Geotechnical Investigations

This module addresses geotechnical investigations. The information presented is general in that it applies to most geotechnical investigations regardless of the purpose or type(s) of proposed improvement(s). Specifics on the appropriate types and extent of explorations are provided in the individual design modules.

The three references cited at the end of this module contain relevant information that is not provided here and it is recommended that the geoprofessional become familiar with their contents as they may serve as valuable references for investigation work.

This module documents Department standards and procedures for both planning (K and 0 phase) investigations and design (1 phase) investigations. Geotechnical investigations are conducted in the office and in the field, generally in the following order:

- Office work (As-built/Literature review)
- Field investigation (Planning Phase)
- Field investigation (Design Phase)

Office investigations consist largely of literature reviews and discussions with other staff. Field investigations consist of activities performed at the project site to acquire information such as surface mapping, or subsurface investigations using drilling, geophysics and/or the CPT. Field investigations may be performed by the geoprofessional alone or in coordination with Drilling Services, Geotechnical Instrumentation and/or Geophysics. The types of services they offer and the procedures for getting them are presented in their respective modules.

In some cases, more than one geoprofessional from more than one design branch may be performing investigations on the same project. If more than one geoprofessional is working on the project, communicate and coordinate the investigative work with all parties to maximize efficiency.

Investigation Process

The geotechnical investigation for a project begins with a request for a District or Structure Preliminary Geotechnical Report (DPGR or SPGR). The information presented in these planning-phase reports is typically based on the results of a literature review, conversations with knowledgeable staff such as other geoprofessionals or Maintenance personnel, and a limited field investigation. Design phase reports, such as the Geotechnical Design Report (GDR) and Foundation Report (FR), are based on the findings of the planning-phase work and the field investigation, which may include drilling, sampling, testing, and/or geophysical testing.

Office Work

The geoprofessional should become familiar with the proposed project by reviewing the request and plans to determine what work product is being requested. Meet with or at a minimum telephone the client to review the work request. The specifics of the work request will vary depending on the type of work proposed and the project phase. Specific information that should be included in the work request is found in the applicable design module. Location and size of structures, embankments, and cuts should be understood. Discuss the amount of flexibility in the location of structures or other works, and determine the approximate loads to be transmitted.

Consult with other geoprofessionals who have worked in the area or perhaps even on that project. Contact the local Maintenance supervisor to inquire about their experience with the site and invite them to the site visit. They may have information that will be useful in planning the geotechnical investigation and/or that will be documented in the report, e.g. landslide or rockfall history.

The geoprofessional should perform a thorough literature search to become familiar with all pertinent information. Review the relevant design module(s) to identify the types of information needed and the reporting requirements. The following resources should be reviewed during the literature search and prior to the field investigation.

Publicly available resources:

- Geology and topography of the area and site:
  - State Geologic Map
  - California Geologic Survey
  - US Geologic Survey
  - Google Maps
  - Topozone
  - HistoricAerials.
  - Graduate Theses
- Groundwater data are available from the California Department of Water Resources.
- Soil surveys are available from the Natural Resources Conservation Service.
- Liquefaction maps are available from the Association of Bay Area Governments.
- California fault maps (e.g., Alquist-Priolo Earthquake Fault Zone Maps) from the California Geological Survey.
- Environmental, soil, and water information is available at GeoTracker.

Caltrans Internal Information

- GeoDOG for geotechnical reports, lab tests, and Log of Test Borings (LOTB).
- Photolog for a virtual drive-by.
- California Log of Bridges on State Highways

- BIRIS for bridge as-built plans (including LOTB) and maintenance records.
- Document Retrieval System (DRS) for District roadway and maintenance records.
- Caltrans ARS Online for seismic information.
- Aerial photographs are available from DHIPP or the Office of Photogrammetry.
- Bing Maps and Google Maps/Earth offer oblique aerial photogrammerty.

The Caltrans Library at 1120 N Street Sacramento, as well as the California Geological Survey Library (801 K St. 14th Floor, Sacramento) have many reports and references, and can facilitate interlibrary loans.

