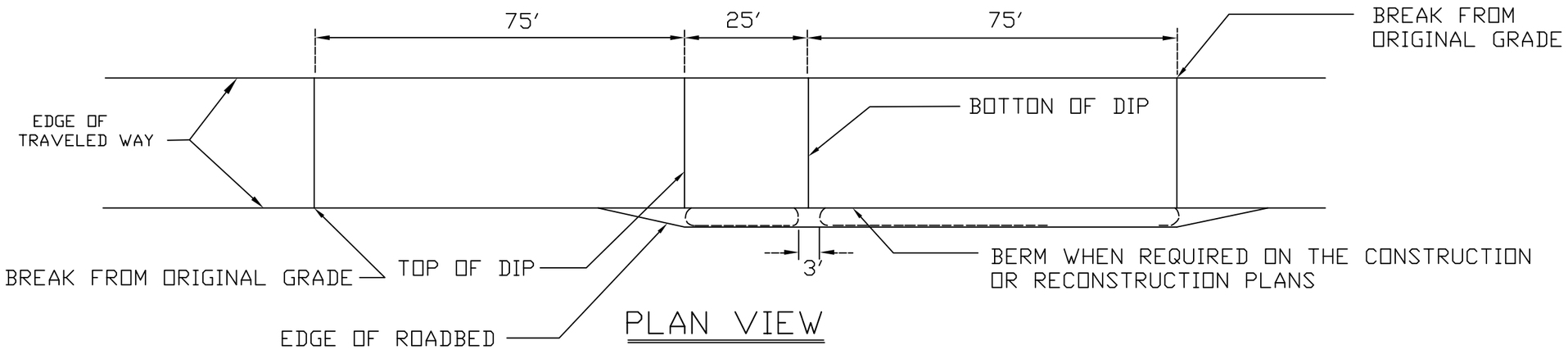
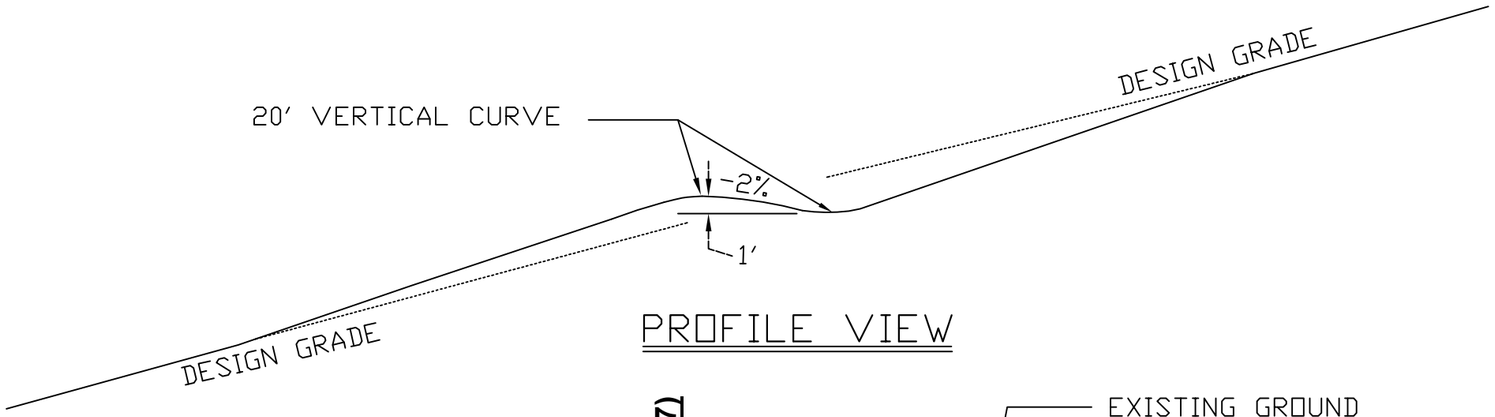
ROLLING DIP DETAIL

