


Memorandum

*Flex your power!
Be energy efficient!*

To: ALL GEOTECHNICAL SERVICES STAFF

Date: October 27, 2005

From: **JAMES E. DAVIS** 
Deputy Division Chief
Geotechnical Services
Division of Engineering Services

Subject: The Code of Safe Practices for Geotechnical Drilling - 2005

Geotechnical Services (GS) has revised and is reissuing the Code of Safe Practices (Code) for Geotechnical Drilling to ensure the health and safety of GS staff. The Code is to be implemented on all projects involving subsurface boring or drilling operations for geotechnical investigation. The safe practices and procedures contained in the Code apply to all permanent staff, as well as temporary staff, students, Contractors, California Conservation Corps employees, and others who plan or participate in subsurface boring or drilling operations. The practices and procedures in the Code are meant to be task specific and used in conjunction with Departmental Policy and Procedure Memoranda, Safety Orders, and Manual instructions relating to employee health and safety on the job.

GS Office Chiefs are responsible to distribute the code and review with staff on an annual basis. All staff are to read and comply with the code. Please pay particular attention to the Appendix B Special Purpose Codes.

The Office of Drilling Services is tasked with maintaining and updating the Code. As a dynamic document, the Code will need to be revised and updated periodically. Any GS staff member may use the short form in the Appendix at the end of the Code to forward to Drilling Services a comment or suggestion to revise or update the Code.

Attachement

**CALIFORNIA DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES**

**CODE OF SAFE PRACTICES
FOR GEOTECHNICAL DRILLING**

Revised October 24, 2005

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Chapter I

General Safety Rules

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Responsibilities

I. GENERAL SAFETY RULES AND RESPONSIBILITIES

A. Roles and Responsibilities

1. All individuals, including Foundation Driller's, Engineering Geologists, Engineers, and any temporary or part-time staff, are responsible for the safety of themselves and their coworkers on the job.
2. Employees, supervisors and managers are all responsible for safety within their individual duties.
3. Senior Engineering Geologists, Senior Engineers, and Senior Driller's:
 - a) Enforce the safety policies of Caltrans, the Division of Engineering Services (DES), and Geotechnical Services (GS).
 - b) The Senior Engineering Geologist or Engineer in charge of drilling and the Senior Engineering Geologist or Engineer in charge of the project shall approve the Site Safety Plan.
 - c) The Senior Supervisor in charge of developing/implementing the Code of Safe Practices for Geotechnical Drilling (the Code) shall update the Code annually, or more often as needed, and provide a Safety Stand down every 12 months.
 - d) If an alternate work schedule is required to accommodate a traffic management plan or environmental constraints that have limited closure hours or requires a shift change for night work, the Office of Drilling Services (ODS) management will determine the most appropriate schedule based on safety, efficiency, maximizing drilling time, bargaining unit 12 contract rules, class A driving restrictions, and minimizing overtime.
4. Person in Responsible Charge (PiRC) of the field operations:
 - a) As the Engineering Geologist or Engineer assigned to a Geotechnical Design Group who submits the Drill Request, is the person in ultimate charge of the project. The PiRC coordinates all aspects of the field operation with Drilling Services, Geotechnical Support, as well as the District Offices, Structures, and any public or private entity that has an interest in the project or field operation.
 - b) Responsible to develop and implement a Site Safety Plan, have the Plan reviewed and approved by their Supervisor, and briefs the drill crew on the Plan. The features of the Site Safety Plan are included in Section II. A, below.
 - c) Performs on-site tailgate safety meetings as first order of work to discuss with all staff on site the utility clearances, traffic handling plan, physical hazards and other site-specific issues. If the PiRC did not perform utility clearances, the person who did must be on site to perform the tailgate safety meetings and be present for each borehole set up.
5. Party Chief:
 - a) The person in responsible charge of the field site operation. If the PiRC is on site during drilling operations, (s)he is the Party Chief. If the PiRC is not on site, the responsibility may be delegated to another Engineering Geologist or Engineer.
 - b) Responsible to implement the Site Safety Plan during field operations.
 - c) Responsible to communicate to the Lead Driller(s) the operational needs such as the borehole location(s), total depth, sampling plan, etc.
 - d) Responsible to coordinate with the Lead Driller(s) for ensuring safe work practices are followed at the drill site.
 - e) Documents all safety meetings and forwards the meeting reports to ODS.
 - f) Records all information on any safety issue or accident that occurs on the project.

- g) Coordinates with the PiRC (when not on site), District Maintenance, the District Hazardous Waste Coordinator, or any other entity as required, to resolve any problem that occurs during the field operation.
 - h) Has the authority, along with the Foundation Driller Leadworker, to cease field operations when unsafe conditions develop due to weather, traffic, presence of hazardous materials, or any other condition.**
 - i) Has the ultimate responsibility for ensuring safe work practices are followed on any project not involving drilling, such as geophysical surveys and field mapping.
6. Foundation Driller Leadworker:
- a) The person in responsible charge of the drilling operations, crew and equipment.
 - b) Responsible for communication with the Party Chief, and directs the drill crew.
 - c) Responsible to coordinate with the Party Chief for ensuring safe work practices are followed at the drill site.
 - d) Confirms that a Site Safety Plan has been completed and approved, and does not drill before a tailgate safety meeting has been performed by the PiRC or Party chief who developed the Site Safety Plan.
 - e) Checks the Site Safety Plan for underground and overhead utility clearances
 - f) Verifies the directions to medical facilities, that a copy of all permits are on site, and any other features affecting the drilling operation.
 - g) Instructs new crewmembers, or directs a subordinate to instruct new crewmembers, on site-specific safety issues.
 - h) Has the authority, along with the Party Chief, to cease field operations when unsafe conditions develop due to weather, traffic, presence of hazardous materials, or any other unsafe condition.

B. Safety Meetings

1. On site tailgate safety meetings shall be held at the start of each new job and documented on the Safety Meeting Report Form (PM-S-0110). Meetings must occur at intervals not to exceed 10 working days, as required by the Caltrans Safety Manual, and when changing the work zone, the lane closure, or new personnel arrive on site.
2. A staff member as designated by the Office Chief will perform monthly in-office safety meetings.
3. Participation in the annual Safety Stand down is mandatory for all staff involved in drilling at which time, the ODS Supervisors will present any changes to this Code.

C. Personal Protective Equipment (PPE)

1. All personnel working on drill sites shall wear proper safety clothing as required by Chapter 12 of the Safety Manual, including hard hats, eye and ear protection, steel-toed work boots, gloves, and high visibility clothing.
2. All personnel working on drill rigs shall avoid wearing loose clothing or long, free hanging hair that can become entangled in machinery.
3. All personnel shall wear clothing appropriate for the weather conditions.

D. Training Classes

1. Basic First Aid and Cardio-Pulmonary Resuscitation (CPR) Training
 - a) As required by the Caltrans Employee Safety Manual, all Foundation Driller's shall be trained in First Aid and CPR, and receive refresher training at least every two years for First Aid
 - b) Engineering Geologists and Engineers performing periodic field duties shall be trained in First Aid and CPR, and receive refresher training at least every two years for First Aid

2. Hazards Awareness and Hazards Communication Training
 - a) All staff involved with drilling operations shall have completed the Hazards Awareness Training and Hazards Communication Training.

E. First Aid Kits

1. All ODS field staff shall be issued at least a 5-Unit, personal first aid kit. All staff shall have a first aid kit available while on field duties.
2. All ODS drilling equipment, including truck-mounted drill rigs, tenders, and the barge, shall be supplied with at least a 16-Unit first aid kit. The lead worker of the crew operating the equipment is responsible to keep the kit stocked and up to date. It is the responsibility of the driver to check supplies during the vehicle pre-op.

F. Location of Medical Facilities

All personnel working in the field shall be familiar with the location of approved emergency medical facilities in the area, prior to the start of the job.

G. Lane Closure Safety

1. Minimize staff exposure in lane closure as much as possible, especially at night, while maximizing drilling time in necessary lane closures.
2. All lane closures shall be set up and taken down by District maintenance personnel or Contractor. Enter the work zone after the lane closure has been established.
3. Review and be familiar with proper lane closure procedures.
4. No ODS employee shall work in an improperly set-up lane closure.
5. Review and comply with Chapter 9 of the Caltrans Safety Manual and Chapter 8 of the Caltrans Maintenance Manual of Instructions.

H. Night Work Safety

1. Schedule night work in advance to allow employees to adjust their schedules and avoid unnecessary fatigue.
2. Wear required protective clothing:
 - a) Orange or lime-green vests with reflective strips, and
 - b) White coveralls.
3. Use sufficient illumination.
 - a) Traveling public shall be able to identify location where employees are grouped together and engaged in work activities.
 - b) The lighting shall be oriented so that the traveling public is not blinded.
 - c) The intensity of the illumination should not be any brighter than that necessary to perform the work.
4. Review and comply with Chapter 9 of the Caltrans Safety Manual and Chapter 8 of the Caltrans Maintenance Manual of Instructions

I. Motor Vehicle Safety

All GS staff shall:

1. Review and comply with all provisions of Chapter 8, Motor Vehicle Safety of the State Safety Manual, including the reporting of all accidents.
2. Be properly licensed and shall operate State vehicles in compliance with federal, state, and local regulations.