Field Investigation for Planning Phase

Subsurface investigations utilizing drilling, Cone Penetration Test (CPT) or geophysics are typically not performed in the K and 0 phases, or for non-programmed work. However, if project needs justify these or other non-resourced work, the geoprofessional should propose the work to the Project Engineer (PE) and Project Manager and communicate resource needs through DES Program Project Management to the District. An example would be a proposed bridge site with no available subsurface information but where liquefaction is suspected and would impact foundation and structure types.

The purpose of the planning-phase field investigation is to gather existing site information, evaluate if the proposed work is appropriate, and to support preliminary recommendations. The field investigation is typically limited to a site visit, field observations, mapping, and hand measurements such as lengths, heights, and slope angles. If there are anticipated challenges relating to the design-phase field work, invite the appropriate support representatives along to plan future work. The Project Engineer and the local Maintenance supervisor should be invited.

Specific observations or measurements made will depend on the types of improvements proposed. The geoprofessional should read the relevant design modules and reporting documents to identify the information needed. During the planning-phase field investigation:

- Field-check preliminary plans for accuracy, ideally with the Project Engineer.
- Assess the performance of existing structures and improvements (e.g., scour, slope stability, erosion, and rock fall) as they relate to the proposed work.
- Decide whether the proposed work is constructible as planned. Identify suitable foundation types, and needs for ground improvement or other items that could have significant impact on the scope of work.
- Walk the site with Maintenance. Ask them to identify any problems in the area and their availability to assist with future field work such as traffic control or access road construction.
- Select potential boring locations and related access.
- Determine geophysical testing needs.

- With the PE and Caltrans personnel involved in obtaining permits, determine the need for permits and when to start the permit process.
- Identify potential hazardous materials (i.e. nearby gas station, dry cleaner, etc)
- Determine potential task order needs and discuss with the PE and Project Manager (PM).
- Photograph or video relevant site features and probable exploration locations.
- If drilling is to be performed during the planning phase, refer to the following sections on planning a subsurface investigation for the design phase.

Field Investigation for Design Phase

The design-phase geotechnical investigation begins with a request for a Geotechnical Design Report (GDR) or Foundation Report (FR). The purpose of the design-phase field investigation program is to obtain the engineering properties of the soil or rock and to determine the areal extent, depth, and thickness of each identifiable soil/rock unit that could affect the design of the project, while minimizing exploration costs.

The geotechnical investigation for design should adequately define the subsurface conditions for design purposes, and be consistent with the standards of practice identified in this manual. The extent of the exploration and testing, and the number of measurements of each critical design property in each unit/stratum must give a reasonable degree of confidence in the property measured. Specifics of information needed for design are presented in the applicable design module(s) of the Geotechnical Manual and their references.

The geoprofessional may or may not have been involved in the planning-phase investigation for the project, so the amount of literature review necessary at this time will vary.

Preparing for Site Visit

To prepare for the site visit:

- Review work request for completeness. See the applicable design module, Bridge Memo to Designers (MTD) 1-35 for bridge foundations, or MTD 5-19 for earth retaining structures for the required content. The request must provide adequate information to allow for effective planning of the investigation.
- Speak with the requestor to establish a working relationship and to review the work request. Invite the client to the site visit.
- Review literature and all K- and 0-phase reports. Speak with the report authors, if available.
- Submit a *Site Assessment Questionnaire* to the District Environmental Coordinator. Hazardous subsurface materials could affect the investigation and therefore need to be identified as early as possible. The specifics of hazardous materials present at the site will determine whether or not GS staff can perform the

drilling, CPT, or other investigative work, and determine special precautions needed. If GS cannot perform the field work then the geoprofessional must arrange for a Task Order to have a consultant perform the field work.
- Speak to and invite the local Maintenance supervisor to the site visit.
- If permits are anticipated invite the appropriate district personnel (Right of Way, Environmental, etc.)
- Contact District Surveys to obtain benchmark close to the project.