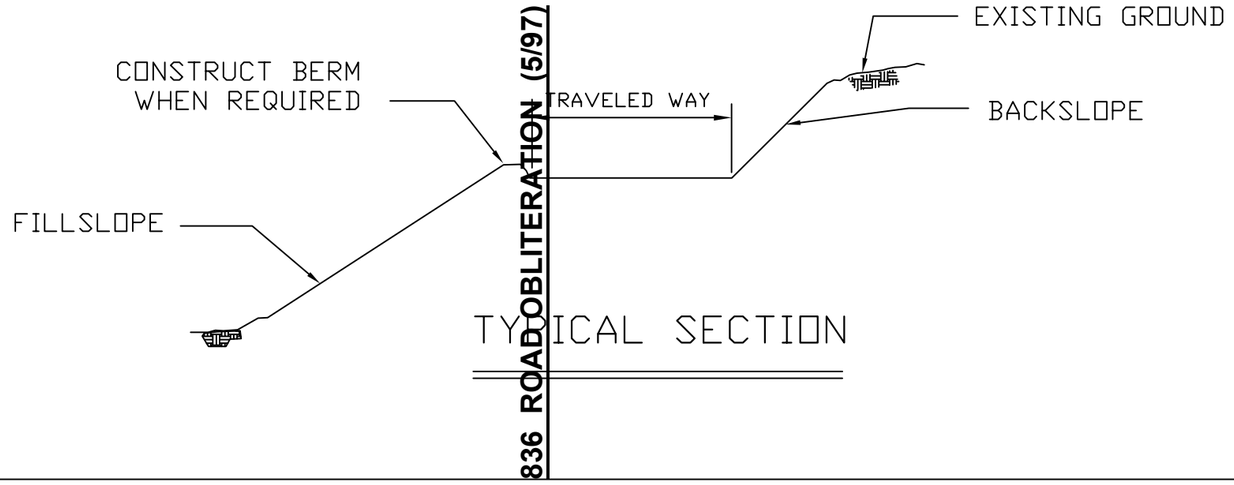
NO SCALE



PLAN VIEW



PROFILE VIEW



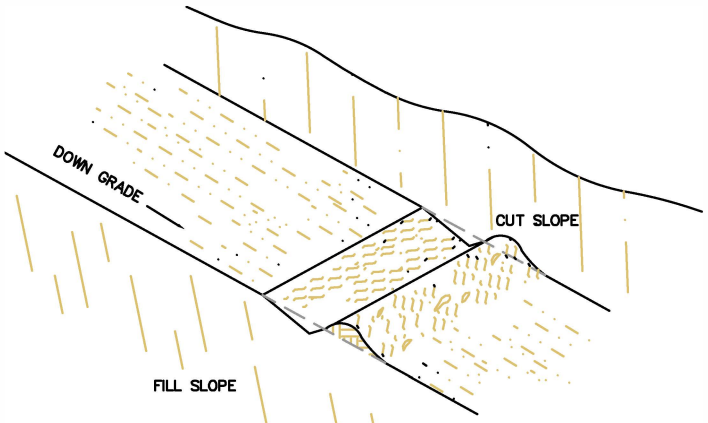
TYPICAL SECTION

ROLLING DIP DETAIL		
PROJECT NAME	SHEET NUMBER	OF SHEETS

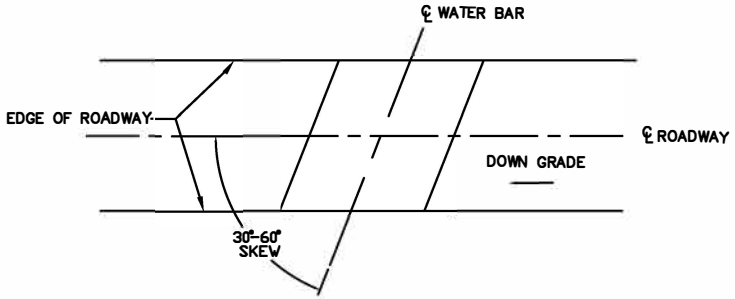
WATER BAR DETAIL

For Use on Open Roads

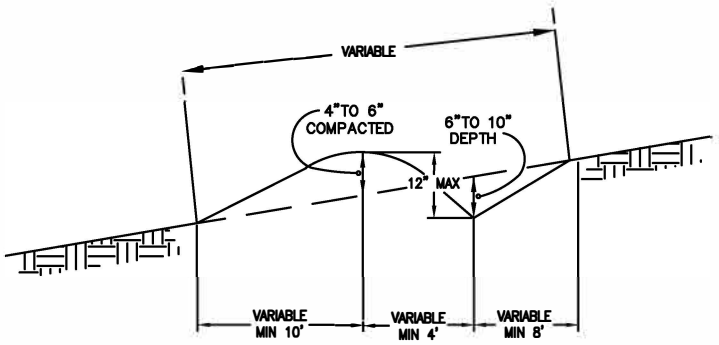
NO SCALE



PERSPECTIVE VIEW



PLAN VIEW



PROFILE VIEW

NOTES:

1. ALL WATER BARS SHALL BEGIN AT THE INTERSECTION OF THE ROAD BED AND CUT SLOPE AND RUN ACROSS THE ENTIRE WIDTH OF ROADBED.
2. ALL WATER BARS SHALL HAVE FREE FLOWING OUTLETS
3. WHEN STAKES ARE USED, THEY SHALL DESIGNATE THE OUTLET LOCATION
4. WATER BARS SHALL BE SKEWED AS SHOWN IN PLAN VIEW

WATER BAR DETAIL		
PROJECT NAME	SHEET NUMBER	OF SHEETS

Specifications

Construction Requirements

204.04 Preparation for Roadway Excavation and Embankment Construction. Clear the area of vegetation and obstructions.

204.05 Conserved Topsoil. When designated, conserve topsoil from roadway excavation and embankment foundation areas. Stockpile conserved topsoil in low windrows immediately beyond the rounding limits of cut and embankment slopes or in other approved locations. Separate conserved topsoil from other excavated material.

204.06 Roadway Excavation. Excavate as follows:

(a) Rock cuts. Blast rock according to Section 205. Excavate rock cuts to 6 inches (150 millimeters) below subgrade within the roadbed limits. Backfill to subgrade with topping or other suitable material. Compact the material according to Subsection 204.10.

(b) Earth cuts. Scarify earth cuts to 6 inches (150 millimeters) below subgrade within the roadbed limits. Compact the scarified material according to Subsection 204.10.

(c) Drainage Feature. Drainage feature includes construction of all ditches, minor channel changes, drainage dips, catch basins, surface water deflectors, and other minor drainage structures. Compact the material according to Subsection 204.10. Excavate on a uniform grade between control points.