J. Rope Access Work

For the purposes of this section, rope access work is defined as any work where the use of rope(s), technical rock climbing techniques and equipment, are required by ODS management in order to insure the protection of workers, to the maximum extent possible, from sustaining life threatening falls and/or serious injury. Rope Access is further defined in Title 8 (General Industry Safety Orders) of the California Code of Regulations (see Appendix B).

1. General Rules
 - a) Drilling Services management must pre approve all rope access work.
 - b) Solo rope access work is prohibited. A minimum of two climbers is required for any rope access work performed as part of a drill site preview and/or reconnaissance. A minimum of four climbers is required for any rope access work involving site preparation and drilling operations.
 - c) Daily safety and work plan meetings are required prior to the start of any rope access work.
2. Staff Selection and Training
 - a) Because of the inherent danger of such work, the risk of serious, as well as life threatening personal injury cannot be ruled out. Rope access candidates are therefore selected from a list of volunteers and it is understood that each climber has the right and responsibility to abort any rope access work that they deem unsafe.
 - b) Drilling Services management shall select staff from the list of volunteers for eligibility to active climbing status.
 - c) All active climbing personnel must be in good physical health and condition. In addition, active staff must not be working under any modified work agreement as a result of a medical condition or injury.
 - d) Active staff must have completed an initial 16 hour Rock-Climbing Course and remain current by attending an annual refresher course.
 - e) Active staff must possess a valid Basic First Aid and CPR card.
3. Rappelling
 - a) When rappelling, climbers must maintain a minimum of two points of contact with the rope at all times. The primary point of contact must be a CMI Rescue-8 rappel device or equivalent. The second point of contact may be either an approved self-belay device or a safety prusik (6mm minimum diameter accessory cord). All climbers using a safety prusik as the secondary point of contact must be protected from an uncontrolled descent or fall by means of a belay via a secondary rope.
 - b) Prior to rappelling down any rope a simple figure eight knot must be tied a minimum of 4 feet from the end of the rope to prevent accidental separation from the line.
 - c) Depending on the specific harness, all harness straps must be doubled backed through their buckles or tied off with an overhand stopper knot.
 - d) A locking carabiner is required for securing the rappel device to the harness.
 - e) Avoid bounding as well as fast rappels.
4. Rope Usage and Care
 - a) All ropes designated for rope work shall have identification markers on each end (A and B) that list the date of manufacture (or purchased/received date), a unique identification number and length.
 - b) Rope usage shall be recorded in a logbook that accompanies the ropes' storage bag.
 - c) All ropes designated for climbing/rope work shall be retired from service after a maximum of 4 years from date of manufacture or receipt date. Retired ropes shall have their identification markers removed from both ends.

- d) Always inspect a rope before and after each use. If in doubt as to a ropes condition, immediately retire it from service. A questionable rope is not worth the risk of serious injury or your life.
 - e) Never use a designated climbing rope for any purpose other than for what it was intended for. It is never to be used for towing vehicles, hauling heavy equipment, tying down cargo, etc.
 - f) Always store ropes away from heat, sunlight and chemicals. Keep ropes away from acids, alkalis and oxidizing agents. Avoid contact with battery acid and bleach. Avoid contact with petroleum substances such as gasoline and oil.
 - f) Never step on a rope. Stepping on a rope grinds dirt and rock fragments into the rope fiber that may lead to unseen core damage and weakening of the rope over time.
 - g) Staff performing any rope access work where they may be exposed to a potential free fall (dynamic loading) condition, such as traversing or leading beyond or past an anchor/protection placement must be protected by the use of dynamic ropes.
 - h) For ascending operations, the use of mechanical ascenders shall be used in conjunction with static ropes only.
5. Communications
Climbers shall be able to communicate with each other at all times. Two-way radios shall be used whenever distance or distracting background noise (i.e., traffic, drilling equipment, wind, etc.) interferes with normal voice communication.
6. Personal Protective Equipment
- a) All climbers are required to wear a helmet fitted with a chinstrap.
 - b) Climbers who wear prescription eyeglasses must wear a retention band with their glasses at all times. In addition, any eye and/or sunglasses worn during rope work must be impact and shatter resistant. Gloves are not mandatory, however their use is strongly recommended, particularly while rappelling.
 - c) Protective kneepads should be worn when the risk of potential knee injury is apparent, particularly when rappelling down slopes greater than 60 degrees.
 - d) Rugged, leather (or similar man-made material) boots are required for this type of work.
7. Specific Site Safety Plan Requirements
- a) Prior to the startup of any rope access work and as part of the site safety plan, at least one or more locations at, or reasonably close to the job site where clear cellular phone transmission/reception can be established must be noted and all rope team members made aware of them.
 - b) All rope team members must also be made aware of the nearest in-service, landline telephone location to the job site.
8. Protecting the Public and Others
Rope access operations at sites where rock/debris fall potential exists and endangers the public as well as others will require the use of lookouts and/or traffic control.

Chapter II

PiRC /Party Chief's

Safe Work Practices

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Responsibilities

II. PiRC/PARTY CHIEF SAFE WORK PRACTICES AND RESPONSIBILITY

A. Develop the Drilling Plan Package

The Drilling Plan Package is composed of at least three pages, the Drill Request, the Site Safety Plan and the Hazardous Materials Questionnaire. All three forms are provided by ODS, but other attachments may be included as necessary for the project. The following information must be included in the package:

1. Underground and above ground utility clearances. Contact Underground Service Alert (USA) **at least 2 weeks ahead** of the drilling target date to give utility locators the time to complete locating utilities prior to the start of work as defined by law. Perform field meets with utility locators at least a week prior to the start of drilling especially concerning gas, electric, and pressurized fluid lines. Work with Caltrans Maintenance, Electrical, Design, etc, and other non-USA subscribers to locate other utilities not included in the USA ticket. The USA ticket number and expiration date must be forwarded to Drilling Services **at least 2 weeks prior to** the start of drilling. No drilling can commence unless the area to be drilled is clearly marked with white paint, and the known utilities at the site are all accounted for. USA extensions must be called in no later than 2 days prior to the expiration date, as required by law.
2. Traffic Control Plan, contact name, and number. Make the initial contact with District Maintenance at least a month ahead of the drilling target date to obtain traffic control restraints, lane closure dates and advertising periods for specific drilling locations. ODS will confirm the final arrangements with Maintenance for traffic control as required for equipment needs and scheduling. If an alternate work schedule is required to accommodate a traffic management plan or environmental constraints that have limited closure hours or requires a shift change for night work, ODS management will determine the most appropriate schedule based on safety, efficiency, maximizing drilling time, bargaining unit 12 contract rules, class A driving restrictions, and minimizing overtime.
3. Location of nearest emergency medical facility, including a map.
4. Hazardous materials. Submit the Hazardous Material Questionnaire for review as soon as possible. Since ODS must forward questionable sites to the Office of Health & Safety, additional time should be allocated for this review. If hazardous waste is present, include the items required by the Health and Safety Plan prepared by the Office of Health & Safety addressing that hazard.
5. Difficult and/or limited Access. Arrange a field meet with a Senior Driller to determine drilling equipment requirements and access to the project area.
6. Environmental Site Constraints and Permits. Contact the Project Engineer and/or the District Environmental Section, such as a biologist, archeologist, water quality specialist, etc. to obtain environmental site constraints, permits or restricted work process parameters. The ODS should be included early in this process to discuss equipment requirements and accessibility.
7. Permits to Enter. Determine what permits are required to enter the site, such as
 - a) Right of way agreements for access to private property,
 - b) Railroad clearance for drilling on railroad property, drilling within 40 feet of the railroad tracks, or for crossing any railroad tracks to get to the site,
 - c) Fish and Game Permits for drilling within the high-water mark of any water way,
 - d) Local jurisdiction permits as required,
 - e) Army Corp of Engineers for drilling on a levee, etc.

8. Physical Hazard Identification. Note potential or unusual presence of poison oak, snakes, ticks, steep slopes, proximity to water courses, presence of overhead power lines, hypodermic needles, violence toward Caltrans crews from local residents, etc.

B. Implementing Site Safety Plan

1. A preliminary copy of the Site Safety Plan will be supplied to the Scheduling Senior Driller as soon as possible. The final and complete copy should be submitted **at least 2 weeks** prior to the scheduled drilling start date. The Scheduling Senior Driller will supply a copy to the Lead Driller prior to departure so that all necessary tools, equipment and supplies required to complete the job are packed and available at the job site.
2. Discuss and implement the Site Safety Plan at each new job site, and ensure safety meetings occur every 10 working days.
3. Ensures that a Safety Meeting Report Form (PM-S-0110) is properly filled out and signed by all attendees, and provide copies of the Form to ODS.
4. Verifies that all crewmembers attend the safety meeting including the Lead Driller(s), Foundations Driller(s), Student Assistant(s), Volunteer Aides, Contractors, and any California Conservation Corps members present.
5. The directions to the local medical facilities will be verified by driving from the site to the hospital.
6. Copies of all necessary permits will be provided to the Scheduling Senior Driller, Lead Driller or Acting Lead Driller, and any further information relevant to the drilling operation.

