ADMN 053 LBNL Surface Penetration Procedures

1.0 Objective:

This procedure defines the steps necessary for the safe penetration of ground, walls, or other existing surfaces of LBNL properties and covers those institutional requirements that must be completed prior to beginning any penetration action in any surfaces in LBNL. Of particular concern is the prevention of contact with live electrical conductors or other significant hazards (i.e. natural gas, water lines, compressed air lines, etc.) The intent of this procedure is to minimize the chance of injury or death to personnel and to protect known or unknown buried utility lines. This will minimize disruption of essential services when penetrating or excavating the ground surface of LBNL property. The objectives of this procedure are to:

- Maintain employee health/safety
- Protect the environment and real property
- Ensure operational reliability of concealed utility systems
- Ensure the Penetration Permits are tracked, reviewed, approved, distributed, and revised as necessary
- Improve communication with personnel involved in the permit process

2.0 Application:

This procedure applies to all work that requires penetrations of existing surfaces of LBNL and LBNL property, and leased buildings where the surface penetration work is managed, supervised and controlled by LBNL personnel. The LBNL Permit to Penetrate Ground or Existing Surfaces of LBNL Property (here after known as Penetration Permit) is required for all penetration of any surfaces.

A Penetration Permit will not be issued if the area cannot be scanned or when reliable data on Utilities location cannot be obtained.

3.0 Scope:

- 3.1 The permit is required for all concrete surface (wall, floor, ground including asphalt, paving, etc) penetration work regardless of depth. For other types of penetrations, this permit is required if the penetration depth is 2 inches or greater.
- 3.2 The permit is valid for 45 calendar days from the time of issuance. The Responsible Individual (RI) may request a 45 day extension provided the Utility Coordinator/Locator inspects the site and determines that the work scope, job hazards, and hazard controls of the original permit are still valid. Only one 45 day extension is permitted

- 3.3 The initial permit can be issued for greater than 45 days with approved variance from the Facilities Division Deputy Director
- 3.4 The permit must list conditions and potential hazards and controls. The permit must clearly identify equipment and utilities that will be affected
- 3.5 This procedure and Penetration Permit only addresses the hazards and controls directly related to surface penetration. The permit does not address other hazards such as trench access, shoring, traffic control exposure to chemicals, confined spaces, utility isolation, LOTO, etc.

Exemptions:

- No Penetration Permit is required for survey staking by the surveyor in soil using wood stakes not deeper than 6 inches.
- No Penetration Permit is required for gypsum board (sheet Rock) wall
 penetrations provided that the area has been swept for active and passive
 electric current by LBNL Utility Coordinator or his designee, and both sides
 of the wall have been visually inspected for evidence of repairs and wall
 cavity have been visually inspected for hidden objects. Drill a pilot hole 1/8
 inch in diameter to depth of anchor.
- Wall cavity shall be inspected by cutting a opening (not more than ¾ h
 deep) and visually inspecting for any hidden objects within the surface
 penetration area. Multiple openings can be made for complete inspection of
 the wall cavity if needed. Other hazards such as asbestos are covered
 under a separate EH&S procedure.
- No Penetration Permit is required for the LBNL in house Groundskeepers for routine maintenance, such as removal of dead plants or re-planting for excavation 12 inches or less. Hand tool use only.
- No Penetration Permit is required for the Laborers when clearing souse soils from the edge of a road way
- No Penetration Permit is required for the Telephone Services Installers when locating telephone boxes in the landscape area by the use of hand tools.
- No Penetration Permit is required for concrete shield block surface penetration. However, scanning for the alignment of rebars need to be performed so that the Facilities Structural Engineer can confirm that the structural integrity of the shield block is not compromised. The RI is still responsible for the radiation protection integrity of the shield block.
- No ground Penetration Permit is required for cutting asphalt berms provided the cut is less than 2 inches into the underlying asphalt pavement.
- No ground Penetration Permit is required for the LBNL Environmental Services Group's routine site-wide soil and sediment sampling collection program. These samples are collected using a hand trowel and penetrates no deeper than 3 inches into the underlying asphalt pavement.