Site Visit

The objective of the site visit is to prepare for a successful field investigation. In many cases multiple site visits may be necessary to prepare for the subsurface investigation work, such as drilling, CPT, and geophysics. The geoprofessional should:

- Meet with personnel who will support the field investigation, such as the project engineer, maintenance supervisor, and environmental coordinator.
- Review the site and plans with the project engineer. Confirm that the planned work is appropriate. Use of a handheld GPS to locate proposed improvements is helpful.
- Field-check plans, layouts, and cross sections for accuracy with the project engineer.
- Assess the performance of existing structures and improvements (scour, slope stability, erosion, rock fall, etc.) as it relates to the current work. Do not limit observations to just the footprint of the structure, wall, or other improvements being considered. Make note of relevant geologic features within a reasonable distance of the site. Ask the maintenance supervisor for their insight and experience with the site.
- Estimate the type and variability of subsurface conditions. What's expected will help determine the appropriate investigation tools to be used, the number and location of borings, and the sampling needs.
- Identify field investigation methods to be used (drilling, CPT, geophysics) and the preferred order (or staging) or the work. See *Selection of the Appropriate Investigation Method* and *Choosing Boring Locations* below.
- Look for conditions that will affect the location of borings such as:
    - Wetland or other surface water
    - Environmentally sensitive areas
    - Underground or overhead utilities
    - Active rockfall areas
- Evaluate site access, the need for permits and timing of work. Talk with designer about potential for changes to alignments, support locations, wall lengths, etc, and consider these when applying for permits and determining access routes (see *Permitting* below).

- Working with Maintenance and Drilling Services, check access for exploration equipment and determine the best suited equipment type for the site. If site preparation is necessary, determine the type of equipment, such as a bulldozer, that may be needed for drilling equipment access. Note exploration locations and access details on the layout plan and submit this with the *Drilling Request*. District Environmental will need to be involved in any plans to do grading work for site access.
- For projects adjacent to rivers or lakes inquire with the District Environmental if water can be pumped and used for drilling. This will eliminate idle time associated with water resupply.
- Determine the need for traffic control to accomplish the field exploration program (see *Choosing Boring Locations*).
- Locate the benchmark(s) to be used (see *Borehole Location Module*). Create a temporary benchmark closer to the planned exploration locations to make the borehole location task easier on the day of drilling, especially for night drilling.
- Identify geophysical testing needs. (see *Geophysics Module*)
- Mark for utility clearance (see *Utility Clearance* below) and ask Maintenance to mark irrigation and electrical lines at all proposed boring locations.

Follow-up work to the site visit

This may include the following, depending on the nature of the planned field investigation work:

- Submit Drill Request, CPT Request, and/or Geophysics Request. Follow the requesting procedures of the support branch, which are available on the geotechnical manual webpage. Use the current request forms on the GS website under *Client Requests*.
- Drilling Services requires a site preview with the geoprofessional prior to drilling. They may propose a peer review or modifications to the exploration plan (see *Geotechnical Drilling* module).
- Work with Maintenance to finalize site access and traffic control needs.
- Submit pertinent information for permitting to the District (see *Permitting* below).
- Obtain utility clearance (see *Utility Clearance* below).

Selection of the Appropriate Investigation Method

The purpose of the investigation is to acquire the information needed to design the project. The geoprofessional should evaluate As-Built information and utilize it for planning the investigation. This may reduce or eliminate field work. It is often possible to obtain information in several ways. The specific method used can vary depending on equipment availability, access, timing, site conditions, and the planned work. For example, a foundation investigation for a bridge using driven standard plan piles could

use mud rotary drilling, augering, CPT, or the dynamic penetrometer. Sampling could range from none in CPT and penetrometer holes, to visual descriptions and on-site testing of samples using pocket penetrometer, torvane and vane shear, to detailed laboratory testing.

