

# Subgrade/Subbase Considerations During Reconstruction

Because the subgrade and/or subbase might be disturbed during reconstruction activities, special considerations exist to ensure that uniform support is reestablished.

The subgrade and/or subbase below a concrete pavement might be disturbed during reconstruction activities that require pavement removal such as intersection replacement, utility cuts, inlays, etc. When this occurs, the uniform support that previously was supplied by the existing well- and uniformly-constructed subgrade and/or subbase might be compromised. To ensure that this uniform support is reestablished, several special subgrade and subbase considerations for reconstruction must be addressed. This publication details some of these special considerations and more on these are available in ACPA's **EB204P**, "*Subgrades and Subbases for Concrete Pavements*."



## Special Subgrade Considerations

A reasonably uniform subgrade, with no abrupt changes in support, is ideal for any concrete pavement. Achieving this condition after pavement removal operations will require some additional effort especially in the relatively confined work area of an intersection. The first step is to ensure that the subgrade soils are of uniform material and density.

Compacting the subgrade surface adequately requires a compactor heavy enough to achieve 95 percent of AASHTO T99 density, the same as with other pavement construction. However, it may be difficult to maneuver large compactors in a trench created by removing an older pavement for an intersection. A more effective strategy in a confined area may be to apply more compaction effort using smaller equipment, such the vibratory plate compactor shown in Figure 1. Because final trimming disturbs the subgrade surface slightly, additional compaction rolling is usually necessary after trimming.

The soil moisture content should be reasonably uniform during compaction; excessively wet or dry spots require correction to produce reasonable uniformity. For most soils, compaction should be performed at moisture contents at or slightly above optimum.

Soft spots in the subgrade often become visible after removing an old pavement. It is not acceptable to merely place a granular layer over these soft areas; excavation is necessary to remove the suspect soils. Ideally, the replacement soil should be of the same type as in the surrounding subgrade to develop uniform support.

Contractors must pay particular attention to sections of the subgrade overlying any utility installations such as sewers, telephone and power conduits and water lines. Careless compaction of fill materials in these trenches often causes loss of support soft spots. Controlled low-strength fill (flowable-fill) materials are an economical alternative for these areas.



Figure 1. Recompaction of the subgrade during reconstruction using a vibratory plate compactor.



Figure 2. Flowable-fill being placed inside of a utility trench prior to placement of new concrete surface (City of Lawrence, KS).

Flowable-fill materials do not need compaction and flow easily to fill a trench (Figure 2). The mixtures contain portland cement, sand, fly ash and water and typically develop 28-day compressive strengths of about 50 to 100 psi (0.35 to 0.70 MPa). Flowable-fill materials provide enough strength to prevent settlement, but are easy to remove using a bucket on a back hoe or front-end loader if future excavation is necessary.

## Special Subbase Considerations

Once the subgrade has been prepared with the special considerations discussed earlier in this publication, a new or replacement subbase must be placed. All placement techniques, compaction requirements (Figure 3), trimming tolerances, etc. are the same as for new construction, but some consideration must be made for the size of the work area.

For large intersections, contractors may use automatic trimming equipment to shape the subbase and deposit any excess material outside the paving area. For fixed-form paving, the automatic trimming machine rides on the forms after they are fastened into place. For slipform paving, the trimming machine references the stringline(s) for the slipform paving machine.

On small projects and in confined work zones it may not be practical to use automatic trimming equipment and the contractor will probably trim the grade with a motor grader or small loader.

Because final trimming disturbs the subbase surface slightly, additional compaction rolling is usually necessary after trimming.



*Figure 3. Compaction of a cement-treated subbase in a large area using a vibratory roller.*



## References

City of Lawrence, KS, [http://www.lawrenceutilities.org/Downtown\\_Project\\_2006.shtml](http://www.lawrenceutilities.org/Downtown_Project_2006.shtml).