Do not disturb material and vegetation outside the construction limits. Retrieve material deposited outside the construction limits. Dispose of unsuitable or excess excavation material according to Subsection 204.13. Replace shortage of suitable material caused by premature disposal of roadway excavation.

Shape to drain and compact the work area to a uniform cross-section at the end of each day's operations.

204.07 Borrow Excavation. Use suitable roadway excavation in embankment construction. Do not use borrow excavation when it results in excess roadway excavation.

Obtain approval prior to developing a borrow source. Borrow sources must be restored. Do not excavate beyond the established limits. When applicable, shape the borrow source to permit accurate measurements when excavation is complete.

204.08 Preparing Foundation for Embankment Construction. Prepare foundation for embankment construction as follows:

(a) Embankment over natural ground. Remove topsoil and break up the ground surface to a minimum depth of 6 inches (150 millimeters) by plowing or scarifying. Compact the ground surface according to Subsection 204.10.

(b) Embankments over an existing asphalt, concrete, or gravel road surface. Scarify gravel roads to a minimum depth of 6 inches (150 millimeters). Scarify or pulverize asphalt and concrete roads to 6

inches (150 millimeters) below the pavement. Reduce particles to a maximum size of 6 inches (150 millimeters) and produce a uniform material. Compact the surface according to Subsection 204.10.

204.9 Embankment Construction. Incorporate only suitable roadway excavation material into the embankment. When the supply of suitable roadway excavation is exhausted, furnish unclassified borrow to complete the embankment. Obtain written approval before beginning construction of embankments over 6 feet (2 meters) high at subgrade centerline. Construct embankments as follows:

(a) General. At the end of each day's operations, shape to drain and compact the embankment surface to a uniform cross-section. Eliminate ruts and low spots that could hold water.

