

Shoulders shrinking?

When you plan to improve a section of roadway, think about the effect on shoulders and side slope, advises Don Walker, Director of the T.I.C. "It may not be a big deal for any one improvement, but it adds up," he says.

Take a gravel road for example. When you add 6" of new gravel, it can cut 12" off the width of each shoulder or a total decrease of 2 feet in road width if the side slope is 2 to 1. The loss would be even worse if the side slope is flatter, such as 3 to 1. Do this again and you have lost a significant amount of your shoulder width.

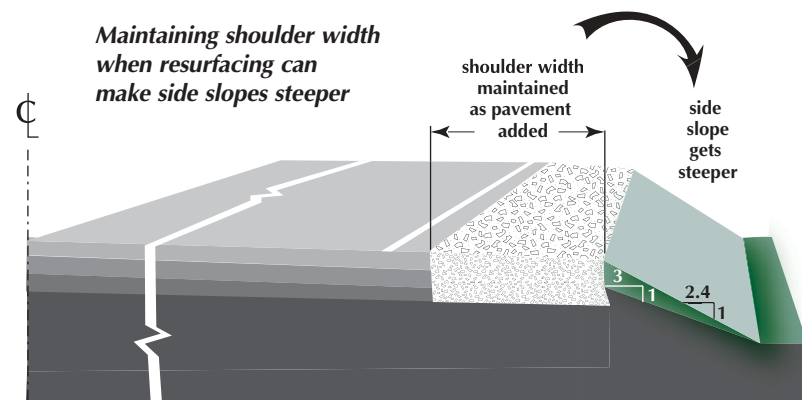
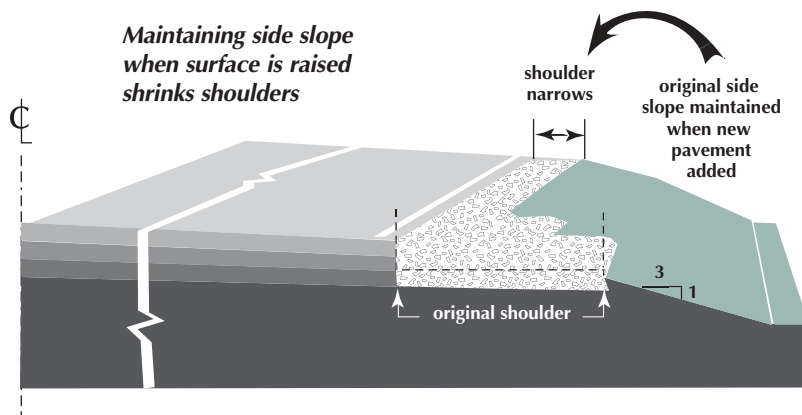
Similarly, if you pulverize an asphalt pavement, mix in new aggregate and lay a new 3" bituminous mat, you raise the road height enough to shrink each shoulder by 6" to a foot if the side slope is 2 to 1! This may make your road non-conforming to the standards for local roads.

"It's a geometry problem," says Walker. "It happens when the construction improvement finishes the shoulder by tapering it at the existing angle of the road side slope."

If you decide to push the shoulders out and retain the shoulder width, then you change the angle of the road side slope. Again, the effect is cumulative. Raise the road 6" and a 3:1 slope now becomes about 2.7:1. Do it twice and your slope is 2.4:1 on a 4' fill—an incline that can cause problems for mowing, erosion, and vehicles that run off the road.

The solution involves measuring shoulder width and calculating ditch slope as part of developing your improvement plans. During construction, operators can move the ditch bottom further away from the road if there is room on the right-of-way or raise the ditch bottom, if the ditch grade allows. "If these options don't work, you can also consider installing pipe along the ditch bottom to eliminate a steep slope, or putting in guardrail," Walker advises. "These are expensive options, so you want to solve the problem through proper grading whenever you can," he adds.

"For both safety and maintenance reasons, it's important to look at the cross-section as a whole—surface, shoulder and ditch—when you're planning an improvement," says Walker.



Height road raised	3"	6"	12"
Loss of shoulder width or ditch relocation (3:1 side slope)	9"	18"	36"
Change in 3:1 side slope (for a 4' high fill)	2.8:1	2.7:1	2.4:1



Measuring slopes is not hard if you have a little training and a couple of common tools. The T.I.C. offers a one-day on-site workshop— "Basic Surveying for Local Highway Departments"—that teaches highway workers and foremen how to do it using a tape and hand level. (See Calendar on page 5.)