

Chapter 11: [Excavation Safety](#)

Excavation Procedures

Product ID: [119](#) | Revision ID: 1374 | Date published: 10 October 2011 | Date effective: 10 October 2011
URL: <http://www-group.slac.stanford.edu/esh/eshmanual/references/excavationsProcedAll.pdf>

1 Purpose

The purpose of these procedures is to ensure that every excavation project is reviewed as required, that all internal and external permits are in place before work begins, and that all records are updated once work is completed.

These procedures cover excavation operations in which contact with soil is expected – such as trenching, drilling, and removing soil – that meet any of these conditions at any time:

1. Depth is one foot or more
2. Power tools will be used
3. Utilities are identified
4. Any hazardous condition is likely to be encountered

The following operations are exempt:

- Sampling soil, concrete, and asphalt from bins, hoppers, or stockpiles using hand tools
- Replacing existing sign posts in and around SLAC roads, parking areas, and pathways, provided sleeves are used

These procedures apply to all persons involved in excavation-related activities.

2 Procedures

Procedures for planning an excavation, conducting excavation operations, and closing the project out follow. These acronyms and initialisms are referenced throughout.

Cal/OSHA	California Division of Occupational Safety and Health
EP	Environmental Protection Department
ESPM	excavation safety program manager
FSD-SS	Field Services Department, Safety Services Group
FSD-WM	Field Services Department, Waste Management Group
JSA	job safety analysis
MD-FDS	Mechanical Design Department, Facilities Design Services Group
PM	Project manager
FCM / UTR	Field construction manager / university technical representative
RP	Radiation Protection Department
WPC	Work planning and control

2.1 External Permits

Specific requirements apply for certain types of excavations:

- Current annual permit from the California Division of Occupational Safety and Health (Cal/OSHA) per (8 CCR 341–341.5) for any excavation that is five feet or deeper into which one or more employee is required to descend
- A San Mateo County Environmental Health Division [subsurface drilling permit](#) is required under any of these conditions:
 - Soil borings are anticipated to encounter groundwater
 - Soil borings extend deeper than 10 feet
 - Groundwater monitoring wells, including geotechnical wells, will be installed or destroyed (installation or destruction must be in accordance with California Well Standards as established by the California Department of Water Resources)

2.2 Planning

The planning phase of the permit process includes defining the project scope, a multi-departmental ESH review, documenting utility location results, and obtaining approval for the excavation to proceed.

Note Allow 10 working days for required reviews to be completed. If soil testing is required, allow up to two weeks of additional time from the sampling date.

Step	Person	Action
Planning: Define excavation		
1.	Excavation permit requester	Submits service request to MD-FDS
2.	MD-FDS	Initiates permit process <ul style="list-style-type: none"> ▪ Assigns a unique number to each permit request (if a permit is cancelled, the cancelled permit number cannot be reused) ▪ Pulls all as-builts pertaining to the proposed excavation area ▪ Completes top part of Section D, "Utility Drawing Review" of Excavation Safety: Excavation Permit Form pdf or Word and sends permit and as-builts to the PM or FCM / UTR
3.	PM or FCM / UTR	Completes Section A, "Description", of the permit and marks specific location, width, length, and depth of the proposed excavation on the as-builts and forwards permit to RP
4.	RP	Reviews the permit for potential radiological concerns such as <ul style="list-style-type: none"> ▪ Location: any excavation located within an area posted as any type of controlled area, radiologically controlled area, contamination area, radiation, high radiation or radioactive material area or if within 25 lateral feet of beam housing (see Beam Line Map) to determine if any radiological work permits are

Step	Person	Action
		<p>required</p> <ul style="list-style-type: none"> ▪ New wells or soil borings near accelerator housing: investigate to ensure that no radiological conditions will be encountered (such as tritium in groundwater) ▪ Radioactive sources that are to be brought on-site (such as soil density gauge, x-ray generator, thoriated weld rods, radiographic devices) to determine if a radiological device authorization is required ▪ Potential for generating radioactive waste <p>Completes Section B, "Radiological Review", of permit and submits to EP.</p>
5.	EP	<p>Completes Section C, "Environmental Review", of the permit to note</p> <ul style="list-style-type: none"> ▪ Special requirements ▪ Recommendations for excavated material handling and disposition
6.	EP	Notifies FSD-WM with waste disposal recommendations
7.	EP	Forwards permit to PM or FCM / UTR
8.	Utility survey requester	<p>For excavations performed by SLAC personnel, the PM or FCM / UTR submits a request for utility location to MD-FDS</p> <p>For excavations performed by a subcontractor, the subcontractor arranges for a utility survey (and ensures that the excavator will be present during the survey)</p>
9.	PM or FCM / UTR	<ul style="list-style-type: none"> ▪ Notifies building or area manager of work plans ▪ Notifies FSD-SS of the utility survey date so that a representative can be present as needed
Survey Work Site		
10.	PM or FCM / UTR, MD-FDS, representative, excavator	<p>Must be present during utility location</p> <p><i>(PM or FCM / UTR should be familiar with the limitations of survey techniques)</i></p> <p>Recommended: FSD-SS representative presence during survey</p>
11.	Utility locator	<p>Surveys excavation area and marks utilities following Excavation Safety: Utility Marking Requirements</p> <p>Every utility shown on the as-built drawings must be located, using all applicable methods:</p> <ul style="list-style-type: none"> ▪ If an electrical line is difficult to locate, such as direct-bury Romex, methods and/or equipment that improve the chances of locating that line must be used, such as inducing a signal with the locator's equipment or causing current flow by energizing the circuit. ▪ If the excavation will be within three feet of a known utility, the exact location must be determined by potholing (see Excavation Safety: Potholing Requirements). ▪ If a known utility is not found using these methods, potholing of the excavation area is required to locate it. ▪ If a utility is found that is not marked on the drawing, it must be drawn in.
12.	Utility locator	Completes a Excavation Safety: Utility Location Results Form
13.	PM or FCM / UTR,	Sign completed utility location results form if results are complete and accurate