Consider the cost of the investigation including time and dollars, safety, and effects on traffic and maintenance operations. Rather than planning many conventional borings with Standard Penetration Test (SPT) borings, consider using many CPT holes in conjunction with a few conventional borings with SPT. If piles are to be founded on rock or dense soils, consider dynamic penetrometer holes or geophysical testing to delineate the bearing surface. For the cost of one SPT boring it is possible to push about 5 CPT soundings or 20 dynamic penetrometer holes. Weigh the effort versus the cost and desired outcome. Consider Wacker-driven 1-inch soil tubes instead of truck mounted drilling, if clearing new access roads are required for the latter. Instead of drilling in lane closures or at night, consider drilling on city streets, even if it requires an extra boring or two.

Caltrans has the ability to drill borings using wireline/conventional rotary drilling, hollow stem augers, dynamic penetrometer, hand-drilled soil tubes, and CPT. For more details, refer to the Drilling Services webpage or contact the appropriate Drilling Services liaison. In some situations hand or backhoe trenches, geophysical measurements, and surface mapping can replace drilling. Exposure of workers to traffic can be minimized by choosing the CPT and/or dynamic penetrometer (DP) in high traffic areas and correlating results with conventional drilling performed in safer areas. CPT is considered safer because the operator is protected by the truck, and dynamic penetrometer is safer because holes are completed in minutes rather than hours.

When developing a subsurface investigation, consider the various drill methods and sampling needed to achieve the project goals. Augering is cheap for relatively shallow holes and provides instant groundwater information, but it is not suitable for SPT work below the water table or when borehole geophysical measurements are planned. Wireline (self casing) drilling makes it easy for the drillers to maintain stability of the holes and is ideal for borehole geophysics, but their use may mask hole instability. If CIDH piles are being contemplated for the design, then consider at least one hole not using a self-casing drilling method in order to determine if caving is a problem. All methods have limitations. CPT cannot go through very hard or dense layers, or retrieve samples. Augers cannot penetrate hard rock. The dynamic penetrometer provides only relative data. SPT holes require truck or trailer mounted equipment which may require construction of access roads. But each has its use.

Testing should also be appropriate for the foundations and design methods being considered (refer to the relevant design module). In situ and field testing are often quicker and cheaper than lab testing. Where appropriate, use vane shear, pocket

penetrometer, and torvane to determine cohesive shear strength. The pressure meter or dilatometer can determine rock strength in the field.

Consult with the Geophysics and Geology Branch to determine what they can do to reduce the effort (time, cost) and uncertainties in the field investigation. Geophysics cannot provide a description of the soil or rock; however it can be used to evaluate variability of soil and rock in the subsurface, and can provide in situ material properties such as bulk density, shear modulus, and porosity. Shear wave velocity can be obtained directly from a down instrument placed in a borehole at the end of drilling operations, or indirectly from surface wave measurements. Geophysics can be cost-effective for small projects where specific targets are needed, e.g. landslide imaging, borehole geophysics for in situ properties, void detection, subsurface utilities, and rock rippability. For large projects, it may be useful to perform geophysical investigations to determine the uniformity of the subsurface conditions. Based on those results, the number or location of boreholes may be adjusted.

CPT can provide shear wave velocity measurements more cheaply than PS Suspension logging. Consider using the seismic cone even if measurements cannot be made to a depth of 100 feet. Surface wave velocity measurements can also be used in lieu of drilling and CPT in areas with restricted access or rocky conditions.

If a required investigative method is not available in-house, the geoprofessional should work with the appropriate support branch to acquire consultant services.

Choosing Boring Locations and Depth

For many investigations the exact location of boreholes may not be critical. Choosing the location of boreholes is a function of the project and the geology. For example, if the project is a landslide investigation where the slide is occurring on a highly localized geologic feature, such as a thin clay layer, then it may be imperative that the boring be located exactly. If the project is a retaining wall on piles in an area of uniform geology, it may be sufficient to drill a hole up to several hundred feet from the wall layout line. Whenever possible, the borehole locations should be chosen so that the drilling does not require lane closures or expose personnel to traffic. Maintenance can remove barrier rails to allow access to potential boring locations. Drilling on city streets and frontage roads is safer than drilling on highways and freeways. Consider drilling two holes slightly off-site rather than one exactly on-site to lessen exposure to traffic.