4.0 Training and Qualifications:

- Responsible Individual (RI) shall be formally trained in the requirements of ADMN-053. All Responsible Individuals shall demonstrate a thorough understanding of the procedure prior to their designation as an RI. The RI is appointed by Management to have oversight over a project requiring surface penetration based on the individual's demonstrated capabilities and experience.
- The Locator must be trained and certified as defined by the professional locator competency standards and performance criteria of the National Utility Locating Contractors Association (NULCA) and instrument manufacturer. The locator must be competent in the use of a variety of locating technologies.

5.0 Method of Performance:

- Any core drilling or saw-cut operations that remove concrete areas greater than 4 inch in diameter shall require the approval of the LBNL Facilities Structural Engineer.
- Soil excavation within a 30 inch radius of a marked or exposed utility must be
 excavated by non-destructive means using appropriate safe technology such
 as an air knife, shovel, vacuum, chipping gun with a spade bit (may use a
 pointed bit to break the concrete surfaces then use spade bit in the soil),
 breaker bar or high pressure water excavation. Drills, circular saw, jack
 hammer, boring equipment, coring equipment, concrete saw, pick, backhoe, or
 any power excavation machine is not allowed.
- No drilling is allowed within 6 inches of any marked utilities. Within the 6 incheradius, hand chisel and hammer shall be used to expose the utility.
- Variance Request Authorization is required for the following conditions:
 - Requests for permit period of longer than 45 days
 - Requests for using destructive means for excavations within 30 Inches of exposed, detected, or known utilities
 - Requests for drilling within 6 inches of an of an exposed or detected utility

Exception: No Variance approval is required for destructive means of asphalt pavement removal and/or cutting etc. provided that a pilot hole is cut at a minimum of 30 inches from a located utility to determine the actual thickness of the asphalt pavement in order to set the blade so that the penetration into the sub grade is no greater than 1 5/8 inches.

RI shall submit a Variance request along with the Penetration Permit
Application. The RI shall provide the justifications that the rule is inapplicable,
infeasible, or impossible to conform with and identify appropriate mitigation
measures. The RI shall submit the Variance Request to the Utility Manager for
review. The Utility Manager will provide a recommendation to the RI's

respective Department Head for approval. Once the respective Department Head approved the Variance Request, the Utility Manager will provide a recommendation to the Facilities Deputy Director for approval. Once the Variance Request is approved by the Facilities Deputy Director, the approved Variance Request shall become part of the Penetration Permit package and shall be posted at the surface penetration work site. At the completion of the surface penetration work, the whole package shall be filed in the Project Files.

- For areas with prior development or known soil contamination (brown field sites) as determined by the EHS&S, the Penetration Permit shall include approval from the EHS&S Environmental Services Group. If requested by the RI, a representative will participate in the pre-start meeting with the workers.
- The LBNL Master Specification includes the requirement that the RI obtains an approved Penetration Permit prior to any ground penetration, adhere to the conditions during work, and take financial responsibility for any damage to utilities or to other resulting losses.
- The Project Manager shall ensure that the following sections of the specifications are in place, revise if necessary for specific project needs.
 - Master Specification Section 01020, paragraph 1.19.A, Permit to Penetrate Ground or Existing Concrete Surface.
 - Master Specification Section 01210, paragraph 3.01, Safeguards Existing Equipment, Underground Utilities and Artifacts.-Mike will check this section numbers

6.0 Roles and Responsibilities:

All LBNL employees, subcontractor employees have the authority and obligation to stop the work when unexpected utilities are encountered or any hazards are observed.

Responsible Individual (RI)

- 1. Authorizes work
- 2. Is responsible for the overall performance of the work
- 3. Is responsible for the safety of the job site
- 4. Implements ADMN-053 and permit procedures correctly
- 5. Confirms that the surface penetration JHA is approved for the work scope detailed in the Penetration Permit
- 6. When required, submits Variance Request. The scope of work in the Variance Request shall match exactly with the scope of work detailed in the Penetration Permit application. Both forms are to be submitted together
- When required, conducts field review of Variance Request with line management (Facilities Department Head or direct supervisor for non-Facilities RI), PM/CM, Utility Coordinator and/or subcontracted utility locator and Utility Manager

