

# Union Pacific Public Projects – Geotechnical Requirements

## Geotechnical Investigation

The consultant shall conduct geotechnical exploration, using AREMA guidelines where applicable, for soils testing and analysis and provide recommendations addressing general railroad design issues that include but are not limited to:

- Existing soil and groundwater conditions to be encountered within cut and fill areas
- Depth of stripping required prior to excavation and filling operations
- Sub excavation required to remove unstable subgrade conditions
- Benching of new fill into existing slopes
- Sub excavation and stabilization recommendations at culvert locations
- Select placement of borrow materials located on the project, if required
- Compaction recommendations on the project
- Minimal railroad ditch depths as measured between the proposed railroad ditch flow line level and nearest finished shoulder point elevation
- Minimum gradients to facilitate drainage within railroad ditches
- Subballast thickness recommendations. (AREMA method)
- Recommended safe embankment foreslopes and excavation backslopes, based on stability analysis results.
- Local materials specified in the local given State's "Standard Specifications for Highway Construction" handbook
- Series of borings are to generally be performed at quarter mile intervals. Test pits may be utilized to supplement borings as necessary. The location of each series of borings need not be performed at the specific quarter- mile post marker locations but should be selected so as to represent either the prevalent cut or fill scenario within that quarter mile of the project. Each series of borings should have a boring performed atop the existing track grade between the edge of ballast and nearest existing shoulder point, a boring performed at the midslope, and a boring performed within the existing railroad ditch line just off the existing toe of slope. The Geotechnical Consultant is to advance borings to the depth required to obtain stable track and embankment subgrade/foundation conditions.
- At those locations where a series of borings is performed in a cut section, a boring needs to be made from a location atop the cut slope --- possibly just inside the ROW/property line. The purpose of each of these borings is to determine the types of materials that will be encountered during the performance of the grading operations and be available for use as borrow for embankment construction on the project. The minimum depth of exploration at these boring locations should equal the height of the cut as measured from the top of the cut section to a level 5 feet below the proposed railroad ditch flowline elevation. Disturbed soil samples of the predominant borrow materials that will be encountered at these cut locations should be obtained for classification and performance of moisture-density relationship determinations (per ASTM D-1557).
- Borings should be performed at the end of each culvert that will require an extension. Recommendations should be provided for sub excavation and subgrade stabilization required at these locations to limit differential settlement of the culvert structures to an acceptable magnitude.
- Soil borings as required for proposed bridge construction
- Borings should be performed at unique proposed structures such as retaining walls and provide associated geotechnical design recommendations.
- A knowledgeable soils engineer, not a drilling coordinator, helper or head driller, should visit the site and assess where geotechnical exploratory borings are required to be responsive to the projects needs. Consultant should provide recommendations for additional borings, soils testing and analysis believed to be necessary, based on findings of field reconnaissance, to provide stable track foundation conditions throughout the project.
- Geotechnical report, including site map, boring location plan, laboratory test results, moisture-density relationship(s), results of stability analysis, and recommendations for the design topics discussed above is to be provided to the project design engineer in pdf format. UP will decide

how many bound and unbound copies of the geotechnical report need to be provided, not to exceed four (4) copies.

- For locations where an adjacent track is being placed next to a short span structure, the attached geotechnical form is to be included in the general geotechnical report for each specific location that this occurs.