C. Work Zone During Drilling Operations

1. The Party Chief will designate the work zone based on site constraints before drilling begins. Preferably, the geotechnical workstation should be set up outside of the immediate drilling work area a distance of at least 1.5 times the mast height away from the drill.
2. Stay alert to drill rig malfunction, falling objects and traffic hazards.
3. Inform Lead Driller of any perceived safety hazards while drilling.
4. Know where the “kill” switch is located on the drill rig.
5. Communicate and coordinate work with local maintenance crews as necessary.
6. Be familiar with any equipment specific hazards as defined by this Code or the Code of Safe Practices supplied by the Contractor for his equipment.

D. Stop Drilling Operations Until Safety Hazards Are Corrected

Every employee on site is responsible to respond immediately to any perceived safety hazard identified by Maintenance, CHP or other authority concerning public safety as well as work zone safety. **Stop drilling operations until all safety hazards are corrected.**

E. Encountering Unexpected Hazardous Materials

If suspect hazardous material is encountered in types or quantities not anticipated when the Site Safety Plan was developed, it shall be of paramount importance to temporarily shut down the drilling operation to maintain the safety of the crew. As soon as hazardous material is suspected, stop drilling and sampling, leaving the equipment as is while doing as follows.

1. The Foundation Driller Leadworker shall contact ODS immediately when suspected hazardous waste has been encountered. ODS has primary responsibility to determine the amount of work, if any, that the crew shall perform in closing down the site.

2. The Party Chief shall assist the Leadworker in all ways possible to determine the severity of the situation, including operating air-monitoring equipment such as an organic vapor analyzer or combustible gas indicator. The PiRC and/or ODS management may contact the District Environmental, and/or the Safety and Health Office for clearance. Before drilling may resume, the PiRC must obtain clearance verification.
3. The Party Chief and Foundation Driller Leadworker shall secure the work site and provide for public safety during the suspension of drilling operations.
4. If it is determined that it is safe to do so, the crew shall containerize the drill cuttings and drilling fluids and backfill the hole with grout.

Chapter III

Driller's

Safe Work Practices

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Responsibilities

III. DRILLER'S SAFE WORK PRACTICES AND RESPONSIBILITIES

A. General Safety Practices.

All Drillers shall:

1. Operate as a team in which every crewmember is responsible for his own safety and that of each of the other crewmembers.
2. Know their individual duties so that work can progress smoothly, efficiently and safely.
3. Stay alert with their minds on their jobs.
4. Stay observant for safety problems and correct them as they occur or report the problem to the lead worker.
5. Use all required and recommended safety equipment.
6. Refrain from engaging in practical jokes around the drilling rig and work site.
7. Get proper rest and nutrition so that they report to work in a physically and mentally fit condition.
8. Never work under the influence of alcohol or drugs, whether legal or illegal.
9. Pass an operational capability test administered by the employee's supervisor or supervisor's representative on each type of equipment the employee will operate on state business prior to operating the equipment unsupervised.
10. Always use the buddy system whenever working on the highway;

B. Driller's are Designated as Safety Sensitive Employees

All Safety Sensitive employees must comply with the requirements of the "Commercial Motor Vehicle Driver Handbook", Caltrans, 2004

C. Motor Vehicle Safety

All Driller's shall:

1. Review and comply with all provisions of Chapter 8, Motor Vehicle Safety of the State Safety Manual, including the reporting of all accidents.
2. Be properly licensed and shall operate State vehicles in compliance with federal, state, and local regulations.
3. Pass a road test administered by the employee's supervisor or supervisor's representative. Every car, truck, tractor and drill rig has its own handling characteristics; every new driver shall learn these characteristics in the company of an experienced driver. Every employee shall be qualified on each type of vehicle/equipment the employee will operate on state business prior to operating the vehicle/equipment unsupervised.
4. Know the dimensions of any equipment (s) he is driving, including the required overhead clearance, and the width, length and weight of the rig. The driver also shall know the load limits for highways and bridges, and be certain that the vehicle is not exceeding those limits. NOTE: Service stations and motels frequently have canopies and electrical service lines that are too low for a drill rig to clear; extreme caution must be used in these areas.
5. Pre-op equipment before leaving the yard and be familiar with operator's manual.
 - a) Equipment that is in an unsafe condition shall not be operated. Notify the Equipment Senior Driller immediately of all vehicle problems.
 - b) Vehicles shall not be used unless the brakes are in sound working order.
 - c) Check logbooks to be sure all scheduled PM's (preventive maintenance) have been completed and the Pre-op, Charge book and Driver's logbook are all current.
6. Check brake connections, pintle hook, and safety chain before towing a trailer.
7. Never overload the tender or any other vehicle.
8. Properly load and secure all cargo.

9. Use proper mounting/dismounting techniques when climbing into and from vehicles/equipment. Face the equipment and use the hand and footholds provided. Do not jump off equipment.
10. Use vehicle ladders to access truck beds. Do not climb on tires.
11. While on state business, seat belts and shoulder harnesses will be used in state vehicles, rental vehicles or private vehicles, or, as the vehicle is equipped.
12. Maintain adequate vision by keeping the windshield, windows and mirrors clean.
13. Keep wipers in good condition.
14. Keep tires properly inflated.
15. Keep slack adjusters on air brakes properly adjusted.
16. Allow engine to reach operating temperature before using full capacity operation.
17. Keep vehicles clear of unsecured objects or materials that could fall off.
18. Keep cab neat and orderly with no loose objects on floor or dashboard.
19. Move their disabled vehicle off the road and set out flares and reflectors or cones, and leave trouble lights on and flashing.
20. Never work under a vehicle unless steps have been taken to prevent it from rolling. In addition to setting the parking brake, chock blocks and/or other methods shall be used to secure the vehicle to prevent movement.
21. Never leave mobile equipment unattended unless the controls are placed in gear or the Park position and the parking brake is set. When parked on a grade, the wheels shall be chocked or turned into the bank.
22. Allow for mast overhang when cornering or approaching other vehicles or structures.
23. Never pick up hitchhikers in State vehicles.
24. Not operate trucks 1-ton and above unless equipped with automatic backup alarms.
25. Never drive onto an off-road site without first walking the route to check for depressions, rocks, stumps, gullies and similar obstacles.
26. Use caution when traveling side-hill. Be conservative when evaluating side-hill capability of the rig; loading of drill rod, tools and equipment may have raised the center of gravity. Whenever possible, travel directly uphill or downhill;
27. Always walk around the truck prior to backing to assure that the area behind the truck is clear of equipment and workers.
28. Use an assistant on the ground to help guide whenever lateral or overhead clearance is close.
29. Never back out of a site onto a highway, unless traffic control is provided.
30. Always position the vehicle in the safest possible place at drilling locations.
31. Never move a drill rig with the mast up.
32. When working in a lane-closure, always have District Maintenance set up the lane closure. Do not enter the lane closure until it is set up. All lane closures must comply with Chapter 8 of the Maintenance Manual. It is the responsibility of all members of the drill crew to be familiar with the provisions of Chapter 8 of the Maintenance Manual; do not work in an improperly set up lane closure.
33. CDL holders required by DMV to wear corrective lenses must wear them at all times performing Safety sensitive duties.

D. Drilling Safety

1. Site preparation
 - a) No drilling, trenching or other underground work shall commence unless an Underground Service Alert (USA) ticket is active for the site and underground utility locations are clearly marked. Walk around the site and look for utilities beyond the boring location not identified in any markings. The PiRC/Party Chief is responsible to obtain the USA ticket; however, it is the driller's responsibility to verify the utilities are located and it is safe to drill.
 - b) Prior to move-in, the site should be adequately cleared and leveled to accommodate the drilling equipment and supplies, and to minimize fire hazard.