- 8. Ensures that boundary markings remain visible. Ensure that all excavation work be conducted within the boundary area
- 9. Posts signed copy of the permit and supporting documents
- Conducts pre-start briefing to all participating workers unless worker is a qualified RI
- 11. Contacts TAAP Inspector 24 hours prior to start of penetration of any surface
- 12. Initiates, requests, and maintains valid Penetration Permit for the duration of the work
- 13. Provides job information to the Utility Coordinator
- 14. Resolves unexpected issues
- 15. Requests LBNL Subcontracted Surveyor to determine and record the actual alignment and depth of the located utility line(s)
- 16. Inspects excavation site prior to backfill and confirms that the utility's three-dimension coordinates have been recorded by LBNL Subcontracted Surveyor
- 17. Arranges soil compactions test
- 18. Confirms as-built conditions are marked on the subcontractor's set of as-built drawings for LBNL leased buildings
- 19. Ensures that boundary marking remain visible
- 20 Removes the Permit after job completion and files the Permit with supporting documents in the official project files

Utilities Coordinator/Locator

- 1. Processes permit application
- 2. Performs field inspection of job site prior to issuing permit
- 3. Reviews all applicable documents, as-built drawings, area Utility Sheets, historical construction project drawings, etc.
- 4. Attaches as-built drawings, photographs, area Utility Sheet etc...
- Ensures Locator personnel are trained and certified as defined by te professional locator competency standards and performance criteria of the National Utility Locating Contractors Association (NULCA) and instrument manufacturer
- Coordinates Locator activities and ensures appropriate technologies and methods are used to locate underground utilities
- 7. Reviews Locator results with Responsible Individual
- 8. Identifies limiting conditions on permit
- 9. Issues permit to Responsible Individual
- Confirms with the RI that the selection of tools meets the nondestruction methods of excavation when required
- 11. Participates with the RI in the field review of Variance Request. Contact subcontracted Utility Locator if required

Facilities Division Technical Assurance Assessment Inspector

- 1. Routine worksite penetration permit program evaluations
- These inspections access contractor and LBNL Facilities personnel Penetration Permit program practices at the work site, interview employees, and contractors performing ground or existing surface penetrations, and document observations of penetration work activities

Site Excavation Workers

- 1. Attend and understand pre-start briefing
- 2. Follow the requirements of the permit
- Stop work and alert supervisor of unusual and unexp4ected conditions
- 4. Sign the permit

Utility Manager

- 1. Approves permit
- 2. Performs field review of Variance Request
- 3. Reviews and endorses Variance Request
- Responsible Individual's Line Management (Supervisors, Department Head for Facilities and RI direct supervisor for non-Facilities Division)
 - 1. Participates in field review of Variance Request
 - 2. Reviews and endorses Variance Requests
 - 3. Ensures that changes to the process and procedure are communicated to all RIs.

EH&SS

- 1. Performs construction safety inspections
- 2. Monitors compliance with permit conditions
- 3. Provides training resources
- Environmental Services Group (ESG) approves the Permit for area of known soil contamination (brown field sites) and attends the Prestart meeting when support is requested by the RI

Facilities Deputy Director

1. Approves Variance Requests for :

- Permit period of longer than 45 days
- Emergency requests for short-time turnaround of permit application
- Variances from non-destructive excavation requirements
- Drilling or excavation within 6 inches of utilities

7.0 Addendum

- Memorandum of Understanding and Request for Pub3000 Variance between the LBNL Advanced Light Source Division, the Facilities Division, and the EHS&S Division
- Memorandum of Understanding and Request for Pub 3000 Variance between the LBNL Bella Facilities, the Facilities Division, and the EHS&S Division

8.0 Responsibilities and Controls

The responsibility for document control remains with the following listed individuals. Revisions to this document can be submitted with justification to the Facilities Utility Manager for consideration. The Facilities Utility Manager will review the revision submittal and seek concurrence and approval.

