

Example Problem 1C-1_1: Overlay Project

A project has been initiated to repair the pavement on a section of roadway. A pavement analysis concludes that an 8" overlay is required. A 3.5" overlay was previously placed.

Step 1 – Identify the design criteria that may be affected.

In this case, adding 8" of elevation to the roadway and tying into the existing ground will impact one or more of the following:

- Lane width.
- Roadway cross-slope.
- Shoulder cross-slope.
- Shoulder width.
- Foreslopes.
- Clear zone (because it is directly related to the foreslopes).
- Ditch width.

Step 2 – Identify the current values and acceptable ranges from the Initial Design Criteria Tables

For this example, let's assume that this is a rural Expressway on an NHS route. The values from the tables are:

Design Element		Preferred Values		Acceptable – Requires Approval per Section 1C-8		Existing Condition
clear zone (ft) – Refer to Section 8A-2		34		30		Generally 31' to hazards, 2 large culverts at 21' in the median
mainline cross-slope (%)		2%		1.5% min, 3% max		2%
		outside lane	inside lane(s)	outside lane	inside lane(s)	
Design lane width (ft)		12	12	12	12	12
shoulder width (ft) (may include a portion of lane pavement width)		10	6	8	4	10 outside / 4 inside
shoulder cross-slope (%)		4%		2-6% but not less than roadway cross-slope		4% initially rolled down 3" in outside 4' and 1" of vertical drop at edge of shoulder
foreslope (see Roadway Typical Cross Sections)	adjacent to shoulder	10:1 for 4' then 6:1		3:1		4:1 generally, 3:1 in locations
	beyond standard ditch depth and design clear zone	3.5:1		3:1		
	curbed roadways	curbed roadways are not preferred		not steeper than 3:1		
normal outside ditch (depth x width) (ft)		5 x 10		--		5 x 10

Step 3 – Identify all reasonable options and determine how they would affect the design criteria

This project adds 8" of overlay, but must also account for 4" of height due to previous rolled shoulder and edge rut. This is roughly 12" of height to transition into the existing ground. If the previous

overlay can be milled off, then only the proposed 8" must be accommodated. For thick overlays, or overlays on pavement that was previously overlaid, projects will likely require:

- Adding fill to the foreslope for the width of the designed clear zone.
- Installing a barrier, such as high tension cable guardrail, to shield the slope.
- Reconstruction or inlay (3:1 slopes that were previously covered with a design exception will not require a new design exception to be written if the slopes are not changed).

With any of these solutions, it will be difficult to add future overlays without significant upgrades. Therefore, with a thick overlay or inlay, the designer should consider shifting the centerline of the pavement in 1' or 2'. This will allow extra shoulder width to accommodate future overlays on the outside shoulder where foreslope corrections are more costly. Always consult the Pavement Design Engineer to ensure an overlay will be thick enough to prevent reflective cracking before shifting the centerline.

Step 4 – Select the best option

This determination will depend on the design of pavement repair and replacement and associated costs.

Step 5 – Submit the design for approval and document the process (Section [1C-8](#))