Step	Person	Action
	MD-FDS representative, FSD-SS rep (if present)	
14.	PM or FCM / UTR	Submits permit to MD-FDS
15.	MD-FDS	Finalizes Section D of permit and forwards to ESPM (or designee) for approval
Plan Work		
16.	PM or FCM / UTR	If indicated, coordinates with RP to obtain radiological work permit(s) and/or radiological device authorization(s)
17.	PM or FCM / UTR	Ensures hazard analysis and work planning documents are complete as required per <ul style="list-style-type: none"> ▪ Chapter 2, "Work Planning and Control", and ▪ Chapter 42, "Subcontractor Safety"
18.	PM or FCM / UTR	Plans excavation to meet requirements described in Excavation Safety: Physical Requirements
19.	PM or FCM / UTR	Contacts FSD-WM to arrange for disposal coordination or waste containers
Approve Permit		
20.	ESPM or designee	Reviews permit and approves as applicable or ensures that missing sections are completed and any missing documentation is attached
21.	FSD-SS staff	If the excavation involves a drilling rig: <ul style="list-style-type: none"> ▪ Completes the Excavation Safety: Mobile / Portable Drilling Rig Initial Inspection Form (or equivalent) ▪ Ensures the completed form is in the WPC package (red or yellow)
22.	ESPM or designee	Delivers approved permit (original or copy) to PM or FCM / UTR and notifies RP, EP, and MD-FDS that the excavation permit is approved

2.3 Excavation

2.3.1 Emergency Protocol

The following procedure applies to normal working conditions. In the event of an emergency, anyone in the excavation who is physically able must exit immediately, providing assistance to others only when not endangering their own safety.

If rescue is required the SLAC emergency response protocol applies: call 911 and provide accurate detail (see permit if needed). Any rescue action that can be performed safely from outside the excavation, such as hoisting a harnessed victim, may be undertaken while waiting for rescue personnel. Also call SLAC Site Security (ext. 5555) to report the incident.

Important Do not attempt to enter an unprotected or failed trench to perform a rescue – call professional responders.

2.3.2 Excavation Procedure

At least one person meeting the requirements for an excavation competent person must be present during active operations in which personnel are expected to descend into the trench. If work is being conducted in the trench by more than one subcontractor, each must have its own competent person when employee exposure can reasonably be anticipated.

Step	Person	Action
1.	PM or FCM / UTR	Ensures permit is current If permitted work is not initiated within three months of original submission, the permit must be resubmitted to confirm the in-field survey is still accurate.
2.	PM or FCM / UTR	Ensures the WPC work folder contains all required documents (excavation permit with hazard analysis, work planning documents, and any additional required permits, such as the Cal/OSHA annual permit) before work begins
3.	PM or FCM / UTR	Ensures sediment management practices are (and remain) in place (see Chapter 26, "Stormwater")
4.	Excavation competent person	Conducts inspections, takes steps to mitigate identified problems (such as removing workers until the excavation area is stabilized), and maintains record of inspections using the Excavation Safety: Daily Inspection Checklist or equivalent that demonstrates the adequacy of the inspection. Inspections are required <ul style="list-style-type: none">▪ Daily▪ Before start of work and as needed throughout the shift (as determined by the competent person and/or PM or FCM / UTR)▪ Whenever worker presence can reasonably be anticipated (check excavation(s), adjacent areas, and protective systems for signs of potential edge or wall collapse, cave-in, indication of protective system failure,

