

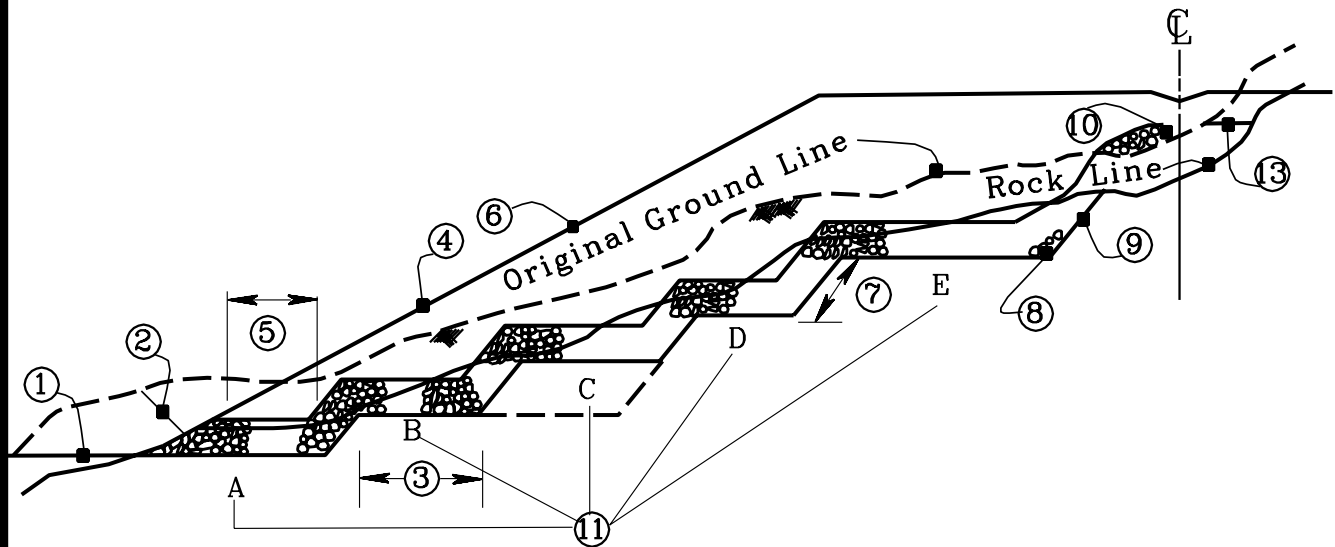
**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DESIGN DIRECTIVE**

DD-404
TYPICAL FILL BENCH AND BERM DESIGN
November 1, 1994

The attached drawings and accompanying notes are for your guidance in fill bench and berm design.