Depth of drilling is a function of the project and the geology. If the project foundations are well established, e.g., it is certain that Class 90 Alternative “X” piles will be used, then it makes sense to drill 10 to 20 feet deeper than the estimated pile tip. On the other hand, if there is a reasonable possibility that the proposed pile group foundation may be replaced with single CIDH or CISS piles, then at least some of the exploration borings should be deep enough for design of the CISS or CIDH piles. Consideration of the geology is also important. Where the geology is well exposed and uniform, drilling may

not be necessary. For example, even if VS30 is required for a seismic analysis and the site is homogeneous granite, it may not necessary to drill a 100 foot deep hole to establish the shear wave velocity. The design modules provide general guidance for drilling depths. However, consideration of the geology and project parameters must take precedence.

Minimize encroachment on environmentally sensitive areas (ESA) to save the time and extra work needed to address the special needs of the area. Locations of ESAs are typically shown on the project layout plans. The PE, or the project's environmental staff, should be able to locate the ESAs during the site visit. The Categorical Exemption/Categorical Exclusion (CE) obtained from District Environmental prior to drilling will identify the ESAs and special requirements needed during the drilling process.

Drilling through a bridge deck may be more efficient than using a barge. Drilling through a bridge deck requires the approval of the Bridge Maintenance Engineer to assure that critical structural elements are not damaged by the coring operations.

Utility Clearance

Prior to any excavation into the ground (soil borings, trenching, etc.) the geoprofessional must determine the location of all underground utilities by:

- Researching available information
- Marking the excavation locations and/or limits of potential locations
- Requesting an Underground Service Alert (USA) ticket
- Requesting Maintenance to locate Caltrans utilities
- Verifying that USA members have marked their utilities

Research Available Information

Review existing contract and/or As-Built plans for known utility locations. Consider contacting the Project Engineer and/or Project Manager for utility information. For borings that will be performed on private property or that will be performed in areas inaccessible to USA, contact District Right of Way.

Underground Service Alert

Underground Service Alert is an organization that coordinates location of underground utilities in California. After a USA ticket is created for proposed excavation work, USA contacts their members to mark and identify their underground utilities in the field. USA has two separate call centers for California: Underground Service Alert of Northern California (USA North) and Underground Service Alert of Southern California (USA South, aka DigAlert). The geoprofessional must read the CA Excavation Manual.

The geoprofessional is responsible for complying with California Government Code 4216, "Protection of Underground Infrastructure - Regional Notification Center System." The geoprofessional is responsible for marking the excavation locations, contacting USA to request utility marking, and verifying that all members respond and/or mark. The geoprofessional is then responsible for examining the utility markings and positioning the borehole in a safe location in accordance with USA requirements.

Marking for USA

With white paint, outline the limits of a proposed excavation area large enough to allow adjustments to the borehole location if necessary. An area 50' x 50' or greater is desirable to allow flexibility in placement of the borehole.

In paved areas the drilling location should be marked with white marking paint sprayed on the paved surface. Consider also bringing black marking paint to "erase" (paint over) mistakes made while marking with white paint. In non-paved areas (such as open fields), use stakes, or colored flags. Do not paint when the pavement is wet. Take several cans of marking paint to the site as spray cans nozzles plug-up over time. When marking for USA on busy streets or highways, consider having a second person present to act as a spotter for oncoming traffic.

Requesting and Maintaining a USA Ticket

Ticket requests can be phoned by dialing 811 for USA North (Northern California) or DigAlert at 1-800-422-4133 (Southern California). Both USA North and DigAlert provide a ticket form with the list of questions required for the ticket request. Alternatively, the ticket request can be submitted electronically at either website.