ADMN 053 LBNL Surface Penetration Procedures

Managed by:	Mason	9 4 2013
	Michael C. Dong Utility Manager, Operations Department Facilities Division	Date
Concurred by:	Richard & Olfol	9/4/2013
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	Manager, Safety Department	
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	Ken Fletcher Deputy Division Director Facilities Division	Date
Approved by:	Gerniger S. Ridgeway	9/9/13
	Jennifer Ridgeway Division Director Facilities Division	Date

Glossary of Terms

Non-destructive Means of Soil Removal: Soil removal by use of vacuum, or excavated with appropriate safe technology, such as an air knife, shovel, vacuum, pneumatic or electric chipping gun (manufactured by Ingersoll Rand, model # 2, weigh less than 20 lbs or similar but no more than 20 lbs, pointed bit for breaking concrete and spade bit for soil), breaker bar or high pressure water excavation.

Destructive Means of Soil Removal: Soil removal by use of powered or heavy equipment such as drills, circular saw, jack hammer, boring equipment, coring equipment, concrete saw, pick, backhoe, or any power excavation machine.

Soil Excavation: Soil removal by use of non-destructive and /or destructive means.

Area Utility Sheets (U-sheets): Drawings that shows the existing underground utilities in an area of 1,000 feet wide in the East-West directions and 400 feet high in the North-South directions.

Exterior surfaces: 5 feet or more from the building exterior wall surfaces.

Interior surfaces: All indoor surfaces including up to 5 feet from the building exterior wall surfaces.

LBNL Property: LBNL property is defined to include all properties within the LBNL site and the leased buildings.

Potholing: Potholing is the practice of digging a test hole to expose underground utilities to determine the horizontal and vertical locations. Potholing shall be performed using non-destructive means as defined above. Potholing shall be utilized during construction activities as required herein to prevent damage to existing underground utilities. The purposes of potholing are as follow.

- To verify utilities in congested areas where multiple utilities are routed in close proximity and/or crisscrossing each.
- Underground infrastructures interferences where utility locates have greater potential to be less accurate.
- Within the tolerance zone of the utility which is +30 inches on each side of the located or known utility.
- Within the 6 inch radius of any marked or known utilities, hand chisel and hammer shall be used to expose the utility.

Permit Process

The following process defines the steps for any penetration or excavation of any depth at LBNL. NOTE: The roles and responsibilities of Subcontractor will apply to in-house labor performing penetration / excavation activities.

Person Responsible for Performing Task	Required Actions
Responsible Person (RI)	Penetration Permit Request 1.0 The RI is the Laboratory representative requesting the permit and shall ensure that subcontractors are informed about LBNL Penetration Permit requirements so that they will allow for these costs in their bids. The requirement for the LBNL Penetration Permit and underground utilities location prior to excavation must be reviewed at Pre-bid meetings.
	1.1 RI shall request the Penetration Permit through the Facilities Web Site (https://fac.lbl.gov/Facilities/OpMaint/DigApp/) by completing the Permit Application form (including the application checklist) online
	1.2 The RI shall notify the Building Manager or closest Building Managers of any surface penetration activity within their buildings. The RI shall notify the nearest effected building manager for exterior LBNL sites for upcoming construction activities. The RI will notify the zone manager, bus services and fire department as needed.
	1.3 The RI shall check with EH&S Environmental Services Group (ESP) and Radiation Protection Group if there is any known contamination at the surface penetration site. For known contamination sites, a representative from either one or both of these two groups (depending on type of known contamination) need to approve the Penetration Permit and shall be present during the Pre-start meeting. The RI shall arrange for the Penetration Permit approval and Pre-start meeting.
Subcontractor	 1.4 The subcontractor is instructed to obtain the Penetration Permit from the Responsible Individual (RI). 1.5 The Subcontractor requests the RI to initiate the permit request. The request may be made any time after excavation is scheduled, but not so early that conditions may change prior to excavation. For efficiency of scheduling, the request should be made at least 10 working days before Penetration is scheduled to begin. Poor planning does not constitute an emergency. The Subcontractor or RI shall mark on the ground the extent of the excavation with "WHITE" color paint only (per Uniform Paint Color of California

