

## Excavations and Blind Penetrations into Walls & Floors

(Instructions for using JLab *DIGGING, EXCAVATING, FLOOR/WALL PENETRATION PERMIT REQUEST*)

**Permits are required on JLAB property for any penetrations into the ground. Exclusions for this permit concerning blind penetrations are up to; 1 ½” into a CMU wall; the thickness of a gypsum-board wall (self drilling wall anchors do not require a permit); and 2” into the top side of a concrete floor/slab. Drill stops are required.**

Figure 1

Jefferson Lab has extensive buried utilities. Also, many buildings have electrical conduit, piping, and data/communications cable within walls and imbedded in floor slabs. If you have work that requires digging or drilling into soil **or** blind penetration into walls or floors with tools or fasteners that exceed the thresholds called out in figure 1, call Facilities Management (x7400) to request utility-location services. Refer to the attached Dig Permit Flow Chart for specifics concerning routing and responsibilities.

Identifying circuits and other utilities before work can save your life and prevent expensive damage. Never assume a circuit, conduit, pipe, or other utility device is “dead” until that has been verified by a qualified person. Never assume that you will not encounter buried utilities when you dig.

### Definitions:

**Blind penetration** – Drilling, cutting, nailing, and installing fasteners, etc. into a wall or floor when the interior is concealed from view.

**Boring** – Commonly called horizontal directional drilling or HDD, is a steerable trenchless method of installing underground pipes, conduits and cables in a shallow arc along a prescribed bore path by using a surface launched drilling rig, with minimal impact on the surrounding area.

**Competent person** – In the context of this policy and related procedures, one who has documented training and experience in the location and marking of buried and concealed utilities by use of specialized instruments and by interpreting building and site drawings to aid in such location. (*EH&S Manual definition: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.*)

**Excavation** – Digging, grading, tunneling, trenching, and drilling below grade, and installing stakes, rods, etc. to a depth greater than 6 inches. This includes penetrations of slabs on grade such as sidewalks and roads.

**Soft Digging** – Excavating with tools or equipment that utilizes air or water pressure as the direct means to break up soil or earth for removal by vacuum excavation.

**Subject-Matter-Expert** - (SME) is a person who is an expert in a particular area or topic.

**Tolerance Zone** – A specified circumferential distance around the indicated location of the utility. Virginia code requires 24 inches or more.

**Utility Locate** – Term in general use in the utility industry for the process of locating and marking buried or concealed utilities.

### Policy:

Excavation, digging, boring into soil, drilling or cutting blind penetrations into floors and wall, and demolition at Jefferson Lab shall be performed only after utilities have been located and marked by a competent person. Refer to Fig. 1 for exclusions.