During all stages of construction, route and distribute hauling and leveling equipment over the width and length of each layer of material.

Rocks too large to be incorporated in the embankment shall be placed on the downhill side, outside the traveled way. Rocks shall be places so that they will not roll or obstruct drainage. Rocks may not be placed against trees, nor hinder the use and the maintenance of the roadbed.

Compact embankment side slopes with a tamping foot roller, by walking with a dozer, or by over-building the fill and then removing excess material to the final slope line. For slopes 1V:1¾H or steeper, compact the slopes as embankment construction progresses.

(b) Embankment within the roadway prism. Place embankment material in horizontal layers not exceeding 12 inches (300 millimeters) in compacted thickness. Incorporate oversize boulders or rock fragments into the 12-inch (300-millimeter) layers by reducing them in size or placing them individually as required below. Compact each layer according to Subsection 204.10 before placing the next layer.

Material composed predominately of boulders or rock fragments too large for 12-inch (300-millimeter) layers may be placed in layers up to 24 inches (600 millimeters) thick. Incorporate oversize boulders or rock fragments into the 24-inch (600-millimeter) layer by reducing them in size or placing individual rock fragments and boulders greater than 24 inches (600 millimeters) in diameter as follows:

(1) Reduce rock to less than 48 inches (1200 millimeters) in the largest dimension;

(2) Distribute rock within the embankment to prevent nesting;

(3) Place layers of embankment material around each rock to a depth not greater than that permitted above. Fill voids between rocks; and

(4) Compact each layer according to Subsection 204.10 before placing the next layer.

(c) Embankment outside of roadway prism. When placing embankment outside the staked roadway prism, place material in horizontal layers not exceeding 24 inches (600 millimeters) in compacted thickness. Compact each layer according to Subsection 204.10.

204.10 Compaction.

Adjust the moisture content of the material to a moisture content suitable for compaction. Fill the interstices around rock with earth or other fine material as practical. Operate hauling and spreading equipment uniformly over the full width of each layer for a minimum of three complete passes.

When compacting with rollers or hauling and spreading equipment is not practical, use approved mechanical tampers for a minimum of three complete passes.

204.11 Drainage Features. Slope, grade, and shape all drainage features. Remove projecting roots, stumps, rock, or similar matter. Maintain all drainage features in an open condition and without sticks, and other debris.

Form furrow ditches by plowing or using other acceptable methods to produce a continuous furrow. Place excavated material on the downhill side so the bottom of the ditch is approximately 18 inches (450 millimeters) below the crest of the loose material. Clean the ditch using a hand shovel or other suitable method. Shape to provide drainage without overflow.

204.12 Sloping, Shaping, and Finishing. Complete subgrade, slopes, drainage features, culverts, riprap, and other underground minor structures before placing aggregate courses. Slope, shape, and finish to the designated tolerance class C as defined in Table 204-2 as follows:

(a) Sloping. Leave earth slopes with uniform roughened surfaces, except as described in Subsection 204.12(b), with no noticeable break as viewed from the road. Except in solid rock, round tops and bottoms of slopes including the slopes of drainage ditches. Round material overlaying solid rock to the extent practical. Scale rock slopes. Slope rounding is not required on tolerance class D through M roads.

If a slide or slipout occurs on a cut or embankment slope, remove or replace the material and repair or restore damage to the work. Bench or key the slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

(b) Stepped slopes. Where required, construct steps on slopes of 1⅓V:1H to 1V:2H. Construct the steps approximately 18 inches (450 millimeters) high. Blend the steps into natural ground at the end of the cut. If the slope contains non-rippable rock outcrops, blend steps into the rock. Remove loose material found in transitional area. Except for removing large rocks that may fall, scaling stepped slopes is not required.

(c) Shaping. Shape the subgrade to a smooth surface and to the cross-section required. Shape slopes to gradually transition into slope adjustments without noticeable breaks. At the ends of cuts and at intersections of cuts and embankments, adjust slopes in the horizontal and vertical planes to blend into each other or into the natural ground.