	Government Code 4216, Underground Service Alert).
Subcontractor continued	Note: Once the Penetration Permit is issued, the subcontractor is implicitly granted control of the site. The subcontractor is responsible for all new underground utilities installed. As a result, an additional Penetration Permit will not be required if the excavation is within the original boundaries and consistent with the terms of the initial Penetration Permit. If excavation extends beyond the original boundaries or is not consistent with the terms of the initial Penetration Permit, a new Penetration Permit shall be
	required. Work Order to Utilities Coordinator
Utilities Coordinator/Locator	2.0 The Utilities Locator will arrange to have NULCA certified personnel to perform the survey. This will include a firm with expertise in locating underground utilities.
	Site Drawing Review
Utilities Coordinator/Locator	 3.0 Review all current available sub-surface utility maps (Area Utility Sheets (U-sheets) for exterior underground infrastructure utilities and/or building underground utilities if the permit application is for interior surface penetrations. 3.1 Review drawings and other historical documentation which are available in Project Stick Files, and microfiche system. 3.2 Collect information from knowledgeable employees based on personal recollection of construction in a particular area. 3.3 Locate, on prints/maps, all underground utilities in work area. 3.4 Make copies of all relevant drawings if applicable and attach to the Penetration Permit. 3.5 Take photographs of the surface penetration area if applicable and attach to the Penetration Permit. 3.6 Mark area defined by work requested on drawings to be included with permit. 3.7 Review any unexpected problems with RI.
Utilities Coordinator/Locator	Site Locator Sensing Survey 4.0 Thoroughly sweep work area with appropriate utility sensing locating instruments. Look for signs of recent construction work such as patched asphalt, etc. particularly around nearby mechanical and electrical equipment pads or substations. Any new unrecorded utilities in these areas may extend into the permit area. Disconnected electrical circuits may need to be turned on to provide a flow signal, since they could be crossing the permit area but not be detectable due to lack of current flow. Do not assume anything. If in doubt, inform the RI and have the RI obtain assistance from the appropriate building trades' supervisor and together clear the discrepancies.

Utilities Coordinator/Locator Continued	 4.1Compare the location and depth of underground utility lines found using appropriate utility sensing locating instruments with the location and depth shown on prints/maps. 4.2 Clear up all discrepancies between Utility Locator findings and locations shown on prints/maps. 4.3 Utility Locator will mark the center line of buried utilities above ground using Uniform Color Code and marking standard consistent with California Government Code, 4216. Extend marks beyond area to be excavated so they will be visible throughout work. 4.4 Clearly indicate utility lines and shut-off valves on prints/maps. 4.5 A Penetration Permit will not be issued if the area cannot be scanned or reliable data on utilities location cannot be obtained. 4.6 Review any unexpected problems with Plane
	4.6 Review any unexpected problems with RI.
Subcontractor	 4.7 Review any unexpected problems with RI 4.8 Contact Facilities to disconnect electrical circuits 4.9 Contact Facilities to turn on ay electrical circuits that may need to be turned on to provide a flow signal, since they could be crossing the permit area but not be detectable due
	Tributation (1900) Chicarage of this Chicarage (1900) Chi
	to lack of current flow
Utilities Coordinator/'Locator	Permit Preparation 5.0 Fill out the Penetration Permit form in canary color Paper 5.1 Mark area defined by permit on maps to be included with permit 5.2 Define requirements during initial survey of specific conditions to be met on the Penetration
	Permit.
	Permit. 5.3 Review any unexpected problems with RI. For
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Responsible Individual	 5.3 Review any unexpected problems with RI. For areas of known contamination, the RI shall obtain an email from a representative of the EH&S Environmental Services Group or the Radiation Protection Group 5.4 Completes the Permit Checklist 5.5 Reviews with the Utility manager and obtains approval signatures. 5.6 Notify the RI that the Permit is ready and prints out the Permit in the canary color paper 5.7 Utilities Coordinator scans the Permit and electronically file in GUtilities\PenetrationPermits\PPG 5.8 Give Penetration Permit, marked-up copy of prints/maps, as-built drawings, photographs and if