**Requirements:**

1. Individual responsible for *digging, excavation, or floor/wall penetrations that do not meet fig. 1 exclusions shall complete and submit a permit form (Section 1) plus provide a sketch or drawing describing the planned activity along with the specific location referenced to fixed objects. If required, the SOTR, Project Manager or Inspector is responsible for providing the work order number, project tile and account code associated with this dig, excavation, or floor/wall penetration.*
2. The SOTR, Project Manager, Inspector will coordinate the completion of Section II – “Subject Matter Expert Approval”, these signatures are required as part of the Dig Permit process.
  - a) Accelerator Operations Approval is required for any excavation work within the accelerator fence. **Any mark-ups to the utility plan must be initialed next to the mark-up.**
  - b) Radcon Approval is required for any excavation work within the accelerator fence and for work on any structure or surface that serves as a physical barrier to a radiologically-controlled area. In some cases the proposed work will require detailed analysis of shielding, potential radiation exposure to workers and coordination of the proposed work with accelerator operations. Work planning should allow time for this process, which is most likely to be necessary for work in close proximity to the accelerator, FEL or Experimental Hall enclosures. **Any mark-ups to the utility plan must be initialed next to the mark-up.**
  - c) Facilities Subject Matter Experts for Electrical, Chilled, Cooling, Low Conductivity Water, Potable Water, Sewer, Communications/Data, Stormwater, Fire Protection, Gas systems will review every permit and provide undocumented information to the utilities drawing and / or sign-off to show the respective utilities have been reviewed for completeness. Structural reviews for completeness will occur for those permits within a structure. Building managers may be asked to review and sign-off if the work requires it. **Any mark-ups to the utility plan must be initialed next to the mark-up.**
3. Pre-disturbance utility location and marking is mandatory, and it shall be performed only by Facilities Management (or designated subcontractor) and its designated locator subcontractor(s). Facilities Management (or designated subcontractor) is required to complete Section III regarding: the JLab contact, the locating company, the company’s technician and the locating equipment, the date the utilities were located and marked, and the building and emergency points-of-contact.
4. SOTR, Project Manager or Inspector shall provide utility locator subcontractor with a color plan with known utilities overlaid and area of planned excavation marked for verification and marking the location of newly discovered utilities. This paperwork shall be attached to a ‘Facilities Director’ approved dig permit form. Dimensions shall be used to locate newly discovered utilities from buildings or similar fixed objects.
5. Locators shall be equipped with fully functioning, suitable equipment and shall be trained in its use. A sweep for unknown utilities over the entire excavation site is mandatory. All utilities identified on the plan must be confirmed by the locator. Utilities on the plan that cannot be confirmed by the locator must be resolved by the SOTR prior to any excavation.
6.
  - a) Jefferson Lab Activity - The Locator SOTR is to ensure that field verification of located utilities is reviewed with the requestor. It is the Project SOTR’s responsibility to ensure that those utilities found during the utility locate, that were not correctly shown on the Site Master Utility Plan are documented and provided to facilities drafting for incorporation into the Site Master Utility Plan.
  - b) Subcontracted Work - The Subcontractor is to ensure that field verification of located utilities is reviewed with JLab SOTR, or inspector. It is the Subcontractor’s responsibility to ensure that those utilities found during the utility locate, that were not correctly shown on the Site Master Utility Plan are documented and provided to the JLab SOTR. JLab SOTR will have the changes incorporated into the Site Master Utility Plan.

7. Locators shall use industry best practices, and shall meet the requirements found in...

*JEFFERSON LAB DIVISION 1 MASTERSPEC, LOCATION OF EXISTING UNDERGROUND UTILITIES* - Section 011000 Summary:

#### LOCATION OF EXISTING UNDERGROUND UTILITIES

1. LOCATE As required in the procedure for obtaining a Jefferson Lab "Dig/Blind Penetration Permit" use locate-industry "Best Methods" to scan the project site with suitable equipment and mark the surface of the ground where existing underground utilities are discovered (see section 013529 for a summary of all required Jefferson Lab permits). Locate utilities to CI/ASCE 38-02 "Quality Level B" requirements unless otherwise indicated. Employ locate-industry standard color system for markings. Verify that the actual locations of all existing utilities are consistent with the locations indicated in the subcontract documents. Report any discrepancies noted, including the presence and location of any utilities that were not indicated in the subcontract documents, as required in the Dig Permit procedures. Determine exact elevations of any existing piping, utilities, or any other type of underground obstructions not indicated or specified to be removed but indicated in the drawings or discovered during scanning in locations that will be crossed by piping, ducts or other work to be installed under this subcontract. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made. Unidentified existing utilities found in the course of this project shall be traced out to the project limits and reported as required in the Dig Permit procedures. These utilities and any abandoned in place utilities shall be documented on the as-built drawings as described below. Deliver information in the format called for in CI/ASCE 38-02.
  2. EXCAVATION Inform the SOTR at least 24 hours prior to commencement of each separate phase of excavation. No excavation work shall be performed without a signed Dig/Blind Penetration Permit – a copy of which shall be available on site at all times excavation work is in progress. Excavate (including drilling, augering, or driving piles, posts or pegs) to avoid marked utilities, staying outside of customary tolerance zones for each utility. If excavation must be performed within a tolerance zone, or when located utilities must be exposed, use industry best-practice methods to protect people, property, and the utilities – in that order of priority. When conditions change from the original plan re-assessment of the plan is required.
8. The SOTR responsible for the excavation work shall inform Building Managers and receptionists before work commences when their building may be affected by a planned or unplanned service interruption. When applicable, this shall include any special actions to take in the event of an emergency caused by the excavation work.