The excavation location is typically referenced to the nearest intersection (e.g., "starting approximately 100 ft. east of the intersection of Folsom Blvd. and 59th Street, mark an area extending 200 ft. east and 300 ft. south"). Call no less than two and no more than fourteen calendar days before digging.

The geoprofessional with firsthand knowledge of the excavation site should request the USA ticket so that any questions by the USA operator has can be answered.

A USA ticket is active for 28 calendar days and must be kept active for the duration of the excavation work. Renew the USA ticket prior to the expiration date if work is to continue past ticket expiration.

Field Meeting

Consider requesting a field meeting with USA members before excavating if planned boreholes are close to underground utility lines, especially when drilling near gas, electric, or pressurized fluid lines.

What to do When USA Members Fail to Respond

If the start date/time has passed and any USA member has failed to respond, the following steps are to be taken:

- **First No Response Follow-up:** Call USA and request USA to send a "*First No Response Follow-up*" to the members that failed to respond. Request the member(s) to call and respond ASAP or call and provide clearance.
- **Second No Response Follow-up:** Wait at least an hour from the first call and request USA to send a "*Second No Response Follow-up*" to the member(s) that have failed to respond. Request the member(s) to call and respond ASAP or call and provide clearance.
- **Third No Response Follow-up:** Wait at least an hour from the second call and request USA to send a "*Third No Response Follow-up*" to the member(s) that have failed to respond. Request the member(s) to call and respond ASAP or call and provide clearance.

The geoprofessional must receive a positive response from all USA members prior to excavation. Do not drill if there is any doubt in utility locations.

Caltrans Utilities

Caltrans is not a member of USA. Contact the Caltrans District Electric Office to mark for electric lines, fiber optic lines used for changeable message signs, etc. Contact the local Caltrans Maintenance for information regarding other Caltrans utilities (water lines, storm drains, etc.). Typically, water lines and storm drains are managed by different Maintenance groups. Maintenance may have utility plans that are not shown on Biris or the DRS websites. Caltrans utility locators are not staffed to handle 48 hour turn-around time for marking utilities like USA. Geoprofessionals should coordinate with each locator to determine their availability to mark utilities.

Other Utilities

Be aware there could be underground utilities whose owners are not members of USA. USA notifies only its members of the planned excavation work. The geoprofessional must work directly with any non-member to locate utilities. Suggestions for identifying possible non-member utilities include: discussion with local Maintenance, District staff, local property owners, and field observation. On private property USA members will typically mark their utilities up to the meter, curb, or sidewalk.

Location of Subsurface Utilities Using Geophysics

The Geophysics and Geology Branch can assist in locating underground utilities using surface geophysical techniques. Consider this when locating utilities at Caltrans facilities where utility information is lacking.

Distance of Boring from Utility

California requires a 24 inch tolerance zone on either side of the outside edge of the underground facility. When excavation is within 24 inch of a facility, the law requires hand exposure and protection of the facility prior to using power equipment.

Power Lines

Always check for overhead power lines. It is Caltrans practice for the drill mast to be at least fifteen feet (depending on the voltage) from all power lines (see table below).

MINIMUM CLEARANCE DISTANCES
(**Modified From:** OSHA 1612.1, Power Line Safety (up to 350 kV) - Equipment Operations)

Voltage (nominal, kV, alternating current)	Minimum Horizontal clearance distance* (feet)
up to 175	15
over 175 to 350	20
over 350 to 550	27
over 550 to 1,000	45
over 1,000	*

Note: The value that follows "to" is up to and includes that value. For example, over 175 to 350 means up to and including 350kV.
*as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.

List of Utility Contacts

A list of utilities, contact names and phone numbers must be available at the work site should unusual or an unexpected situation occur during drilling/excavation operations.