- c) Do not commence drilling if tree limbs unstable ground or tripping hazards create unsafe drilling and/or tool handling conditions.
- 2. Blocking the Rig
 - a) Before the mast is raised, the rig must be leveled and stabilized with the leveling jacks.
 - b) Carefully evaluate the drilling site prior to setting the leveling jacks, especially if the location is on water saturated, frozen, or loose, caving soil. Do not set up on sloped ground. If necessary, build up solid, compacted earth where the jacks contact the ground.
 - c) The leveling jacks should be set on timbers of sufficient strength to support the load.
 - d) The drill rig should be re-leveled if it settles after initial set-up.
- 3. Raising the Mast
 - a) Only qualified personnel shall raise or lower the mast.
 - b) Prior to raising the mast, it should be checked for loose objects such as equipment and tools, and inspected for any damaged parts.
 - c) Check Overhead For Obstructions; **BE PARTICULARLY OBSERVANT FOR UTILITY LINES.**
 - d) Raise the mast only after the leveling jacks are down. Do not raise the jacks until the mast has been lowered completely.
 - e) Clear all personnel away from the sides and back of the rig prior to raising the mast; no other work shall be performed in the vicinity of the mast while it is being raised or lowered. Inform personnel in the area that the mast is being raised.
 - f) Before starting drilling operations, secure and/or lock the mast as required by the drill rig manufacturer.
- 4. Equipment Inspection
 - a) Equipment shall be inspected at the start of each shift (pre-op) and at the end of each shift (post-op).
 - b) All major defects and safety defects shall be corrected prior to the start of work.
- 5. All hydraulic hoses, connections, fittings and valves shall be checked and replaced if necessary.
- 6. Notify Senior Driller of any equipment with necessary repairs immediately.
- 7. Drilling Operations
 - a) General Operation:
 - 1) No visitors shall be permitted in the vicinity of the work area without proper protective clothing and authorized permission.
 - 2) Start all engines according to the manufacturer's recommendations, with all gearboxes in neutral, all hoist and hydraulic levers disengaged and the cathead rope, if used, off of the cathead.
 - 3) If the operator of the rig must leave the area of the controls, he operator should shift the transmission controlling the rotary drive and the feed control to neutral.
 - 4) One-person operation of drill rigs is not allowed.
 - 5) All crew members shall be familiar with basic controls of the rig, including how to stop the engines, align the kelly with the borehole, raise and lower the drive head, raise and lower hoists, and chuck or unchuck the rods.
 - 6) The manufacturers' technical specifications for items such as speed, force, torque, pressure, and flow shall not be exceeded.
 - 7) Use the drill rig and tools only for their intended and designed purposes.
 - 8) If drilling in an enclosed area, make certain the exhaust fumes are vented from the work site.

- 9) If drilling with air, the exhaust and cuttings shall be directed away from the workers.
 - 10) Never operate the drill rig with any of the machinery guards removed.
 - 11) Drill rods and sampling barrels should never be left unsecured, leaning against or balanced across the drill rig.
 - 12) Never exceed the pipe and rod racks design maximum load.
 - 13) Always make provisions to prevent stock from accidental rolling.
 - 14) When core is being extruded from a core barrel, hands should be kept out of line of the end of the barrel.
 - 15) Safety chains or cables shall be attached to swivel, air, and other pressure hoses.
 - 16) When cranking pumps or other motors keep head well back of the crank area to avoid being hit when motor turns over.
 - 17) Fugitive dust control is to be used during dry drilling, especially in potential areas of naturally occurring asbestos.
- b) Adding and Removing Drill Rod:
- 1) Only the drill operator shall brake or set the chucks, to eliminate the possibility of engaging the transmission prior to removing the chuck wrench.
 - 2) Do not use the chucks as a brake on a string of drill rods that are being lowered into a hole. Braking the drill string with the chuck will result in metal slivers on the drill rod and consequent hand injuries, and could result in losing the drill rod down the hole.
 - 3) The chuck jaws shall be periodically checked and replaced as necessary.
 - 4) Never place hands on wrenches where they can get trapped between the wrench and the drill rig.
 - 5) Ensure that wrenches are removed from rods before starting to drill.
 - 6) Do not take hold of the male thread end of drill rod. Watch for sharp burrs on rods and casing, and file sharp edges off rods when necessary.
 - 7) Use of extension leverage on pipe wrenches to break drill rod should be avoided whenever possible. If extension leverage is needed, the wrong tool is probably being used. In rare instances where extension is required, use extreme caution to avoid slippage and possible injury.
 - 8) Drill rod shall be cleaned with a rubber wiper or other suitable device when being removed from a hole.
 - 9) Allow drilling fluids to drain from drill rods into the mud pit before setting the rod to the side, to minimize the amount of mud around the work area.
 - 10) The operator shall know the capacity of the hoist and mast, and the weight of the drill rod, to prevent the hoist capacity from being exceeded.
 - 11) The drill rig operator must exercise care to lower the hoist slowly while the drill rod is being carried away from the hole.
 - 12) There should be at all times at least three wraps of hoisting line on the hoist drum to prevent a line load from being applied directly to the fastening clamp.
 - 13) Do not guide or hold onto moving wireline work cables with bare hands.

6. Inclement Weather

- a) Although drilling operations can proceed through a wide range of weather conditions, operations shall cease if weather conditions are severe enough to create a safety hazard.
- b) Safety hazards from weather may include, but are not limited to, low visibility for approaching traffic, inability for the driller's to see, grasp or handle equipment, and rough seas while working on the barge. Other conditions can create safety hazards, and shall be decided in the field.
- c) The Foundation Driller Leadworker and the Party Chief share the responsibility to determine if the severity of the conditions warrants stopping the drilling operation.
- d) Lightning.
 - 1) Never operate a drill rig during a lightning storm.
 - 2) If a storm is moving in, abandon the hole and lower the mast well before the storm is in the immediate vicinity.

E. Working Above the Ground

1. No person shall work 6.5 feet or more above the ground or ascend or descend the mast unless wearing an approved safety harness, correctly fitted and adjusted, hooked onto a climbing safeguard device. No person shall attempt such activity without having first received training in the correct procedures by a competent instructor
2. Tools must either be properly secured to the body when climbing a ladder or be lifted using a hoist line. Always have both hands free and face the ladder when climbing.
3. The rig operator and whoever is working above ground shall work out clear signals prior to ascending the mast.

F. Chemical Safety

1. Know the chemical properties of all additives and substances used during the operation prior to their use. Check the Material Safety Data Sheets in the Right to Know Station in the shop prior to departing for the job.
2. MSDS sheets must be available to the drill crews at all times. Make sure copies of MSDS sheets are located in the trucks and tenders before departing for the job.
3. When mixing mud, use caution to avoid getting dry or wet mix in the eyes. If mix does enter the eyes, flush immediately with clean water. Dust masks or respirators should be worn when mixing grout, dry mud, silica sand or fillers.
4. Goggles or a full-face shield is required when mixing any materials such as caustics that could cause eye burns or injury.
5. Some additives can cause burns or skin rash. Always wash hands face and arms after contact.
6. Fresh cement can cause skin burns upon prolonged contact; always wash hands after mixing or handling cement.
7. Gasoline can cause chemical burns to skin. Wash skin and/or clothes after contact with gasoline.
8. Do not wash clothes in gasoline.
9. Clothing and coveralls that become greasy after a few days shall be changed for clean ones so as not to become a fire or health hazard.
10. Oxygen and acetylene cylinders will be secured upright while on a truck or the ground. When not in use, caps will be placed on the bottles. Gauges and regulators shall be kept clean and free of oil and grease. Regulators and hoses shall be checked before each use and replaced as needed.

G. Augers

1. Do not clean auger flights while the auger is rotating.
2. Use only tight-fitting pins on the auger sections. Replace pins as they become worn.
3. Make sure pins have been adequately tightened prior to entering the hole.
4. Never use mismatched sections of augers.

5. Never lift auger flights by yourself. Have a second person assist or use mechanical methods.
6. Minimize fugitive dust by spraying dry soil with water.

H. Housekeeping

1. Establish a suitable location for storage of tools, equipment and supplies so those items can be safely and conveniently stored and located when needed. Store items so that the work can proceed in an orderly fashion, with sufficient room in the work area to move about without tripping over supplies or equipment. Do not store equipment in places that would interfere with escape routes in an emergency.
2. All tools supplies and equipment shall be kept in their proper places.
3. Every crewmember shall inspect the work site upon his arrival to assure that equipment is in safe condition and the job site is in proper order. Return the job site to proper order prior to proceeding with work.
4. Avoid storing or transporting tools, materials or supplies within or on the mast of the drill rig.
5. Drill rod, casing, augurs and similar tools should be orderly stacked on racks to prevent sliding, rolling, spreading or falling.
6. Work areas, platforms, walkways and other access-ways should be kept free of obstructions such as materials and tools, and substances such as debris, grease, ice and mud, in order to minimize the tripping, slipping and falling hazards around the drill rig.
7. All unattended boreholes must be adequately covered or otherwise protected to prevent drill rig personnel, visitors or animals from stepping or falling into the hole.
8. Used approved cleaning solvents instead of flammable liquids as cleaning agents on or near a drill rig.
9. Never use compressed air for the purpose of cleaning clothes.
10. All trash should be placed in bags and stored in areas outside of the immediate work area.
11. All controls, meters, dials, and operational and warning lights should be kept free of dirt, grease and mud.
12. Keep all flammable liquids in proper containers and stored away from heat and spark sources.
13. All drilling fluids must be contained and disposed off-site, as required by the Storm Water Law of 1997.