After the Facilities Director signs off on the permit, a copy of the utility plan is to be provided to the utility location SOTR and to Facilities drafting. Facilities drafting will incorporate any undocumented utilities into the Master Utility Plan.

Do not use mechanized equipment within 2 feet of utility line markings. If you need to excavate near a marked utility line, carefully expose the utility line by hand digging and keep mechanized equipment at least 2 feet away from the line at all times. All marked utilities must be physically located by hand digging or potholing prior to machinery digging. If this cannot be done, you must obtain SOTR approval before deviating from this requirement.

**Procedures:**

These procedures establish requirements for excavation, and boring, drilling or cutting of penetrations in walls, floors, and ceilings at JLab.

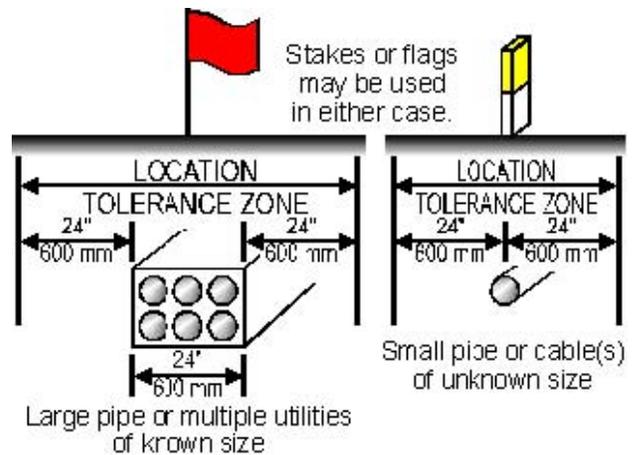
**Situation 1.**

**Facilities Management subcontracted construction or service work necessitates (a) excavation or (b) a blind penetration into a wall or floor that exceeds the thresholds identified in Figure 1.**

1. **Inform:** Subcontractor informs the SOTR (or Inspector and/or Project Manager) and completes Section 1 of the *Digging, Excavating, and Floor & Wall Penetration Permit Request*.
2. **Describe:**
  - a) Area to be disturbed is marked (normally by subcontractor) using **white** marker paint (for ground excavations and penetrations) or by clearly distinguishable markings on floors and walls.
  - b) Subcontractor submits the *Permit Request* to the SOTR or Inspector.

3. **Locate:**

- a) SOTR or Inspector (in consultation with subject-matter experts) reviews pertinent site utility plan and/or building construction drawings for any information concerning buried or concealed utilities within the area to be disturbed. This information is provided to the locate service. **Any undocumented utilities placed on the utility plan need to be initialed by the SME providing the mark-up.**



- b) SOTR contacts utility locate service, and arranges a date and time for the locate.
- c) If utility location is included in the construction subcontractor's scope of work, it is the subcontractor's responsibility to schedule the locate service. The SOTR shall be informed of the date and time. Utilities (and obstructions) are marked by the locate technician.
- d) Unconfirmed utilities need to be resolved by the SOTR prior to the permit approval.

4. **Oversee:**

- a) **Jefferson Lab Activity** – all excavation will be in presence of a competent person designated by the SOTR. In case of excavation within 2 feet of the utility, SOTR or the JLAB inspector will be present.
- b) **Subcontracted Work Activity** – all excavation will be in the presence of a competent person designated by the subcontractor superintendent. The competent person may not be the person operating the excavating machine. The Contractor's Site Safety and Health Representative shall ensure those digging within two feet of any active utility are briefed on the Lab's proper procedure before starting the excavation and that they are prepared to secure that utility in the event of a strike. At a minimum, the Contractor's Site Safety and Health Representative shall make frequent observations of any