Step	Person	Action
		<p>hazardous atmospheres, or other hazardous conditions)</p> <ul style="list-style-type: none"> ▪ After every rain event, exposure to vibrations or heavy loads, or other hazard increasing occurrences (to identify any changes that may affect safety) <p>Inspection documentation must be available for review while the excavation is open.</p>
5.	PM or FCM / UTR	Documents activities at the job site in a daily log
6.	Worker	Conducts work according to permit conditions and excavation requirements
7.	PM or FCM / UTR	<p>Meets at least daily with subcontractor to discuss the JSA for that day and is present at the excavation site as necessary to ensure the subcontractor is operating safely. This includes verification that the subcontractor's excavation competent person is at the excavation site during</p> <ul style="list-style-type: none"> ▪ Active operations in which employees are expected to descend ▪ Placement of support systems and/or access/egress components such as ramps, ladders, or stairs ▪ Activities where powered or heavy machinery is to be used ▪ Activities that present a significant hazard to personnel or equipment
8.	PM or FCM / UTR and/or excavation competent person	<p>Invokes stop work requirements for such conditions as</p> <ul style="list-style-type: none"> ▪ Encountering an unknown/unidentified subsurface utility: the exact nature and condition of the utility must be determined before work can commence ▪ Observation of discolored soil, an odor, or oily sheen: contacts ESPM before work commences to ensure that the permit can be updated for proper waste disposition
9.	PM or FCM / UTR	Notifies ESPM of any scope changes (for example if any unexpected conditions are encountered or excavation size or extent increases)
10.	ESPM or designee	If scope changes: determines, in consultation with all permit reviewers as needed, if the permit should be revised and re-approved
11.	ESPM / FSD-SS staff	Visits excavation site as part of routine construction safety oversight; checks for presence of a competent person and compliance with requirements. If problems are noted, meets with PM or FCM / UTR and/or excavation competent person to resolve.
12.	FSD-WM	Coordinates disposition of excavated material with PM or FCM / UTR according to recommendations from EP and RP

2.4 Excavation Close Out

Step	Person	Action
13.	PM or FCM / UTR	Ensures drawings are marked up with as-built information, if required, and verifies in the field
14.	PM or FCM / UTR	Ensures completion of excavation
15.	PM or FCM / UTR	Meets with ESPM, delivers marked-up drawings, if required, and signs Section F of permit
16.	ESPM or designee	Closes permit record by signing Section F of permit and notifies RP, EP, and MD-FDS that the permit has been closed
17.	ESPM or designee	Ensures that marked-up drawings, if required, are delivered to MD-FDS
18.	ESPM	Maintains the record copies of all closed permits
19.	MD-FDS	Updates as-builts

3 Forms

The following forms are required:

- Excavation Safety: Excavation Permit Form (SLAC-I-730-0A23R-004) [pdf](#) or [Word](#). Documents the safety review process and closing of the project
- [Excavation Safety: Utility Location Results Form](#) (SLAC-I-730-0A23J-004). Documents survey results; must be attached to the applicable excavation permit
- [Excavation Safety: Daily Inspection Checklist](#) (SLAC-I-730-0A23J-003) (or equivalent). Documents required daily inspection
- [Excavation Safety: Mobile / Portable Drilling Rig Initial Inspection Form](#) (SLAC-I-730-0A23J-005) (or equivalent). Documents required initial inspection

4 Recordkeeping

The following recordkeeping requirements apply:

- The excavation permit, daily inspection checklist, and mobile / portable drilling rig initial inspection (if applicable) are kept at the work site during excavation operations (WPC red or yellow work package).
- Once work is completed, the ESPM maintains the record copies of all closed permits.
- MD-FDS updates and maintains as-builts.

5 References

[SLAC Environment, Safety, and Health Manual](#) (SLAC-I-720-0A29Z-001)

- [Chapter 11, “Excavation Safety”](#)
 - [Excavation Safety: Utility Marking Requirements](#) (SLAC-I-730-0A23S-009)
 - [Excavation Safety: Drawing Requirements](#) (SLAC-I-730-0A23S-005)
 - [Excavation Safety: Potholing Requirements](#) (SLAC-I-730-0A23S-004)
 - [Excavation Safety: Physical Requirements](#) (SLAC-I-730-0A23S-007)
- [Chapter 2, “Work Planning and Control”](#)
- [Chapter 17, “Hazardous Waste”](#)
 - [Hazardous Waste Pick Up and Disposal Form](#) (SLAC-I-800-0A08R-001)
- [Chapter 26, “Stormwater”](#)
- [Chapter 42, “Subcontractor Safety”](#)

Other SLAC Documents

- [“Facilities Design Services”](#)
- [Beam Line Map](#) (8628A1)

Other Documents

- Title 8, *California Code of Regulations*, “Industrial Relations”, Division 1, “Department of Industrial Relations”, Chapter 3.2, “California Occupational Safety and Health Regulations (Cal/OSHA)”, Subchapter 2, “Regulations of the Division of Occupational Safety and Health”, Article 2, “Permits - Excavations, Trenches, Construction and Demolition and the Underground Use of Diesel Engines in Work in Mines and Tunnels” ([8 CCR 341-341.5](#))
- San Mateo County Environmental Health Division [Subsurface Drilling Permit](#)