I. Maintenance

1. Have all PM's and other scheduled maintenance completed as recommended.
2. Shut down the drill rig to clean, repair or lubricate fittings, unless the adjustment requires the rig to be running. The operator and lubricator must coordinate their efforts to successfully perform the maintenance safely.
3. While performing maintenance, either remove or tag the key to prevent accidental starting of the rig.
4. Apply grease and oil only through oil and grease inlets.
5. Always block wheels lower leveling jacks and set hand brakes prior to working under a drill rig.
6. Whenever possible, reduce operating systems to a zero energy state, that is, release all pressure from hydraulic, drilling fluid and air pressure systems, prior to performing maintenance. Use extreme caution when opening drain plugs, pressure caps, valves, and removing hoses and hydraulic lines.
7. Do not weld or cut on or near a fuel tank.
8. Replace all caps, plugs, clamps, cables and guards prior to returning the rig to service.
9. No alteration shall be made to any part of the mast without permission from the equipment shop.
10. If it should become necessary to drain oil, fuel, hydraulic fluid or any other industrial fluid in the field, do not allow the fluid to drain onto the ground. The fluid must be

caught in a container and disposed of in an appropriate manner. Avoid spillage as much as possible.

11. All cab areas shall be clean and free of loose materials, equipment, tools and unsecured personal items.

J. Electrocutation

1. The most frequent cause of job-related death in the drilling industry is electrocution caused by contact of the drill rig with overhead power lines. Whenever possible, locate borings to avoid any possibility of contact with power lines.
2. If drilling near power lines is unavoidable, maintain at least 20 feet of clearance between the power lines and the mast of the drill rig. Higher voltage lines require additional clearance, according to the following table:

Nominal Voltage (Phase to Phase)	Minimum Required Clearance (feet)
Over 250,000 to 370,000	21
Over 370,000 to 550,000	27
Over 550,000 to 1,000,000	42

3. Always contact the Power Company for advice before drilling near a power line, and determine if the line can be shut down while working.
4. Never raise the mast of the drill without a designated spotter.
5. If contact between the rig and power lines occurs:
 - a) Assume the entire rig to be electrified. Do not attempt to enter or leave the rig or touch any part of it. Although people in the rig may not be affected, anybody touching the rig while in contact with the ground is in danger of being electrocuted.
 - b) Have someone call the power company and the local fire rescue squad immediately for assistance.
 - c) Do not touch any person who may be in contact with the current.
 - d) If a rescue is attempted, use a dry, clean rope or a dry, unpainted wood pole to remove the victim. **Do not touch the victim until he has been removed from the current.**
 - e) If the victim is unconscious when released from the current, check his breathing and pulse and, if needed, begin CPR immediately.

K. Safe Use of Hand Tools

1. Always observe The Basic Rule: Use a tool only for its intended purpose, and always use the proper tool for the job.
2. Do not use tools with split or defective handles or worn parts. If a tool becomes damaged, repair it before using it again or return to the Drilling Inventory Manager for replacement.
3. Never use excessive forces on a tool. If excessive force is required, the wrong tool is being used.
4. Use safety glasses whenever using a hammer, chisel, power tool or any other tool that can cause particles to fly.
5. Keep all tools clean and orderly stored when not being used.
 - a) Do not leave tools on ladders or other overhead working spaces.
 - b) Do not leave tools on the ground.
6. Never throw or drop tools. Use hoists or hand lines to raise or lower tools.
7. Always use non-sparking tools in areas of potentially explosive materials or atmosphere.
8. Hammers:
 - a) Use only hammers that are in good condition with handles firmly attached. Repair or replace hammers with defective handles or mushroomed heads. If

- the head has mushroomed, dress it prior to using it. When repairing a handle, never use nails as a substitute for a wedge.
- b) Always grip the handle close to the end. "Choking" the grip is less accurate and effective.
 - c) Set nails with a light blow to minimize the possibility of finger injuries.
 - d) Always use a hammer with a flat face to drive nails; never use a machinist's hammer for this purpose.
 - e) Never pound objects with the hammer's handle.
 - f) To prevent flying metal splinters, never strike a hardened object such as a wrench or another hammer with anything but a rawhide or soft-metal hammer.
9. Wrenches:
- a) Use a wrench of adequate size; a larger wrench is safer than using a cheater pipe.
 - b) If using an adjustable wrench, note that the fixed jaw is stronger than the movable one.
 - c) If possible, pull on a wrench using your arm muscles rather than push on it.
 - d) Maintain good footing, one foot bracing behind the other, when using a wrench. Remove sharp objects from the area in case of a fall.
 - e) Position your hands so they will not be crushed or smashed if the nut or joint releases.
 - f) Never apply a wrench to moving machinery.
 - g) Never use a wrench as a hammer.
 - h) Wire brush the jaws of pipe wrenches frequently, and replace worn jaws periodically.
 - i) Use wrenches - not pliers - on nuts.
10. Screwdrivers:
- a) Always use a screwdriver that closely fits the screw slot.
 - b) Never use a screwdriver with a worn, chipped or broken tip.
 - c) Never use a screwdriver as a substitute for a chisel or pry bar.
11. If an accident occurs, treat all cuts and scratches immediately with simple first aid measures to prevent infection, which can occur in a matter of hours.
12. Keep cutting tools sharp.
13. Power tools.
- a) Always read the owner's manual of the tool that you are using to learn the correct application and the limitation of the tool.
 - b) Lubricate tools as recommended by the manufacturer.
 - c) Power tools shall always be properly grounded.
 - d) Never operate power saws or grinders without safety guards.
 - e) Never run power tools in damp or wet locations.
 - f) Always have proper lighting when using power tools.
 - g) Don't abuse the cord - never carry a tool by its cord, or yank the cord to remove the plug from a receptacle.
 - h) Secure the work with clamps to allow both hands to be free to operate the tool.
 - i) Remove adjusting keys and wrenches prior to starting the power tool.
 - j) Keep the work area clean and free of clutter that can interfere with the work or get caught in the power tool.
 - k) Do not wear loose clothing or long hair that could be caught in the tool.
 - l) Don't over-reach; keep good footing and balance when using power tools.
 - m) Don't carry plugged-in tools with your finger on the start switch.
 - n) Disconnect all tools from power source when not in use and when servicing.

L. Proper Lifting

1. Make certain that one person can safely lift the load.
2. If possible, use a mechanical lifting device.

3. Inspect the route to be sure that there are sufficient clearances and no obstructions or spills on the floor.
4. Inspect the object to be carried. Be careful of sharp edges, slivers or other things that could cause injury.
5. Keep feet parted so that one foot is along the side and one is behind the object.
6. Keep the back straight and nearly vertical so that the spine, back muscles and organs are all in proper alignment, with the body weight directly over the feet.
7. Keep the chin tucked in.
8. Bend the knees.
9. Assume a squatting position.
10. Grip the object with the whole hand.
11. Keep the elbows and arms tucked in as much as possible.
12. Start the lift with a thrust of the rear foot, and lift with the legs.
13. When carrying the object or setting it down, never twist the body.
14. When setting the object down, stand as close to the unloading point as possible.
15. Never lift auger flights by yourself. Have a second person assist or use mechanical methods.

M. Fire Safety

1. Personnel shall always be alert to fire hazards and take appropriate actions to prevent fires.
2. Welding and cutting shall be completed, as possible, in the yard to avoid the need for emergency repairs in the field.
3. In off-road areas, the area around the drill rig shall be cleared of combustibles such as dry grass and trash.
4. Flammable liquids shall be stored where they are inaccessible to vandals.
5. No smoking is allowed within 25 feet of refueling areas.
6. Funnels and pour spouts shall be used to avoid spilling fuels.
7. Gasoline and diesel motors shall not be refueled while in operation or when hot enough to ignite highly volatile vapors.
8. A suitable (multi-purpose Class ABC) fire extinguisher shall always be available while refueling.
9. Fuel tanks shall not be overfilled; room shall be left in the tank for fuel expansion, especially in hot weather.
10. Only approved containers shall be used for fuels.
11. All drill rigs and tenders shall have fire extinguishers in easily accessible locations.
12. There shall always be a fire extinguisher on site while work is in progress.
13. All fire extinguishers shall be maintained in good condition.
14. All members of the crew shall be trained in the use of fire extinguishers.

Chapter IV
Equipment Code
of
Safe Procedures

IV. EQUIPMENT CODE OF SAFE PROCEDURES**A. CME-750**

1. Loading and unloading:
 - a) Use ramps of adequate design that are solid and substantial enough to bear the weight of the drill rig with carrier and tooling.
 - b) Load and unload on level ground.
 - c) Always use the assistance of another person positioned as a spotter.
 - d) The drill rig should be loaded and secured on the trailer in accordance to the requirements of the Equipment Shop.
 - e) The drill rig and tools should be secured to the trailer with ties, chains and /or load binders of adequate capacity.
 - f) After arriving at the unloading area, check the position of all levers and switches to confirm that the rig is in driving mode and not drilling mode, as per the CME instruction manual.
2. Always transport the CME-750 with an empty water tank. Fill the water tank as close to the work site as possible.
3. When transporting the CME-750, it is important to check the tie-down after five or ten miles; afterwards, recheck the tie-down periodically (approximately every 100 miles).
4. Be aware of the high center of gravity of the CME-750 during transport and while driving the rig; avoid driving on the side of hills.