**excavation activity. Upon completion of the excavation, the site utility plan or as-built drawings shall be revised as necessary to reflect the installed work and discrepancies revealed during the work. The SOTR is responsible for providing a copy of the utility changes and discrepancies to Facilities Record Drawings Coordinator weekly.**

## **Situation 2.**

***A Jefferson Lab group or department other than Facilities Management intends to excavate or make a blind penetration.***

1. The group or department submits a Facilities Management Service Request for utility-locate services, or it submits a *Digging, Excavating, and Floor & Wall Penetration Permit Request* with Sections I and II completed.
2. The work order is assigned to an experienced Facilities staff member who then coordinates the utility locate as described in Steps 3 – 8 above.

**In the following situations utility location is not normally needed, although Facilities Management coordination is still required and a dig permit is still required.**

1. Boring, drilling, or cutting of masonry wall to depths that exceed 1 ½ inches but less than or equal to 3 inches or from the top side of a concrete floor slab to depths that exceed 2 inches but are **less than 3 inches. Less than 6” in depth outside of a structure.**
2. Penetrations in gypsum-board walls where the interior of the wall at the penetration location can be seen to verify no utilities are present. Refer to Figure 1 for exclusions.
3. Manually chiseled penetrations in hollow-core concrete block walls that remove no more than one block.

### **Standing Requirements for Locate Services:**

Locate Services shall be performed to Underground Utilities industry Standard CI/ASCE 38-02, quality level “B”.

### **Important Considerations for Performing Blind Penetrations (Lessons Learned)**

- Has the work area and surface to be penetrated been adequately inspected, potential hazards identified, and controls implemented?
- If full penetration of a floor, wall, or ceiling is to be performed, has the other side also been checked for hazards?
- Have all available construction/as-built drawings been reviewed for hidden hazards (e.g., electrical utilities) and obstructions (e.g., rebar)?
- Has the surface been checked for hidden hazards using survey equipment and are hazards marked?
- Have identified electrical hazards been de-energized and locked out?
- Is a penetration permit required? Has the permit been approved? Have the permit requirements been reviewed by all personnel involved in the penetration work? Are penetration depth limits established?
- Has appropriately rated personal protective equipment been identified and provided? Will an electrical drill stop be used if embedded rebar is expected?

- What actions should be taken if an obstruction is encountered (e.g., proceed or stop and investigate)? **Excavation Plan Requirements**

*This requirement applies to all excavations deeper than 5 feet.*

### **Comply with provisions of 29 CFR 1926.650 - 652.**

#### **Prior to Start of Work:**

- Submit excavation design to include intended options for sloping, shielding, or shoring. This submittal shall also include the tabulated data basis for this design or, alternatively, the name and signature of the Registered (in the Commonwealth of Virginia) Professional Engineer who designed the sloping, shielding or shoring system.
- Submit name and qualifications of subcontractor's representative designated as the on-site competent person. (This person shall be present with operational authority during all excavation work, stabilization system installation or removal, and personnel entry into and work within the excavation.)
- The requestor or subcontractor is to provide the SOTR at least 24-hours advance notice before any excavation begins.

#### **Location of Unknown Utilities**

Locate utilities discovered during the excavation and backfilling process using dimensions (in feet and inches) both horizontally and vertically) from buildings or other permanent surface structures.

#### **Back-Filling Requirements**

- An excavator performing excavation or demolition at an underground facility shall backfill such excavation with materials and in such manner as specified by the operator or, in the absence of such specifications, with suitable materials and in such manner as will avoid damage to, and provide proper support for, such underground facility and its protective coating both during and after backfilling operations.
- The excavator shall not place large rock, frozen earth, rubble, debris or other heavy or sharp materials or objects which could cause damage to or scraping against any underground facility.
- The backfill beneath and around any underground facility shall be properly compacted in accordance with generally accepted engineering practice.
- Heavy loads and excessive forces shall not be imposed on any exposed underground facility at any time during backfilling operations.

#### **Following Excavation**

- Turn in marked-up drawings showing location of newly installed and located utilities to Facilities Drafting for incorporation in the Site As-built utility conditions