Permitting

The following are the types of permits that may be required in order to perform the field investigation:

- Permit to Enter
- Categorical Exemption/Categorical Exclusion (CE), which may include:
  - Coastal Development Permit
  - Fish and Wildlife Permit
- City/County Encroachment Permit
- Railroad Encroachment Permit
- Boring Permit

The District Project Engineer and District Environmental Coordinator are typically the geoprofessional's primary contacts for permitting. Due to the time it may take to process the permit application through the various agencies, it is important that the

geoprofessional begin the permitting process as far in advance of the subsurface investigation as possible. The following information is generally required for all permits:

- Location and description of proposed work (maps, boring locations, access routes, etc)
- Number of borings/type of work to be performed
- Type of equipment and drilling method to be used for the field investigation
- Estimated dates of work period to be completed
- Anticipated hours of work

The geoprofessional should communicate with the appropriate Geotechnical Support branches (such as Drilling Services, Geophysical Services, and Geotechnical Instrumentation) prior to and during the permitting process so that any particular requirements or recommendations from those branches can be addressed in the permitting process.

The geoprofessional must read and comply with all conditions and special instructions listed for all permits (e.g. training, seasonal restrictions, noise restrictions, pre-work surveys, etc.). The Office of Geotechnical Support branches that are involved in the investigation must also be aware of the conditions and special instructions so they can prepare for and comply with them. If the property owner or governing agency instructs that they are to be contacted prior to beginning the field investigation, the geoprofessional should work with District to determine who will contact the property owner or agency.

The Office of Geotechnical Support branches providing services during the field investigation must be provided a copy of all permits. A copy of all permits must be available on-site during the field investigation.

Permit to Enter

The geoprofessional must obtain legal permission to work on, or traverse across, private property. The two ways to obtain permission are a Permit to Enter or Right of Entry.

The Permit to Enter (PTE) and the Right of Entry (ROE) are contracts between Caltrans and a private property owner that permit the State to enter upon, or traverse across, the land and perform certain work. A PTE for the geotechnical field investigation is usually obtained for a property where no Right of Entry (ROE) agreement has previously been obtained by the District.

Prior to the field investigation, the geoprofessional must contact the District Right of Way to determine if a Right of Entry already exists for the property needed to be accessed. If a Right of Entry agreement exists, the geoprofessional should ask the District Right of Way if the geotechnical field investigation or traversing across the property is covered under the ROE. If so, then no Permit to Enter is needed.

Categorical Exemption/Categorical Exclusion (CE)

- Categorical Exemption: Classes of projects which the Secretary of Resources has determined not to have a significant effect on the environment, and shall, therefore, be exempt from the provisions of CEQA (14 Cal. Code Reg. 15300, 15354).
- Categorical Exclusion: Categories of actions which do not, individually or cumulatively, have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a federal agency (CEQ NEPA Regulations, 40 CFR 1508.40).

Prior to a field investigation that includes soil borings or trenching, Caltrans District Environmental will determine if the work qualifies for a Categorical Exemption /Categorical Exclusion (CE) under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). The time this takes generally depends on whether or not the investigation will enter a streambed or an environmentally sensitive area. If it does, the CE process can take up to two years; therefore it is prudent to begin the CE permitting process as soon as a request has been received for preliminary work. Consider requesting the CE for work outside a streambed separately from the request for work within the streambed. The CE for work outside the streambed will usually be completed first, and with fewer restrictions than the CE for streambed work, so the field investigation outside the streambed is not delayed.

To obtain a CE, contact District Environmental to inquire about their process and to determine whom to send the request to. Some districts may have a formal request process with specific forms; other Districts may not.

At a minimum, the following information must be provided in the request for CE:

- Name of structure or project
- District/County/Route/Postmile
- Project EA and Project Identification Number
- A concise summary of the proposed work/project
- A description of the work, including drilling/trenching/sampling techniques
- Drill cutting disposal
- Vehicles and equipment to be onsite
- Number or borings and/or trenches
- Approximate diameter and depth of borings/trenches
- Estimated number of work days
- Daily work schedule
- Estimated area (square feet) the work will require at each boring/trench location
- Impacts to vegetation (i.e. driving over brush, necessity to trim branches, etc.)