B. Truck and Trailer-Mounted Drill Rigs

1. Be aware of the large dimensions of the truck-mounted rigs.
2. Backing
 - a) Always walk route prior to backing rig into site location.
 - b) Always walk around rig prior to backing.
 - c) Always use a spotter when backing.
 - d) Maintain awareness of potential of jackknifing.
3. Winching
 - a) Set brakes on truck.
 - b) Charge air lines on rig to release brakes.
 - c) Never deploy excessive length of cable.
3. Operating.
 - a) Do not operate rig unless properly leveled, with out riggers deployed.
 - b) Operate rig at slow speed in high gear for smooth operation and to prevent twisting of drill stem.
 - c) Check all hoses for wear and position of safety restraints.
 - d) Check for plugged hoses before operating pumps.
 - e) Check that the pressure relief valves are functioning and are not sanded in.
 - f) Do not stand on elevated decks of any rig while the rig is operating, unless a special task needs to be performed. Always inform the drill operator prior to entering the elevated area.

C. Boom Truck

1. Maintain at least 20 feet of clearance from high voltage lines.
2. Check boom for cracks, deformities, oil leaks, loose pins, loose nuts and bolts.
3. Be sure the boom hook is in good condition with hook free from spreading or cracking, hook pins secure, and safety catch working properly.
4. Slings, cables and chains shall be properly labeled with the correct lifting capacity.
5. Slings, cables and chains shall be inspected each day prior to use for deformities, kinks, and frayed wire.
6. When not in use, store the boom in its proper storage position.
7. Prior to traveling, check that the boom is in the proper storage position for traveling.
8. Never travel with the power take off engaged.

9. Never exceed the maximum lifting capacity of the boom in its different extensions and positions; always refer to the load chart.
10. Outriggers:
 - a) Check and use outrigger safety locks and warning lights.
 - b) Never use outriggers for lifting.
 - c) Keep outriggers in site when lowering.
 - d) Do not operate the boom unless the outriggers are down and supported with planks or blocks as necessary.
 - e) When setting outriggers, check clearance of outriggers to adjacent lane or sidewalk.
11. Only one person shall operate the boom during a job.
12. Only one person shall assist and signal the boom operator.
13. Always use a straight pull when using the boom.
14. Change directions slowly when swinging the boom.
15. Never rock the boom.
16. Never swing the load to position it.
17. When operating the boom over or near the roadway, maintain safe clearance from passing vehicles or provide traffic control.
18. Never pull objects directly toward the operator's position; the operator shall use the remote control to stay out of the path of the load.
19. Use a sling with a shackle instead of a chain with grab hooks to lift loads.

D. Tenders

1. Prior to driving, make sure that all toolbox doors are secured and locked.
2. Make sure the load is secured.
3. Make sure that the load is below the level of the headache rack.
4. Make sure that the water tank lid is secured.
5. Make sure that no material, including water, is being dumped on the highway.
6. If a hydraulic boom is present, make sure it is locked in position and unable to rotate.

E. Forklifts

1. Only certified operators by the employer and trained in the safe operations of industrial trucks or industrial tow tractors shall be permitted to operate.
2. Rated capacity must be posted on forklift.
3. Riders are not allowed on forklifts.
4. Loaded forklifts shall not be moved until the load is safe and secure.
5. All unattended forklifts shall have mast at vertical position, forks in the down position, engine shut down and the parking brake set.
6. Forklifts shall not be driven towards anyone standing in front of a fixed object where such person could be caught between the forklift and object.
7. Operators shall look in the direction of travel and shall not move forklift until certain that all persons are clear.
8. The forks shall always be carried as low as possible, consistent with safe operation.
9. Forklifts shall not be driven into and out of vehicles at loading docks until such trucks are securely blocked and brakes set.
10. Employees shall not place any part of their body between mast uprights or other parts of the forklift where shear or crushing hazards exists.
11. Employees are not permitted to stand, pass or work below the elevated portion of a forklift.
12. The operator shall slow down and sound the horn at all locations where visibility is obscured or obstructed.
13. If the load obstructs forward view, the operator shall be required to travel with the load trailing, unless traveling uphill.
14. Extreme care shall be taken when tilting loads.
 - a) Tilting forward with forks elevated is prohibited except when picking up a load.

- b) Tilting elevated loads forward is prohibited except where the load is to be deposited on a storage rack or equivalent.
- 15. Special precautions shall be taken in the securing and handling of loads by forklifts equipped with special attachments, and during the operation of these trucks after loads have been removed.
- 16. When lifting employees with a forklift:
 - a) Use an approved basket.
 - b) The operator shall be at the controls at all times.
 - c) The basket shall be secured to the forks.
 - d) A mast guard shall be in place.
 - e) The mast shall be kept in a vertical position.
- 17. Whenever traveling without a load, the forks shall be tilted to the rear to prevent the tips of the forks from contacting the ground.

F. Barge Operations

- 1. Pre-op boat and barge. NOTE: Pre-op of boat and barge is particularly important because our crews do not use this equipment on a regular basis. Deterioration or modification may have occurred since last use. Other divisions in Caltrans use the boat; it may have not been left in the same condition.
 - a) Check tires on trailers.
 - b) Check tie-downs on boat and barge.
 - c) Check that trailers are properly connected: hitches are closed, locked, safety chains installed, lights connected and functioning.
 - d) Check boat fuel, battery and radio.
 - e) Inspect barge and boat for structural damage.
- 2. Assembly
 - a) Crew size.
 - 1) Have a sufficient crew for the unloading and assembly operation. The **minimum** number of workers that should attempt to unload the barge is three, deployed as follows:
 - a. One person operating boom controls;
 - b. One person connecting sling to barge sections;
 - c. One person operating the tag line and assembling the barge.
 - 2) It is preferable, for a safe and efficient operation, to have a fourth person assisting the tag line operator with the barge assembly.
 - 3) If a fifth person is available, that person should serve as a group coordinator, observing for safety problems and assisting where ever required.
 - b) Properly level crane prior to unloading.
 - c) All outriggers shall be set prior to unloading.
 - d) Check slings cables and chains prior to unloading for signs of wear, kinks, or deformities. Do not attempt to use worn equipment.
 - e) Attach sling to proper three points on each barge section.
 - f) Only personnel working on barge unloading and assembly shall be in the immediate work area; all other observers shall remain clear of the area.
 - g) Do not allow barge sections to rotate freely while unloading. At least one person shall guide barge sections using a tag line.
 - h) Crane operator and tag line operator shall be in direct communication, with clearly understood pre-arranged signals, while unloading.
 - i) All personnel shall be alert for overhead-suspended hazards.
 - j) Barge shall be assembled using designed configuration of barge. Make connections with all designed pins.
 - k) When backing rig onto barge, be sure 2 x 12's of ramp are properly blocked.
 - l) Properly tie down rig to barge prior to moving barge.

- m) Load equipment to properly distribute loads on barge; use proper knots for all tie-downs.
 - n) Attach safety rope to perimeter of barge prior to moving barge.
3. Towing and anchoring barge.
- a) Be familiar and comply with all applicable Coast Guard regulations and safe boating practices.
 - b) Properly attach guy lines from barge to boat to assure control of barge.
 - c) All personnel on boat and barge shall wear life jackets while towing barge.
 - d) At least one anchor shall be ready to deploy as an emergency brake.
 - e) Maintain a sufficiently slow speed to prevent barge from "dolphining".
 - f) Properly coil and stow all ropes on barge to prevent entanglement with personnel.
 - g) When deploying anchors, utilize at least two personnel on boat, one to operate the boat and one to catch and deploy anchor lines.
 - h) Do not allow anchor lines to become wrapped around any part of your body.
4. Drilling
- a) If working in a tidal zone, set casing at either high tide or low tide so that tidal currents are at a minimum.
 - b) Night work-have sufficient number of lights. At least one standard (two lights) of lights should be deployed at each corner of the barge.
 - c) Lights should also be oriented so that the surrounding water is illuminated in the event a "man overboard" situation arises.
 - d) Properly display "barge working" signal.
 - e) All personnel should maintain vigilant awareness of work progress and safety and weather and water conditions.
 - f) Monitor anchor lines periodically throughout the work shift to ensure anchor stability.
 - g) Be continually aware of tidal fluctuations and current directions; as these change, they will affect barge stability and crew boat location.
 - h) Signal lights shall be displayed when working at night.
 - i) Good housekeeping shall be maintained to avoid tripping hazards; keep decks clear of drilling fluids and other tools and equipment.
 - j) Store all tools, supplies and equipment in secured places at all times to prevent items from falling on personnel.
 - k) Be careful of slippery decks and unsure footing.
 - l) Keep a boat at the barge for emergency exit at all times.
5. It is required to wear lifejackets while working on the barge at all times. Lifejackets shall also be worn whenever the barge is being moved.