(d) Finishing. Ensure that the subgrade is visibly moist during shaping and dressing; smooth and uniform, and shaped to conform to the typical sections. Remove material larger than 6 inches (150 millimeters) from the top 6 inches (150 millimeters) of the roadbed. Remove unsuitable material from the roadbed, and replace it with suitable material. Scarify to 6 inches (150 millimeters) below the bottom of low sections, holes, cracks, or depressions and bring back to grade with suitable material.

Maintain proper ditch drainage.

204.13 Disposal of Unsuitable or Excess Material. Dispose of unsuitable or excess material at sites designated by the Forest Service

Table 204-2
Construction Tolerances

Location Description	Tolerance Class (a)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Roadbed width (ft)	+0.5	+0.5	+1.0	+1.0	+1.0	+1.0	+1.5	+1.0	+2.0	+2.0	+2.0	+2.0	+2.0
Subgrade elevation (ft)	±0.1	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±2.0	±3.0	±2.0	±3.0	(c)
Centerline alignment (ft)	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±1.5	±2.0	±3.0	±3.0	±5.0	(c)
Slopes, excavation, and embankment (% slope[b])	±3	±5	±5	±5	±5	±5	±10	±10	±10	±10	±20	±20	±20

(a) Maximum allowable deviation from construction stakes and drawings.
(b) Maximum allowable deviation from staked slope measured from slope stakes or hinge points.
(c) Unless otherwise shown the centerline alignment and subgrade elevation, as built, have no horizontal curves with a radius of less than 80 feet, and no vertical curves with a curve length of less than 80 feet when the algebraic difference in the grade change is less than 10 percent, or a curve length of less than 100 feet when the algebraic difference of the grade change is greater than or equal to 10 percent. The centerline grade is not to exceed 20 percent in 100 feet of length.

835 ROADWAY DRAINAGE

1. DESCRIPTION

This work consists of providing drainage on roads that have been physically closed to traffic.

2. DRAINAGE REQUIREMENTS

a. Access

1) The Government will provide for access through locked gates and also provide any special devices other than standard wrenches or tools, required for removal or replacement of fabricated barricades.
2) Other work associated with Contractor's access shall be the responsibility of the Contractor. The entrance shall not be left available for access to persons not associated with this contract; temporary barricades shall be used during the active performance of work.

b. Drainage

1) Upon completion of work, the roadway shall be shaped to provide for the removal of surface water, but need not be passable to vehicles. Waterbars, barriers or berms existing prior to the Contractors operation shall be repaired or reinstalled. Areas where water is ponded by existing centerline profile sags in through cuts may be left untreated.
2) Continuous blade shaping of the roadbed is not required under this specification.
3) Work to be done at staked locations shall be as indicated on the stake and/or stated in Special Project Specifications.
4) Any of the following methods are acceptable for use at eroded or rutted locations.

a) Method A: Outsloping the roadbed at not less than one-half (1/2) inch per foot.

b) Method B: Insloping the roadbed at not less than one-half (1/2) inch per foot of width.

c) Method C: Water bar roadbed at locations staked on the ground or shown in Special Project Specifications. Construct in accordance with Dimensions table and Drawings included with the Special Project Specifications.

Waterbar Dimensions

Percent Road Grade	Length (ft) EF	Length (ft) BC	Rise (ft) at B	Rise (ft) at E
5° & Less	10	20	1.5	1.0
6°	15	25	1.6	1.1
7°	20	30	1.7	1.2
8°	25	35	1.8	1.3
9°	30	40	1.9	1.4
10°	35	45	2.0	1.5

5) Drainage structures located in through fills and natural watercourses shall be fully functional without obstructions, including inlet and outlet channel within twenty (20) feet of the structure.

6) Culverts and other fabricated structures providing drainage from road ditches shall either be cleaned and the ditch made functional or waterbar(s) shall be provided across the roadbed. Fabricated drainage structures discharging on natural ground within three (3) feet of roadbed elevation may be removed at Government's option to provide the waterbar. Removed structures shall become Contractor's property to be removed from National Forest Land. Contractor-installed temporary drainage structures, if any, shall be removed and replaced with a water bar.

c. Slides, Slumps and Slough

1) Slides and slough may be left in place provided they do not potentially impound water or divert water from watercourses. Reshaping of the various surfaces shall be done as necessary to provide drainage.