Attachment

TYPICAL FILL BENCH DESIGN

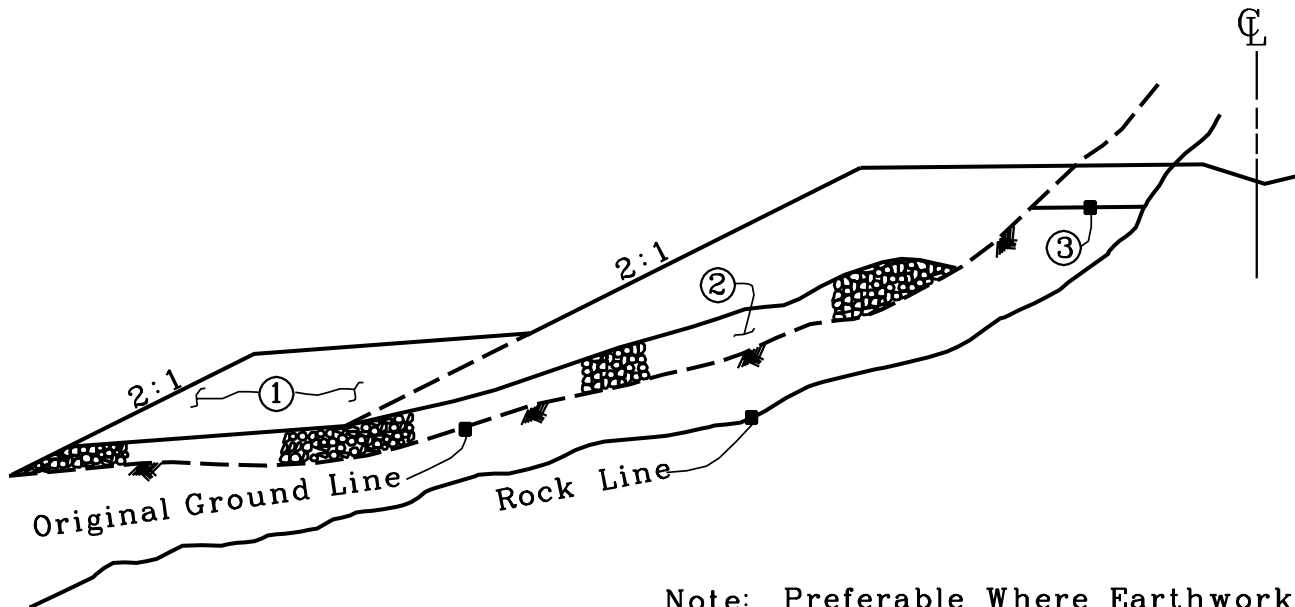


⑫ Note: All Lettered Or Numbered Fill Benches To Be Constructed in Bedrock Or Shale

1. Where possible daylight the excavation on a 20:1 slope away from the embankment.
2. When right-of-way or other considerations dictate, excavation for the toe may be as shown. In some situations, this excavation would be backfilled, and in others left open. Drainage of the Select Embankment should always be obtained either longitudinally or by occasional lateral trenches if the toe is backfilled.
3. Minimum width of the excavated bench is 12'. It is sloped away from the embankment at 20:1.
4. Actual width designed should be a compromise between excavation costs of a few large benches and engineering (survey) cost of many smaller ones.

5. The minimum width of backfill anywhere in the embankment is 12' if all rock, and 12' plus the width of the Select Embankment layer where both the Select Embankment blanket and random material are used. During construction, the width of the Select Embankment blanket may be increased provided that either the full width of the embankment is constructed of rock or that the minimum 12' width of earth backfill shall be retained to allow proper compaction.
6. Select Embankment blankets will be continuous with a minimum thickness of 4' perpendicular to the neat line of the excavation.
7. Height of backslope is variable depending on slope of rock and soil contact. Slope ratio is also variable but since benches are backfilled quickly, the slopes are usually cut steeper than in roadway cuts in comparable rock.
8. The last bench should terminate in the vicinity of the outside edge of the pavement.
9. Slope in soil is variable, but should be flat enough to prevent failure during construction.
10. Select Embankment should be continued on the existing ground as far as considered necessary to provide adequate drainage and stability at the base of the fill.
11. The benches are intended to be generally horizontal longitudinally. Because changes in terrain often cause significant change in the number of benches required on individual cross sections within the same fill, a method of indicating how benches are to be transitioned or eliminated is necessary. This shall be accomplished by lettering or numbering the benches.
12. To eliminate misunderstandings due to the fact that some fill benches are designed to facilitate construction and are not intended to provide stability for the embankment, the note shown on the drawing should be included on each cross section sheet where applicable.
13. Where the roadway template transitions from cut to fill on the cross sections, a transition bench below grade will be designed in the original ground. The bench, intended to reduce the effects of differential settlement, will be shown in the soil portion of the outer slope. It should be 5' deep and terminate either at the rockline or beneath the shoulder. Backfill with random material.

TYPICAL BERM DESIGN



Note: Preferable Where Earthwork Balance Is In Waste

1. Berm size is to be determined by a stability analysis. The stability of the berm itself must be checked, as well as its ability to support the roadway embankment.
2. A minimum 4' blanket of Select Embankment should be used under the fill and the berm.
3. Where the roadway template transitions from cut to fill on the cross section, a transition bench below grade will be designed in the original ground. The bench, intended to reduce the effects of differential settlement, will be shown in the soil portion of the outer slope. It should be 5' deep and terminate either at the bedrock line or beneath the shoulder if the bedrock line is beyond the roadway template. Backfill with random material.