Chapter V

Drill Waste Management

IV. DRILL WASTE MANAGEMENT

A. General

1. This code defines procedures to control the safety and health hazards associated with removal, transport, and storage of drilling waste for the Office of Drilling Services (ODS) staff. All Federal, State, and local agency laws, codes, and regulations are to be strictly adhered to concerning the handling, transportation, and storage of drilling waste.
2. The ODS Senior Engineering Geologist shall communicate roles and responsibilities with project Engineers/Geologists or appropriate persons involved.
3. In the management of drilling waste the primary safety hazards are from loading and unloading drums. Drums of waste are heavy; use proper handling and lifting techniques. Use only the proper tools and equipment to move, load or unload drums. If a hoist is used to load drums, only lifting attachments specifically designed for drum lifting can be used. Do not use makeshift lifting attachments.
4. The material being removed from drill sites must be packaged, moved, stored, treated, and disposed of in a manner that prevents its release into the environment. Special transportation and documentation requirements must be met.
5. This written safety and health program shall be made available to employees; to employee designated representatives; to Cal-OSHA, and to personnel of other Federal, State, or local agencies with regulatory authority over the site.

B. Site Control Measures

1. Steps shall be taken to contain any and all drill waste during drilling operations. This control program shall be modified as necessary or as new information becomes available or as site conditions change.
2. Blocking devices to plug flow paths to create a collection point for filtration and protection of material entering drain inlets or contaminating drill sites are to be used if necessary. (i.e., waddles, sand bags, plastic dams, etc.)
3. All drill waste will be contained on site and placed into approved United States Department of Transportation (DOT) 55-gallon drums supplied to the drill crews by Drilling Services for storage and transport. (Unless ODS management approves other arrangements) As drums are filled, lids will be secured. Loaded drums will be secured before leaving the worksite. The drums will have exterior contamination removed at the worksite. The contaminated material will be placed in another disposal drum if necessary.
4. Note: If leakage or spillage occurs, it will be cleaned up immediately. If necessary, the waste material will be transferred to another container to minimize leakage and appropriate measures taken to prevent reoccurrence.

C. Transportation

1. Drums and containers used to transport drilling waste shall meet the appropriate US Department of Transportation (DOT), OSHA, and EPA regulations for the materials that they contain.
2. Drums and containers shall be inspected and their integrity assured prior to being moved.
3. All drummed materials will be marked with labels showing to the exterior sides. Drums will be labeled "non-hazardous drilling waste" with markings to indicate locations, post mile, project name, onsite project Geologist/Engineer phone number, project route, project EA, onsite drilling leadworker, and the date material is placed into the drum.
4. A Drilling Services approved transport document will be completed by the drill crew lead worker and will accompany each shipment of bulk or drummed material leaving the site.
5. The materials will be off loaded at approved specified locations and segregated as bulk or drummed materials.

6. All original paper work related to storage and transportation of drilling waste will be forwarded and kept on file at Drilling Services HQ drilling office. Copies are to be given to the approved facility's supervisor or their representative wherever waste is stored.

D. Storage

1. In specified areas drums should be lined with a clear plastic bag before any material is placed in them.
2. Drummed materials will be stored at selected ODS approved collection sites. All drums will be placed into spill containment basins. If basins are not available all drums will be tarped or placed on edge by using a 2" x 4" board to allow any collected rainwater to drain off the lids. All drums will be wiped clean before being stored. This will eliminate run off contamination due to rain.
3. When drums are emptied into bins they will be cleaned and placed into service for reuse after being visibly inspected for damage or corrosion. All drums not fit for reuse will be set aside for recycling or disposal and so marked.
4. All labels will be removed or blacked out with paint before being placed back into service.
5. Empty drums will be stored on their side and designated as empty.
6. Each time drill crews transport or store drill waste, ODS approved paperwork will be prepared. When roll off bins or drum storage areas are full, they will be sampled as required to characterize and classify the material for transport and disposal. Appropriate procedures and chain of custody documentation will be used (forms to be supplied by ODS). The information will be kept on record at the HQ Drilling Services.
7. The samples will be tested for hydrocarbons and metals. When results have been received and the waste stream defined, the bins, drums, or waste material will be transported to a disposal or treatment site by the appropriate vendor under contract.

E. Encountering Unexpected Hazardous Materials

1. If evidence of hazardous contamination is detected by sight, smell, or field analytical methods, it shall be of paramount importance to secure the drilling operation while maintaining the safety of personnel. Drilling shall be halted and employees will immediately leave the work area.
2. The Foundation Driller Lead worker shall contact the ODS Senior Engineering Geologist immediately when suspected hazardous material has been encountered.
3. The Foundation Driller Lead worker, along with the ODS Senior Engineering Geologist, shall have primary responsibility to determine the amount of work, if any, that the crew shall perform in closing down the site. The ODS Senior Engineering Geologist shall assist the Foundation Driller Lead worker to determine the severity of the situation.
4. Before work may resume, a responsible professional, as determined by Drilling Services must provide verification of safety clearance to the Drilling Services' Senior Engineering Geologist. If it is determined that it is safe to do so, the crew shall containerize the drill waste and the boring shall be sealed from the bottom of the boring to the ground surface with an approved grout mixture. Sealing shall be done using the tremmie pipe method.
5. The ODS Senior Engineering Geologist shall contact District Environmental, the District Hazardous Waste Coordinator, and the Safety and Health Office for clearance. The ODS Senior Engineering Geologist shall coordinate with the District Hazardous Waste Coordinator for transferring custody of containerized drill waste.
6. Drilling Services personnel shall under no circumstances transport suspected contaminated drill waste.

Appendix A

References

References

1. California Government Code, Section 4216
2. Caltrans Safety Manual, State of California Department of Transportation, 1996 and Revisions
3. Code of Safe Operating Practices, Division of Highway Maintenance, State of California Department of Transportation, 2004
4. Commercial Motor Vehicle Driver Handbook, State of California Department of Transportation, 2004
5. Drilling Safety Guide, International Drilling Federation.
6. Driller's Safety Manual, U. S. Bureau of Reclamation, 1990
7. Electrical Safety, California Division of Occupational Safety and Health, May 1999
8. Maintenance Manual, Volume 1, State of California Department of Transportation, June 1998, with updates
9. Manual of Recommended Safe Operating Procedures and Guidelines for Water Well Contractors and Pump Installers, National Water Well Federation, 1993
10. Safety Regulations, Christensen Boyles Corporation, 1993
11. Traffic Manual, State of California Department of Transportation, 2004
12. Workbook for Safety Sensitive Employees, State of California Department of Transportation, 2004

Appendix B

Special Purpose Codes

Boring Location Utility Clearance

Hazard Review

Unidentified utilities
 Unmarked buried utilities
 Mismarked buried utilities
 Unknown location of Caltrans utilities
 Overhead utilities
 Abandoned utilities
 Utilities not located by the Underground Service Alert One Call Center (USA)

Safe Work Practices

1. Research available information on utility locations within your project work area as soon as possible after receiving the request to do the work.
 - a. Request and review As-Built plans for known utility locations.
 - b. Contact the District Designer for information being utilized for the utility plans for the project.
 - c. Request the Project Manager's assistance to identify Project Development Team members on the project working on locating utilities, relocating utilities or designing new Caltrans utilities.
 - d. Contact City, County, etc for copies of public information available with local utility locations.
 - e. Work with District Right of Way to contact property owners about utility locations on private property behind locked fences, under private facilities, or otherwise not accessible to and covered by USA.
2. Prepare for the field review of the project work area.
 - a. Review photolog and/or DHIPP available on-line for possible utility locations.
 - b. Contact Project Engineer for project specific information.
 - c. Prepare a field checklist of the utilities identified during the research outlined above.
3. Perform a field review to mark the USA zone(s) and identify possible utility conflicts.
 - a. **Mark with white paint** boring location work zone(s) for the USA ticket.
 - b. **Look up!** Check for overhead lines near the work zone(s).
 - c. **Look around!** Check the general area for patterns of utilities in the vicinity of the work zone(s). Look for manhole covers, switch boxes, paddle ID markers, anything that may hint at a buried utility line near the work zone(s).
 - d. **Check access** areas/roads for utilities in conflict with access. Note possible issues with the weight of the equipment over buried utility lines.
 - e. **Take pictures** for later reference, both close-ups of the work zone(s) and access, as well as more broadly of the general area.
4. Call USA
 - a. Call USA 2 weeks prior to the drilling target start date. The law requires a minimum of two working days but also defines a 14 day maximum window for utility locators to respond to your ticket. With the high rate of building activity in some areas of the State, give USA locators every day of that 2 week window.
 - b. Section the work zone(s) into areas of a reasonable size for utility locators to mark within the required time frame. It may be advisable on larger projects to section the work zone(s) into phases that can be cleared as the work progresses.