2) Drainage shall be provided to effectively decrease or eliminate the entry of surface water into slides, slumps, and roadbed surface cracks. The Contractor shall place berms, waterbars or ditches as needed to intercept and remove runoff water from the roadbed. Cracks shall be surface sealed by covering over with native soil materials to prevent additional water entry and compacting with equipment tires.

d. Entrance Devices

1) Upon completion of work, entrance devices shall be replaced to effectively eliminate access by motorized vehicles having four (4) wheels and a width in excess of fifty (50) inches.

e. Seeding

1) All disturbed areas shall be seeded and fertilized in accordance with requirements set forth in Section 841 and are incidental.

836 ROAD OBLITERATION (5/97)

1. DESCRIPTION

This work shall consist of closing designated roads to use by vehicles over 42 inches wide and returning the roadway to resource production using one or a combination of the following items as specified in a written order, listing, or shown on an attached map: removing drainage structures, seeding, fertilizing, scarification, ripping with wing rippers, outsloping roadbed, earth barricade, slashing, and camouflaging road junction.

2. MAINTENANCE REQUIREMENTS

a. Remove Drainage Structures

1) All designated drainage structures such as culverts, metal or wooden open top water diverters, and rubber water diverters shall be removed. Dips and waterbars shall not be removed.

2) Culverts to become the property of the contractor unless specified otherwise and shall be removed from Forest Service Land.

3) Stream channel width after drainage structures have been removed shall be no less than that of existing channel in the vicinity of the inlet and outlet. Stream banks shall be sloped to 3:1 or flatter unless agreed to otherwise. This work is incidental to structure removal.

b. Seeding

1) This work consists of furnishing and placing required seed mix on all areas disturbed under this contract and on any other areas specified. Seeding may not be done until all other ground disturbing work on the road has been completed and accepted. Unless a specific seeding season is listed below, seeding shall be done as soon as other ground disturbing work is accepted.

d. Scarification

1) This work shall consist of seedbed preparation on an existing roadbed by scarification.
2) Scarification shall be accomplished by rippers spaced not more than 6 inches apart and/or with heavy duty gang discs.
3) Scarification depth shall not be less the 3 inches or deeper than 12 inches unless otherwise agreed.

1) e. Ripping with Wing RippersThis work shall consist of subsoiling an existing roadbed by ripping with a winged ripper.
2) The distance between ripper shanks shall not exceed 36 inches. Each shank shall be equipped with a shoe and wings which have a total width of at least 18 inches.

   The design of the shank and wing will be such that the treated soils are slightly lifted and well fractured rather than plowed, mixed or displaced.

3) Ripping shall be accomplished to a minimum depth of 20 inches. The Government may agree to a lesser depth when excessive rock is encountered.

1) f Outsloping RoadbedDesignated roads or segments of roads shall be outsloped by pulling the fill shoulder towards the cut bank. Excavated material shall be spread over the roadbed forming a minimum outslope equal to the existing road grade percent. The Government may agree to a lesser outslope percent if soil conditions warrant.
2) Any existing ditches at the toe of the cut shall be filled with the material excavated during outsloping.

e. Slashing

1) This work shall consist of placing woody material over the roadbed to discourage vehicle traffic.
2) Woody material shall be dead timber and slash removed from an area within twenty five (25) feet of the road shoulders in the vicinity of the areas where it is to be placed.
3) Material shall be placed randomly over the roadbed to give a similar appearance of the surrounding area and may include rocks and other material.

f. Camouflaging Road Junction

1) This work shall consist of manipulating the cut and fill slopes of the designated road so the road template is not obvious. One or more of the following methods will be specified:

   a) When the designated roadway section is a cut-fill section, excavate the fill slope section and place material against the cut section so the designated road is not obvious. The height of the replaced material shall be equal to the existing cut or a maximum of six (6) feet.

   b) When the designated roadway section is a fill section, remove the road fill and place the material as a berm along the road junctioned, creating what appears to be a cut section.