

305.04.06 When an existing drainage structure is to be removed and replaced with a new drainage structure in the same location, the cost to remove the existing drainage structure and a section of the existing pipe will be incidental to the cost of the new drainage structure.

SECTION 306 — UNDERDRAINS, SUBGRADE DRAINS, AND SPRING CONTROL

306.01 DESCRIPTION. This work shall consist of constructing underdrains, subgrade drains, underdrain for spring control, underdrain pipe outlets, and blind drains using pipe, geotextile, and granular material as specified in the Contract Documents or as directed by the Engineer. Cleaning existing underdrain outlets is also included in this work.

306.02 MATERIALS.

No 57 Aggregate	901.01
Concrete Mix No. 2	902.10
Pipe	905
Geotextile, Class as specified	921.09
Securing Pins or Staples	921.09
Flexible Delineator Post and Rodent Screens	As approved by the Office of Materials and Technology

306.03 CONSTRUCTION. The Contractor shall coordinate the field installation of traffic barrier, signs, lighting, and landscaping with the Engineer to avoid any damage to the underdrains, subgrade drains, or outlet pipes. Any damage to the underdrains, subgrade drains, or outlet pipes shall be corrected to the satisfaction of the Engineer.

306.03.01 Excavation. Trenches shall be excavated to the dimensions and grade specified in the Contract Documents or as directed by the Engineer. The sides and bottom of trenches shall be smooth and uniform to prevent tearing of the geotextile when backfilling. Refer to 402.03.01 for excavated material.

306.03.02 Geotextile. Geotextile, when specified, shall be placed in conformance with the Contract Documents. The machine direction of the geotextile shall be parallel to the longitudinal direction of the trench. The geotextile shall be of sufficient width to completely enclose the underdrain trench including any specified overlaps.

The geotextile shall be placed tightly against the underdrain trench to eliminate voids beneath the geotextile. Wrinkles and folds in the

306 UNDERDRAINS, SUBGRADE DRAINS & SPRING CONTROL

geotextile shall be avoided, except when changing trench direction. A minimum 24 in. overlap at the geotextile joint ends or breaks shall be maintained. Geotextile joints and overlaps shall be pinned to securely hold the geotextile in place until placement of the cover material. Longitudinal joints, overlaps, and edges shall be pinned a minimum of 50 ft on center.

Damaged geotextile shall be replaced or repaired as directed by the Engineer at no additional cost to the Administration.

306.03.03 Pipe Placement. Underdrain pipe shall be placed in conformance with the Contract Documents. The slope of the underdrain pipe shall be so that positive drainage toward the underdrain outlet is maintained. Perforated pipes shall be placed with the perforations down and arranged symmetrically about the vertical axis. The ends of trunk lines, wye, tee, or ell laterals shall be plugged as directed by the Engineer. Joints and connections shall be in conformance with the manufacturer's recommendations.

306.03.04 Outlets. Underdrain outlets shall be constructed in conformance with the Contract Documents.

Underdrains shall be outletted into drainage structures whenever possible. Outlets that empty into a drainage structure shall be positioned a minimum of 6 in. above the normal flow level in the structure and shall be constructed of normal underdrain pipe. A minimum of 18 in. of cover over the pipe shall be maintained. A rodent screen is not required when an underdrain is outletted into a drainage structure.

When outletted to a slope or ditch, the outlet pipe shall slope a minimum of three percent unless otherwise directed by the Engineer. Pipe used for outlets shall be plain, rigid polyethylene (PE), or plain, rigid polyvinyl chloride (PVC) as specified in Section 905. Flexible tube type PE or PVC pipe is prohibited. Geotextile is prohibited for underdrain outlets. A sloped concrete headwall with a removable rodent screen shall be constructed at the end of the outlet pipe in conformance with the Contract Documents. A flexible delineator post shall be placed on the slope headwall unless otherwise directed by the Engineer.

Outlets for longitudinal underdrains shall be spaced at 250 ft maximum intervals, unless otherwise directed by the Engineer, and at the lowest elevation on all vertical curves. When changing the direction of the longitudinal underdrain or outlet pipe, all bends in the pipe shall have a minimum radius of 3 ft to facilitate future cleaning.

