fill slopes steeper than 3:1 (permanent seedings)

Use hydraulic seeding equipment to apply seed and fertilizer, a wood fiber mulch at 45 lb/1,000 ft², and mulch tackifier.

SM-2 Gentle to flat slopes or temporary seedings

1) Broadcast seed at the recommended rate with a rotary seeder, drop spreader, or cultipacker seeder.

2) Rake seed into the soil and lightly pack to establish good contact.

Mulch (MU)

MU-1 Steep slopes (3:1 or greater)

In mid-summer, late fall or winter, apply 100 lb/1,000 ft² grain straw, cover with netting and staple to the slope. In spring or early fall use 45 lb/1,000 ft² wood fiber in a hydroseeder slurry.

MU-2 High-maintenance vegetation and temporary seedings

Apply 90 lb/1,000 ft² (4000 lb/acre) grain straw and tack with 0.1 gal/yard² asphalt (11 gal/1,000 ft²).

MU-3 Grass-lined channels

Install excelsior mat in the channel, extend up the channel banks to the highest calculated depth of flow, and secure according to manufacturer’s specifications.

On channel shoulders. apply 100 lb/1.000 ft² grain straw.

Maintenance (MA)

MA-1 Refertilize in early spring the following year. Mow as desired.

MA-2 Keep mowed to a height of 2-4 inches. Fertilize with 40 lb/acre (1 lb/1,000 ft²) nitrogen in winter and again the following fall.

MA-3 Inspect and repair mulch and lining. Refertilize in late winter of the following year with 150 lb/acre 10-10-10 (3.5 lb/1,000 ft²). Mow regularly to a height of 3-4 inches.

MA-4 Topdress with 10-10-10 fertilizer if growth is not fully adequate.

MA-5 Topdress with 50 lb/acre (1 lb/1,000 ft²) nitrogen in March. If cover is needed through the following summer, overseed with 50 lb/acre Koke lespedezza.
<table>
<thead>
<tr>
<th>Area No.</th>
<th>Description</th>
<th>Seeded Preparation</th>
<th>Seeding Method</th>
<th>Mulch</th>
<th>Maintenance Notes</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Steep slopes, low maintenance (3:1)</td>
<td>Bare soil, compacted</td>
<td>SP-1</td>
<td>SH-1</td>
<td>MA-1</td>
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<td>2</td>
<td>Steep slopes, high-maintenance (3:1)</td>
<td>Grassed or sodded</td>
<td>SP-2</td>
<td>SH-2</td>
<td>MA-5</td>
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<td>3</td>
<td>Low-maintenance areas</td>
<td>Mulched, compacted</td>
<td>SP-3</td>
<td>SH-3</td>
<td>MA-4</td>
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<td>4</td>
<td>Summertime</td>
<td>Summer, no seed</td>
<td>SP-4</td>
<td>SH-4</td>
<td>MA-2</td>
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<td>5</td>
<td>Fall (post-construction)</td>
<td>Fall, no seed</td>
<td>SP-5</td>
<td>SH-5</td>
<td>MA-3</td>
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### Table 1: Vegetative Plan

<table>
<thead>
<tr>
<th>Season</th>
<th>Seedling</th>
<th>Maintenance</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Spring</td>
<td>Tall fescue</td>
<td>Rye grain</td>
<td>MA-1</td>
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<tr>
<td>Fall</td>
<td>Kobe lespedeza</td>
<td>German millet</td>
<td>MA-5</td>
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<tr>
<td>Winter</td>
<td>Rye grain</td>
<td>Kobe lespedeza</td>
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### Table 2: Seeding Mixture

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<th>Season</th>
<th>Mixture</th>
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<tbody>
<tr>
<td>Spring</td>
<td>Rye grain</td>
<td>MA-1</td>
</tr>
<tr>
<td>Fall</td>
<td>Kobe lespedeza</td>
<td>MA-5</td>
</tr>
<tr>
<td>Winter</td>
<td>Rye grain</td>
<td>MA-2</td>
</tr>
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### Table 3: Permanent Seeding Mixture

<table>
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<th>Season</th>
<th>Mixture</th>
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<tbody>
<tr>
<td>Spring</td>
<td>Rye grain</td>
<td>MA-1</td>
</tr>
<tr>
<td>Fall</td>
<td>Kobe lespedeza</td>
<td>MA-5</td>
</tr>
<tr>
<td>Winter</td>
<td>Rye grain</td>
<td>MA-2</td>
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