

XI. ASSOCIATED CONSTRUCTION ACTIVITIES

Once the pavement is placed, there are other activities that must be accomplished before the roadway can be opened to traffic. These are a part of the paving contract and therefore are a part of the project and the inspection duties. The following sections describe the earth shoulder construction, longitudinal subdrain construction, and the granular shoulder construction. This is the order that they are normally accomplished.

A. Earth Shoulder Construction.

Article 2123, Road Standard RH-37D

Construction of earth shoulders adjacent to new PCC pavements should begin shortly after pavement has reached maturity and has been opened to the contractor's vehicles. Specification 2123.02 states that "Adequate organization and equipment shall be assigned to this work so that the major portion of shouldering work may be completed within six days after the pavement or base is released by the engineer to the contractor for shoulder work. Active enforcement of this specification encourages timely completion of project and helps shed water to the foreslope and ditch area instead of trapping it in the subgrade trench.

Completion of earth shoulder work prior to subdrain operations ensures direct contact between the porous trench and bottom of granular shoulder. Contract documents will show typical details and quantities and contract items to be used for this work.

Class 10 or specified material is hauled in dump trucks or scrapers to desired locations. Material is spread and leveled with a dozer or motor patrol and compacted as per specifications. Then shoulder areas are trimmed to desired elevation by a motor



Depositing and spreading earth shoulder material



Compaction of earth shoulder material



Shoulder after compaction and prior to final finishing

patrol. The shoulder area is now ready for subdrain operations.

A common problem that both the contractor and the inspector must watch closely is the difficulty in blading and compacting the shoulder material immediately next to the edge of the pavement without damaging the edge. The motor patrol and roller can bump into the edge of the slab and chip off the top edge of the concrete. The inspector needs to watch for this type of damage and have the contractor change procedures if it occurs frequently.



Chipped slab edge from finishing equipment

B. Longitudinal Subdrains

Article 2502, 4143, 4141, 4131, 4109

Road Standard RF-19C, & RF-19E

The construction of shoulder subdrains will consist of furnishing and installing subdrain of the size shown in the contract documents. The subdrain will be installed at the locations and to the grades and elevations shown in the contract documents.

Pipe for subdrains will be of the size and type shown in the contract documents and will meet requirements of Section 4143.

Perforated corrugated polyethylene tubing and fittings will be used. The tubing will be marked with AASHTO M252. The tubing will be perforated with slots. Circular perforations will not be approved.

As per Standard Road Plan, RF-19E, subdrain outlets will be 6 inches (150 mm) corrugated metal pipe meeting requirements of Article 4141.01 or 4 inches (100 mm) corrugated walled PE or PVC pipe with an appropriate coupler.

1. Excavation

The trench for the subdrain is constructed adjacent to the edge of the pavement. It normally is dug with an excavation machine that creates a trench of the proper width and depth.



Excavation of the subdrain trench

2. Placement

Placement of the tubing and porous backfill is usually accomplished with a piece of equipment called a mule. The mule feeds the tubing down to 3 inches (75 mm) from the bottom of the trench. The porous backfill is then dumped from the trucks onto a conveyor belt that conveys it into the mule and in turn filters around the tubing and fills the trench. The vibrators are pulled along with the mule. When the tubing is fed down through the mule, it has a tendency to stretch. The elongation of the tubing should not exceed five percent.

Maximum consolidation will be determined by a trial section, approximately 100 feet (30 m) long. Compaction on this section will continue until maximum consolidation is achieved. Trench rollers will have a minimum trench wheel mass of 2700 kg (6000 pounds).

3. Porous Backfill

Porous backfill material will meet requirements of Section 4131. Aggregate for this material will be either crushed stone or gravel free of clay. The aggregate will meet gradation requirements for Gradation No. 29 of the Aggregate Gradation Table found in Section 4109.

The aggregate for backfill will be wet prior to installation. The Engineer may require a surface application of water.