- c. Call a separate USA ticket for access roads/areas. Don't forget to tell the USA operator to include a note that the access road is tied to the previous ticket covering your boring locations.
 - d. Note the list of utilities the USA operator will notify on each ticket in the space on the Site Safety Plan provided for your convenience, or in the format of your choice. This information can then be referred to by others back in the office or in the field, if a conflict or incident arises while you are on site or otherwise unavailable. This can also be used as a communication tool between you and your colleagues on larger projects, as well as between your Design Office and Drilling Services.
 - e. Request field meets with life-threatening utilities such as gas, electric and pressurized fluid lines.
5. Check site prior to the start of drilling
 - a. Check the work zones previously marked with white paint for utility location markings noting which utilities on your list have responded. Remember there is often more than one electrical or gas line in residential areas.
 - b. Adjust boring locations as necessary to avoid utility conflicts.
 - c. When required to move a boring location to avoid a utility that then lands outside the previously painted USA work zone, mark a new zone with white paint and call in a new ticket as necessary.
6. The start of work
 - a. Call your supervisor and the other Offices involved in the work if a locator refuses to locate a utility, potholing has not been effective, or any other concern with utilities on site arises. **DO NOT PROCEED TO DRILL IF IN DOUBT OF UTILITY LOCATIONS!**
 - b. There is no safe depth to hand auger or dig down to! If in doubt of the exact locations, request potholing. Many Districts have potholing contracts available for limited amounts of work. Hand excavation to a specific depth can give a false sense of security if the utility line in question runs deeper than assumed, has been installed by boring and jacking operations, or is old enough to no longer be buried at the original depth.
 - c. The date of the start of work on the project area reported to USA does not necessarily need to be the first day of drilling. If you are on site with a shovel and a sample bag you become an excavator by law. This trick can give you additional time to clear utilities ahead of the drilling start date.
7. During the work
 - a. Have the list of utilities and contact names and numbers on site during the work in case an issue arises or an incident occurs.
 - b. Call USA to report an incident even if you think no damage was done. Small nicks in the corrosion protect can result in a rapid decay of a buried line. Backfilling improperly over a fiber optic line can also. Let the utility owner decide the amount of damage.
8. If an incident occurs do not hesitate to call for help as needed
 - a. Report an incident to your supervisor as soon as reasonable. Then contact the appropriate parties involved. For example, if you are under a traffic management plan, notify the Traffic Management Center of the incident. Likewise, contact the local maintenance yard, especially if complaints of local utility interruptions may begin.
 - b. Fully cooperate with emergency services as required. Refer all insurance questions to the Office of Risk and Insurance Management (ORIM). The current address and contact numbers for ORIM are shown on the small accordion folded accident form STD-269 that should be on site in State vehicles and drilling equipment at all times.

Appendix C

Example Forms

Forms

1. Code of Safe Practices Update Form
2. Drill Request
3. Site Safety Plan
4. Hazardous Material/Waste Questionnaire

Request No. _____
 FY _____
 Date Logged _____
FOR OFFICE USE ONLY

SITE SAFETY PLAN

Date _____

OFFICE OF DRILLING SERVICES

A complete and signed Site Safety Plan and Hazardous Waste/Materials Questionnaire is due by close of business Tuesday of the week prior to the scheduled drilling start-up date.
 Please fax to ODS Scheduling at (916) 227-4408.

Geologist / Engineer _____	Telephone No. _____	Senior Geologist / Engineer Signature _____	Telephone No. _____
PROJECT INFORMATION		District _____	County _____
Geographic Name / Bridge Name _____		Route _____	Post Mile / KP _____
E.A. No. _____	FA - Activity Code _____	Special Designation _____	

Local Hospital Basic Emergency Trauma Center **Please attach map with route to hospital from site(s) clearly marked**

Name: _____ Is there clear Cell Phone reception and transmission at the Site(s)? Yes No Unknown

Address: _____

Phone No.: _____

Please describe any known Physical Hazards at the Site(s):

UTILITY CLEARANCE (USA) DATA

USA Ticket No.: _____ USA Exp. Date: _____

Location Description as Mapped by USA:

<u>Members Contacted by USA</u>	<u>Did you receive a Member Call-Back?</u>	<u>Did you have a Field Meet with Member?</u>	<u>Did the Member mark or flag their utilities at the site(s)?</u>
_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
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_____	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Are there Non-Member Utilities at the Site(s)? Yes No

Non-Members Contacted: _____ Have you been briefed on the location(s) of Non-Member Utilities at the site(s)? Yes No

Are the locations Marked or Flagged? Yes No

Are there Overhead Utility lines at the Site(s)? Yes No

Remarks

Please remember to document your field (tailgate) safety meeting on form PM-S-0110

PRELIMINARY
 FINAL

DRILLING REQUEST

OFFICE OF DRILLING SERVICES

Date _____

Instructions: Please complete this form and submit to Laurel Jensen (916) 227-4407 Fax # (916) 227-5432

Geologist / Engineer _____ Telephone No. _____	Senior Geologist / Engineer Signature _____ Telephone No. _____
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PROJECT INFORMATION Geographic Name / Bridge Name _____	District _____	County _____	Route _____	Post Mile / KP _____
--	----------------	--------------	-------------	----------------------

EA No. _____	FA - Activity Code _____	Special Des _____	Requested Start Date _____	Drilling Completed by Date _____
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DRILLING AND SAMPLING NEEDS

<input type="checkbox"/> Hxb Core (2.400")	<input type="checkbox"/> Punch Core	<input type="checkbox"/> Auger Boring	<input type="checkbox"/> Drive / Push Samples	
<input type="checkbox"/> Nxb Core (1.875")	<input type="checkbox"/> 2 1/2" Brass	<input type="checkbox"/> 2" Brass	<input type="checkbox"/> SPT	Drilling Phase:
est. qty: _____	est. qty: _____		<input type="checkbox"/> Shelby Tube	Est. # Borings:
			<input type="checkbox"/> California Modified	Est. Max.Depth:
<input type="checkbox"/> Hydraulic Drive Rig <input type="checkbox"/> 1" Soil Tube (Wacker) <input type="checkbox"/> Other _____				
Expected Rock / Soil Type(s):				

SITE CONSTRAINTS

Permit-to-Enter: Yes No

Environmental Permits: Yes No

F & G Army Corp USFWS Other(s) _____

Construction Support

Maintenance Support

LOCAL MAINTENANCE YARD

Name: _____

Contact Person: _____

Phone No: _____ Cell No: _____

Lane Closure Shoulder Closure Bridge Deck

Remarks

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INSTALLATIONS

Est. # SI Borings: _____ <input type="checkbox"/> 3.34" Geo-Lok est. qty(ft): _____ <input type="checkbox"/> 2.75" Geo-Lok est. qty(ft): _____ TDR Cable <input type="checkbox"/> 18 gauge est. qty(ft): _____ <input type="checkbox"/> 0.5" est. qty(ft): _____ Casing Backfill <input type="checkbox"/> Cement-Bentonite Grout <input type="checkbox"/> No. 8 Sand	Est. # Piezo Borings: _____ Slotted (.020) PVC Sch 80 <input type="checkbox"/> 4" est. qty(ft): _____ <input type="checkbox"/> 1.5" est. qty(ft): _____ <input type="checkbox"/> 1" est. qty(ft): _____ Solid PVC Sch 80 <input type="checkbox"/> 6" est. qty(ft): _____ <input type="checkbox"/> 4" est. qty(ft): _____ <input type="checkbox"/> 3" est. qty(ft): _____ <input type="checkbox"/> 1.5" est. qty(ft): _____ <input type="checkbox"/> 1" est. qty(ft): _____	Monuments (qty) <input type="checkbox"/> 5" Flush Mount _____ <input type="checkbox"/> 4" Flush Mount _____ <input type="checkbox"/> 2" Flush Mount _____ <input type="checkbox"/> 4.5" Locking _____ <input type="checkbox"/> 5.5" Locking _____ <input type="checkbox"/> 6" Locking _____
---	---	--

LJ DJO WT JAR Jobs Rec'd

Rev. 12/05 Drilling Plan Package (1 of 3) Received Date

Completed Project

Fax

Attention:	Fax#	Phone#	Date:
Sender:	Fax#	Phone#	# of pages:

Project Name

Dist.-Co.-Rte.-PM

E.A. No.

Geotechnical Services of the Division of Engineering Services needs to conduct geotechnical and exploratory drilling at this site. A site plan showing the general location of the drilling program is attached. Field operations are tentatively scheduled to start _____. The borings (are/are not) anticipated to extend to groundwater.

Project Comments:

Hazardous Materials/Waste Questionnaire

Response by: _____
Print Name *Phone Number*

- Has an initial site assessment been performed for this project? Yes No If yes, is the report available and from where?
- Was the proposed drilling area, as shown on the attached map, identified as having the potential for hazardous waste contamination? Yes No If yes, why?
- If yes, has a detailed site assessment been performed at this location? Yes No
- Please briefly describe the results of the detailed site assessment performed at our proposed drill location.
- Encountering hazardous waste and/or hazardous materials is not , is anticipated within subsurface materials at this location. If any, please attach a list of specific substances, levels, etc. that are anticipated at this site.**

Signed: _____ Date: _____
Hazardous Waste Coordinator
District _____ Environmental Branch

Please complete this form to the best of your knowledge and return by FAX by _____ to the "sender" listed above. If your answers indicate the area is, or may be, contaminated, you will be contacted for further details.

Rev. 2/19/03 Drilling Plan Package (3 of 3)

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 263-2041 or TDD (916) 263-2044 or write Records and Forms Management, 1120 N street, Rm. 1120, MS 89, Sacramento, CA 95814.