**HORIZONTAL DRAINS:**

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| (12-17-19) |  | SP8 R17 |

**Description**

Construct horizontal drains for slopes, rock cuts and retaining walls in accordance with the contract and Geotechnical Standard Detail No. 817.01. A horizontal drain typically consists of a slotted PVC pipe placed in a drilled hole inclined at an angle above horizontal but in some holes, the pipe may be omitted. Horizontal drains are required to drain water from slopes and rock cuts and from behind retaining walls at locations and elevations shown in the plans and as directed.

**Materials**

Refer to Division 10 of the *2018* *Standard Specifications*.

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| **Item** | **Section** |
| PVC Pipe | 1044-6 |

Use solid and slotted PVC Schedule 40 or 80 pipes as shown in the plans for drain pipe. Provide slotted PVC pipes with 0.01" wide horizontal slots in the direction perpendicular to the pipe length and evenly spaced around and along pipe so that open area is at least 1 sq in per linear ft of pipe.

**Construction Methods**

The Engineer will determine the number, locations, elevations, inclination and lengths of horizontal drains required. The approximate known drain locations, elevations, inclination and lengths are shown in the plans. Drain pipe requirements including those drains without pipes will also be determined by the Engineer and known pipe information is shown in the plans.

Use drill rigs of the sizes necessary to install horizontal drains and with sufficient capacity to drill through whatever materials are encountered. Drilling through boulders, cobbles and rock lenses may be required but drilling in continuous intact weathered or hard rock as determined by the Engineer is not required unless drain pipe is omitted. Drill straight and clean holes with the dimensions and orientation shown in the plans or as directed. Drill holes within 6" of planned locations and elevations and 2° of required inclination.

For horizontal drains with drain pipes, do not insert PVC pipes into drill holes until hole locations, elevations, dimensions, inclination and cleanliness are approved. Insert drain pipes through hollow stem augers or into open clean drill holes. Do not vibrate, drive or otherwise force pipes into holes. If a drain pipe cannot be completely and easily inserted into a drill hole, remove the pipe and clean or redrill the hole.

Extend solid PVC sections of drain pipes out past slope face far enough to connect pipe to a drainage system or discharge water as directed. Seal all around drain pipe at collar of drill hole with a method acceptable to the Engineer. Record horizontal drain number, location, elevation and installation date, description of drilling conditions and completed drain pipe, if applicable, and drill hole diameter, length and inclination for each horizontal drain and provide this information to the Engineer.

**Measurement and Payment**

*Horizontal Drains* and *Horizontal Drains Without Pipes* will be measured and paid in linear feet. Horizontal drains will be measured as the linear feet of hole drilled and no measurement will be made for any pipes installed in or extending out from drill holes.

The contract unit price for *Horizontal Drains* will be full compensation for providing labor, tools, equipment and drain materials, drilling and removing cuttings, installing, connecting and sealing around drain pipes and supplying PVC pipes, pipe fittings, sealing materials and any incidentals necessary to construct horizontal drains. The contract unit price for *Horizontal Drains Without Pipes* will be full compensation for the same except for pipe and sealing items.

Payment will be made under:

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| **Pay Item** | **Pay Unit** |
| Horizontal Drains | Linear Foot |
| Horizontal Drains Without Pipes | Linear Foot |