Geotechnical and Utility Engineering Guidance

What is Geotechnical Engineering?

Geotechnical Engineering is a branch of Civil Engineering that involves the application of soils and foundations for construction. Often referred to as Geotech; the activities include boring, trenching, test pits, and other activities which may impact native soils. The purpose of geotech investigation is to assess the soil properties for consideration in engineering and design.

Responsibilities

23 U.S.C. 101 (a)(4) defines preliminary engineering as the location, design, and related work preparatory to the advancement of a project to physical construction. Preliminary design defines the general project location and design concepts and includes activities such as surveys, geotechnical investigations, hydrologic analysis, hydraulic analysis, utility engineering, traffic studies, financial plans, revenue estimates, hazardous materials assessments, other work needed to define the parameters for the final design. These activities may all take place in advance of any NEPA approval for the project. In accordance with 23 CFR 636.103 and 23 U.S.C 101 (a)(4), any such preliminary engineering and other activities and analyses must not materially affect the objective consideration of alternatives in the NEPA review process, such as detailed Section 4(f) evaluations or Section 404 Individual Permits that require multiple alternatives for evaluation.

For ADOT or Local Public Agency (LPA) projects that have been initiated with ADOT where ground disturbing preliminary engineering activities will be undertaken in advance of the overall project NEPA approval, a State Environmental Clearance Memo will be completed. This Memo will document the preliminary engineering activities scope and relevant environmental mitigation to satisfy the requirements of pertinent environmental laws other than NEPA and must be considered prior to any NEPA approval.

Preliminary Engineering Activities Environmental Clearance Process

Geotechnical Engineering

Geotechnical engineering is a branch of Civil Engineering that involves the application of soils and foundations for construction. The associated ground-disturbing activities are often referred to as Geotech. These activities include borings, trenchings, test pits, and pavement coring. The purpose of a geotech investigation is to assess the soil properties for consideration in engineering and design.

At the beginning of the design process, the ADOT Environmental Planner will work with the Project Design Team to determine if and when Geotech activities will be conducted on a project. Geotechnical work should be anticipated for any project with structures; bridges, bridge widening and structural walls. If structures are to be built then avoidance may not be an option and work needed to clear the site for geotechnical work should be undertaken. Therefore, any cleared footprint to build structures will also include any ancillary geotechnical work. Also, The ADOT geotechnical group typically undertakes pavement coring for pavement rehabilitation projects and test pits for work such as shoulder widening.

It is preferred to complete the environmental analysis for the Geotech together with the full project scope of work. In some cases, however, if Geotech investigations are needed early to inform design, then a separate State Environmental Clearance Memo should be completed in advance of the overall project NEPA clearance. Early geotechnical investigations should be coordinated as early as possible with the ADOT Environmental Planner and Geotechnical group to inform scheduling, tasks, and consultant assistance.

When Geotech activities are needed for a project in advance of the overall NEPA clearance, the Environmental Planner should request information, if available, on the location, depth, type of activities, equipment/vehicles needed for work, advance warning signage, and if temporary roads or temporary construction easements (TCE's) are required to access the locations. For projects with complex geotechnical activities or any geotechnical activities that are planned to occur on federal or tribal lands, plan sheets or maps with the needed information are beneficial for expediting environmental review. The geotechnical clearance is for a footprint and exact locations of all geotechnical activities within the footprint are not required.

In addition to working with the Project Team, the Environmental Planner will coordinate with the ADOT Technical Specialists (Biology, Cultural, Hazardous Materials, and Water Resources) to determine the evaluation needed and whether a consultant is needed. Coordination between the Project Design Team and Environmental Planning should be done to minimize and avoid sensitive environmental resources if needed. Considerations for technical evaluations include:

- Cultural Resources: The Historic Preservation Team (HPT) will review the geotechnical activities, identify the consultation requirements, and will inform the Environmental Planner when a cultural resources determination has been completed with information on any requirements such as monitoring or avoidance.
- Biological Resources: The Biological Resources Team will evaluate the geotechnical activities to complete the necessary documentation in coordination with the Environmental Planner, and will provide information on any environmental mitigation requirements.
- Hazardous Materials: The Hazardous Materials Team may complete a database review of the geotechnical activities and identify if there are any known hazardous materials sites or issues in the project area.

- Water Resources: If there is any work in potential waters of the United States (WOTUS), the Wetland Biologist will evaluate the geotechnical activities, complete the required documentation, and will inform the Planner of any permitting requirements or mitigation requirements.

The Environmental Planner should also review for any potential impacts to Section 4(f) properties. A PISA is typically not needed for geotechnical activities. Projects with new ROW or TCEs that require a project PISA should have the project PISA completed in advance of the geotechnical clearance memo if possible.

Following the evaluations, a State Environmental Clearance Memo will be issued for the footprint needed. For larger geotechnical activities, a peer review of the draft State Environmental Clearance Memo is recommended.

For pavement coring activities, a screening review with the technical areas can be completed if there are environmental considerations under other environmental laws that need to be taken into account, such as avoidance of a cultural resource or sensitive habitat. For this screening review, documentation in the project files such as emails or meeting minutes are sufficient, and no State Environmental Clearance Memo is required for this minimal ground disturbance activity unless it is to be combined with larger ground disturbing preliminary engineering activities or assists with communicating larger environmental concerns.

Utility Engineering – Potholing

The purpose of utility potholing is to identify the location of underground utilities for consideration in design and engineering. This procedure commonly involves minimal ground disturbance using standard equipment such as hand tools and a vacuum truck to excavate a typical 1 square foot hole that is 4 feet deep into the ground. Once the utilities are identified and documented, the dirt is returned to its original location and compacted.

Similar to the environmental clearance and coordination process steps outlined for geotechnical activities, the Environmental Planner will work with the project team to determine if and when potholing activities will occur on a project. When potholing activities are needed for a project, the Environmental Planner should coordinate with the Project Design Team and request initial information on the depth, location, type of utilities, and equipment that will be used for the potholing activities.

Once the potholing information is provided by the Project Team, the Environmental Planner will coordinate with the Technical Specialists to evaluate the need for avoidance or minimization measures and any necessary mitigation measure language. This coordination process between the Environmental Planner and Technical Specialists will be documented through email correspondence for the project file. If avoidance, minimization, or mitigation measures are required the Environmental Planner will communicate this information to the Project Design Team and Utility Coordinator. For this screening review, documentation in the project files such as emails or meeting minutes are sufficient, and no State Environmental Clearance Memo is required for this minimal ground disturbance activity unless it is to be combined with larger ground disturbing preliminary engineering activities or assists with communicating larger environmental concerns.