The aggregate is placed differently according to the depth of the subdrain. For a 2 foot (0.6 m) depth subdrain the aggregate will be placed in one lift. The lift will be compacted with a vibratory compactor, narrower than the trench, to maximum consolidation. For a 3 foot (0.9 m) depth subdrain the aggregate will



Mule placing the subdrain and porous backfill



Trench roller

be placed in one lift. The lift will be compacted with a vibratory compactor and an approved trench roller, narrower than the trench, to maximum consolidation. For a 3.5-foot (1.1 m) or greater depth subdrain the aggregate will be placed in two lifts of approximately equal thickness. The first lift will be compacted with a vibratory compactor narrower than the trench. The second lift will be compacted with a vibratory compactor and an approved trench roller, narrower than the trench, to maximum consolidation.

4. Outlets

Outlets through the shoulder will be installed as shown in the contract documents at approximately 500-foot (150 m) intervals. Additional outlets will be placed at the low point of a vertical curve. The Engineer may adjust outlet locations. Outlets will be covered with porous backfill, and Class A crushed stone will be placed over the porous backfill. This material will be compacted by tamping or vibration. The outlet of all subdrains will be covered with a rodent guard described in Article 4143.01. It is important to note that there are two types of rodent guards for subdrain outlets and that each has its specific use. The RF-19E Road Standard shows both the Grate and Removable Fork type outlets and explains that the Removable Fork type outlets should be used when a recycled PCC subbase is placed under the pavement. This is required to prevent buildup of precipitates that can occur on the mesh type outlet when recycled PCC bases are used. Each location will be marked with an orange metal fence post meeting requirements of Article 4159.09. Only one metal fence post will be required to mark the location of a double outlet.



Outlet placed out to the toe of the foreslope



Subdrain outlet on patio blocks

Standard Road Plan, RF-19E, shows the construction of subdrain outlets.

5. Restoring the shoulder

Shoulder subdrain work will include restoration of the shoulder and foreslope area. Unpaved shoulders will be finished with a minimum depth of 4 inches (100 mm) of granular shoulder material and compacted. Shoulders paved with HMA will be finished with a minimum depth of 6 inches (150 mm) of HMA base or better. They shall be compacted in an initial 4-inch (100-mm) lift and a final lift, which restores the surface flush with not more than 1/4 inch (5 mm), above the adjacent pavement surface. Each lift will be thoroughly compacted with a minimum of three passes with a single vehicle tire loaded to 6000 pounds (2700 kg) and no wider than the trench, or by equivalent compaction with an approved trench roller.

When subdrains are constructed on existing roads, and when removal of the excavated material is required, the material will be loaded directly into the transporting vehicle. If the contract documents do not designate an area to place this material, the Contractor will find his own disposal area.

C. Granular Shoulders

Article 2121

Road Standard RH-37D

Construction of granular shoulders usually will begin after the shoulder area has been restored after subdrain operations. Granular material is hauled in dump trucks to the desired locations. Material is placed on top of the earth shoulder, usually with the aid of a shouldering machine. Then shoulder material is compacted as specified.

The final shape of top of shoulder is attained by blading with a motor patrol. Depth of



Outlet is marked by a metal post



Outlet covered with granular material



The granular material is placed with a shouldering machine

material, cross slope of completed shoulder, compaction, and condition of the earth shoulder are controlling factors to a quality finished product. Generally the granular shoulder work is performed near the end of a project as the top of granular shoulder is the finished product and is highly visible to the traveling public.

As with the earth shoulder construction, the contractor must take care so as not to damage the edge of the new pavement. The final finish roller should not be driven on the slab and be very careful to make sure the roller is not driven partially on the slab edge. This will almost assuredly cause damage to the edge of the pavement.



Granular shoulder ready for the final lift



Final shoulder finish with compaction and brooming of slab



Roller partially on the slab likely causing chipping of the edge