- Maps/satellite photos/digital photos showing boring/trench locations and access routes

Once District Environmental has received a request for CE, they will complete various tasks involving:

- Noise Quality Documentation
- Transportation Air Quality Conformity
- Hazardous Waste Documentation
- Cultural Resources Compliance
- Natural Environment Study Biological Assessment

For streambed work, District Environmental will contact state or federal environmental agencies to determine if additional permits are needed, and will submit the applications to those agencies. Typically the permits needed from state or federal agencies to do streambed work include:

- 1602 "Lake or Streambed Alteration Agreement" from California Department of Fish &Wildlife
- 401 "Water Quality Certification" from Regional Water Quality Control Board
- 404 "Nationwide Permit" from Department of the Army

These permits may require additional information, such as:

- The estimated cost for the site investigation
- The "Agreement Term" requested: (usually under or over 5 years)
- The "Project Term" requested: (calendar term the overall project will be performed; e.g. 2014- 2016)
- The "Seasonal Work Period": (calendar term the site investigation will be performed; e.g. Jan 2014 – Nov 2014)

Coastal Development Permit

A Coastal Development Permit may be needed for field investigations near the coastline. District Environmental will determine if a Coastal Development Permit is needed, and will submit the permit application to the Coastal Commission.

City/County Encroachment Permit

Caltrans does not need to obtain Encroachment Permits for work done within State right-of-way. If the field investigation is outside Caltrans' Right of Way and within a local agency's jurisdiction, an Encroachment Permit may be required. The geoprofessional must contact the city or county Office of Public Works to determine if an Encroachment Permit is needed and what information is required to be provided to that office to obtain the permit. The local agency may require the following additional information to obtain an Encroachment Permit:

- Name, address, and phone number of the Caltrans contact person

- A copy of anticipated traffic control system from the Standard Plans, if lane closures are required

Railroad Encroachment Permit

Caltrans must obtain an Encroachment Permit for work done on property owned by a railroad. It may take a year or longer to obtain the permit, so the geoprofessional should contact District Right of Way Division as soon as possible to request the permit. Typically, the railroads will not allow work close to the railroad tracks (i.e. within 25 ft), therefore the geoprofessional should try to locate borings or field work a safe distance from the tracks.

The railroad requires that a flagman be onsite during the field investigation. The geoprofessional and all field staff must work with the flagman to assure a safe working environment.

Staff who will be onsite during the field investigation are required to attend an online Contractor Safety Orientation Course prior to the site investigation. The geoprofessional must register and pay for the training, and submit a Travel Expense Claim (TEC) for reimbursement. The orientation is valid for one year.

Native American Tribal Requirements

For field investigations on tribal land, or in an area of potential tribal resource impact, the CE will list the special requirements for the investigation. It may be necessary to obtain a Permit to Enter on tribal land if the work is outside of Caltrans' right-of-way. The geoprofessional must contact District Right of Way to determine if a Permit to Enter will be needed.

It is common to have a representative from the tribe onsite during a field investigation. The tribal representative usually looks for archaeological relics that might be unearthed during the work. The geoprofessional will be told by District Environmental who the tribal contact person is, how to contact them, and will work with the geoprofessional to coordinate with them.

Boring Permit

Refer to Geotechnical Manual – Supplement A, which specifies the requirements and procedures to comply with the California Water Code and Local Enforcement Agency (LEA) permit/conditions, and Geotechnical Services Directive GS-01 – *Policy for Borings, Backfilling and Local Enforcement Agency Engagement*.

Additional Permits

Each District may have additional permit requirements that are not listed above. The District Environmental Branches and Right of Way Divisions will be aware of the

permits that may be required in a specific geographical area. The geoprofessional should communicate with those offices to assure that all required permits are obtained.

References

1. "*Subsurface Investigations – Geotechnical Site Characterization*", FHWA NHI-01-031, May 2002
2. "*Geotechnical Engineering Circular No. 5, Evaluation of Soil and Rock Properties*", FHWA-IF-02-034, April 2002
3. "*Manual on Subsurface Investigations*", AASHTO 1988