Responsible Individual Utilities Coordinator/Locator	Pre-Start Meeting and Sign-Off 6.0 The RI sets up a Pre-Start Meeting at surface penetration site to issue the permit. The Pre-Start Meeting shall include the Utilities Locator, RI, and workers who will be performing the work, the workers' supervisor and representative from EH&S Environmental Services Group for sites that have been identified to be contaminated. When work is performed by a prime construction subcontractor, the subcontractor's superintendent or foreman must be present. 6.1. RI explains the requirements to all excavation workers including review of site markings, marked-up copy of prints/maps, hold points and, if included, special conditions sheet, and notification list. Workers will read and thoroughly understand all documents. 6.2 The RI issues the permit to the Subcontractors, and obtains the Subcontractor and his employees' signatures accepting the terms of the permit. The permit is valid for 45 days from the time of issuance. 6.3 RI Must notify Utility TAPP Inspector 24 hours prior to start of work 6.4 The Utilities Coordinator/Locator reviews the permit, discussing details and answering any questions. All verbal
Utilities Coordinator/Locator	directions issued during the site meeting, other than those in the permit, must be recorded in the permit. 6.5 The Utilities Coordinator/Locator and RI sign the permit
Responsible Individual	completing LBNL approval
Responsible Individual	Posting of Permit 7.0 Must read and thoroughly understand the Penetration Permit, marked-up copy of prints/maps as built drawings, photographs, approved Variance Request, Pre-start Checklist, hold points if applicable form the Utilities Coordinator/Locator
Responsible Individual	RI Compliance 8.0 Read and thoroughly understand Penetration Permit, marked up copy of prints/maps, as-builts drawings, photographs, approved Variance Request Pr-Start checklist hold points if applicable from the Utilities Coordinator
Responsible Individual, LBNL	8.1 The LBNL Construction Safety Engineer and RI shall

Construction Safety Engineer	confirm permit compliance with signatures, dates, and times. The LBNL Construction Safety Engineer will verify that the approved Penetration Permit is posted conspicuously at the excavation site and readily available to the person (s) doing the work. The LBNL Construction Safety Engineer will inspect the surface penetration site as necessary to verify Permit conditions are met and safe practices are followed, stopping work and resolving problems as necessary with RI, Utilities Coordinator/Locator, and Subcontractor.
Subcontractor/In house Labor	Penetration Work Begins-Hand Dig Only
shop	9.0 Surface penetration within a 30 inch radius of any marked or exposed utility must be performed by hand using appropriate safe technology, such as an air knife, shovel, vacuum, pneumatic chipping gun with a spade bit (may use a pointed bit to break the concrete surfaces then sue spade bit in the soil, chipping gun shall be similar to one manufactured by Ingersoll Rand Model #2, weight 20 lbs or less), breaker bar or high pressure water system. Drills, circular saw, jack hammer, boring equipment, coring equipment, concrete saw, pick backhoe, or any power surface penetration machine is not allowed.
	If destructive means are to be used for surface penetration within 30 inches after sub surface utilities are exposed, the RI shall submit a Variance Request, identifying appropriate mitigation measures and follow the Variance Request. Procedures.
	Note: Shut-off and/or secure located utilities by lock-out/tag- out (LOTO) before the surface penetration begins, by destructive process (per the Health and Safety Manual/Pub 3000). The RI shall coordinate the LOTO procedures per Health and Safety Manual/Pub 3000 requirements.
	Potholing shall be utilized during construction activities as required herein to prevent damage to existing underground utilities. Potholing shall be performed at every known corffins of an underground utility.
	9.1Watch for utility lines and indication of utility lines (sand backfill and warning identification tape) while carefully performing work.
Utilities Coordinator/Locator/Inspector, RI, Subcontractor	Permit Removed and Closed 10.0 All modifications to the Penetration Permit shall be written on the permit. No changes to the Permit are allowed without a site visit by the Utilities Coordinator/Locator. The specific details of the tasks and area shall then be authorized by signature (with date and time)of either the Utilities Coordinator/Locator/ or inspector. 10.1The permit is valid for 45 calendar days from the time of issuance. The Responsible Individual may request a 45 day extension. The Utilities Coordinator/Locator visits the site and evaluates whether the conditions of the Penetration Permit are still valid and applicable. If so, the Utilities Coordinator/Locator or Inspector may issue the extension.
Responsible Individual	Otherwise, a new permit must be initiated. Permit Removed and Closed

s r	11. 0 The RI will confirm with the Subcontractor that the surface penetration is complete, including backfill, then remove the permit and notify the Utility Coordinator. The original Permit shall be archived in the project file where it
	can be audited by a third party.