306.03.05 Backfill. Trenches shall be backfilled to the dimensions and grades specified in the Contract Documents. Underdrain and outlet

trenches shall be backfilled as the work progresses unless otherwise directed by the Engineer.

- (a) **Underdrain.** Aggregate backfill shall be lightly tamped and screened or raked to provide proper thickness and grade.
- (b) **Outlets.** Backfill shall conform to Section 210.

The Contractor shall replace any geotextile, underdrain pipe, or outlet pipe damaged by excessive tamping.

Longitudinal underdrain shall be covered with the next pavement layer within 72 hours. All other underdrain shall be covered within 48 hours. The Contractor shall protect underdrain, including the geotextile, from contamination by soil fines. Any underdrain trench that becomes contaminated, and any geotextile that becomes clogged, shall be replaced or repaired as directed by the Engineer at no additional cost to the Administration.

306.03.06 Video Inspection and Acceptance. All new longitudinal underdrain and outlets shall be video inspected by the Contractor in the presence of the Engineer as part of final acceptance. When any damage is found it shall be corrected to the satisfaction of the Engineer at no additional cost to the Administration.

306.03.07 Cleaning Existing Outlets. Existing underdrain pipe outlets shall be cleaned and the material disposed of as directed by the Engineer. Existing rodent screens shall be removed and replaced and, where there are no screens, rodent screens shall be installed as directed by the Engineer.

Existing rodent screens damaged due to the Contractor's negligence shall be replaced at no additional cost to the Administration.

306.03.08 Permanent Subgrade Drains. Permanent subgrade drains shall be required when specified in the Contract Documents or as directed by the Engineer. Subgrade drains shall consist of trenches excavated through the shoulder and roadside grading from the edges of the road pavement to a side ditch, embankment slope, or other approved outlet and filled with aggregate. Locations, unless otherwise specified, shall be at low points and shall be spaced at 25 ft intervals for a distance of 125 ft on each side of the low point, then at intervals of 100 ft to within 125 ft of the high point. Before placing the road pavement and before completion of the shoulder paving or final roadside grading areas, trenches shall be cut and shaped 24 in. wide, backfilled to underside of shoulder material and to the underside of specified topsoil thickness in the roadside grading area using size No. 57 aggregate. The portion of the trench within the

306 UNDERDRAINS, SUBGRADE DRAINS & SPRING CONTROL

roadside grading area shall be completely wrapped in geotextile. The bottom of the trench at the end adjacent to the road pavement shall be at least 2 in. below the subgrade unless otherwise directed by the Engineer.

306.04 MEASUREMENT AND PAYMENT. The payment will be full compensation for all excavation, pipe, coupling bands, aggregate, backfill, geotextile, video inspection and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

306.04.01 Underdrains, Underdrain Pipe Outlets, Subgrade Drains, and Underdrain Pipe for Spring Control will be measured and paid for at the Contract unit price per linear foot.

Slope headwalls, rodent screens, and marker posts will not be measured but will be incidental to the cost of the Underdrain Outlet.

306.04.02 When an underdrain pipe is not used for spring control, all excavation and backfill for spring control will be measured and paid for at the Contract unit price per cubic yard for Class 3 Excavation for Incidental Construction and Aggregate Backfill for Underdrain.

306.04.03 When directed by the Engineer, excavation for underdrains, subgrade drains, and underdrain for spring control required to lower the trench to an elevation deeper than specified in the Contract Documents will be measured and paid for at the Contract unit price per cubic yard for Class 3 Excavation for Incidental Construction and Aggregate Backfill for Underdrain.

306.04.04 When measuring the length of a manufactured connection (tee, elbows, etc.) other than coupling bands, each actual linear foot will be doubled and payment made at the Contract unit price per linear foot for the appropriate underdrain pipe item specified in the Contract Documents.

306.04.05 Cleaning Existing Underdrain Outlets will be measured and paid for at the Contract unit price per each. The payment will be full compensation for locating outlets, removing and replacing the existing rodent screens, removal and disposal of material removed from the pipe, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.