Northwestern

Restricted Access Utility Tunnel Entry Guidelines

Environmental Health and Safety

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I. Purpose

These guidelines are intended to protect individuals from the hazards associated with entering and performing work in restricted access utility tunnels through evaluations, training, and safe work practices. Entering and working in restricted access utility tunnels should be avoided when feasible and only be considered after reasonable efforts are made to avoid entry. Through project design and configuration, reasonable efforts must be made to avoid creating new restricted access utility tunnels and introducing new hazards in existing tunnels, including installations such as piping that may impede emergency egress.

II. Scope

These guidelines apply to those (e.g., Northwestern employees, contractors) who enter restricted access utility tunnels to perform service, maintenance, installations, inspections, and other activities on campus property or in spaces maintained by, operated by, or under the control of the University. These guidelines do not apply to utility tunnels classified as confined spaces and to contractor-controlled worksites where the utility tunnels are maintained by, operated by, or under the control of a contractor.

III. Definitions

A. Restricted Access Utility Tunnels:
   i. Have limited or restricted means for entry or exit (e.g., fixed ladder and hatch for access/egress, a dead-end more than 50 feet in length, requires climbing over or ducking under pipes, requires navigating through tight spaces).
   ii. Are designed for continuous occupancy (e.g., lighting, ventilation).
   iii. Are not classified as a confined space.
   iv. Are restricted to authorized personnel.

B. Work
   i. For the purposes of these guidelines, ***work*** is defined as any activity requiring the use of tools, manipulation of valves, or similar activities that may come in contact with utility piping, electrical circuits, or other systems in the utility tunnel.
   ii. Visual inspections do not qualify as work.

IV. Responsibilities

A. **Environmental Health and Safety (EHS)**
   i. Adhere to these guidelines.
   ii. Review and revise these guidelines, as necessary.
   iii. Provide consultation and guidance, as necessary and upon request, to identify, evaluate, and control hazards associated with restricted access utility tunnels and to facilitate entries for work.
   iv. Conduct documented tunnel assessments (see **Section V – Assessments**) in collaboration with the applicable stakeholders (e.g., Facilities, Information Technology "NUIT") to determine if they are restricted access utility tunnels, utilities present, potential hazards, and entry requirements.
   v. Collaborate with stakeholders (e.g., Facilities, NUIT, contractors) to develop and approve safe operating procedures (SOPs).

vi. Maintain the database of utility tunnel assessments and provide them to applicable units and contractors as necessary and prior to entries.
vii. Review SOPs and other relevant documentation after each entry to ensure compliance with these guidelines.
viii. Review entry operations when there is reason to believe that the measures taken under these guidelines may not protect employees and revise the guidelines to correct deficiencies found to exist before subsequent entries are authorized. Examples of circumstances requiring the review of these guidelines are:
    a) Any unauthorized entry into a restricted access utility tunnel,
    b) The detection of a restricted access utility tunnel hazard not covered by the SOP,
    c) The detection of a condition prohibited by the SOP,
    d) The occurrence of an injury or near-miss during entry,
    e) A change in the use or configuration of a restricted access utility tunnel, and
    f) Employee complaints about the effectiveness of these guidelines.
ix. Review the scope of construction and renovation projects that may involve restricted access utility tunnels to ensure alignment with these guidelines.
x. Review contractor procedures, as necessary, to ensure compliance with these guidelines.
xi. Provide air monitoring to facilitate Northwestern unit restricted access utility tunnel entries, if necessary.

B. **Northwestern Units**

i. Adhere to these guidelines.
ii. Ensure employees are adequately trained, qualified, and competent for the work and scope of activities (see **Section X – Training**).
iii. Prevent unauthorized entry into utility tunnels within their area through signage and security measures (e.g., locking).
iv. Ensure employees and contractors do not enter utility tunnels unless authorized in accordance with these guidelines.
v. Designate an appropriate number of supervisors, or their designees, to approve entry into utility tunnels, including for contractors entering on behalf of the unit.
vi. Monitor employees' need for additional or refresher training, based upon assigned duties, changes in restricted access utility tunnels, or changes to these guidelines.
vii. Collaborate with EHS and other stakeholders to conduct documented utility tunnel assessments to determine if they are restricted access utility tunnels, utilities present, potential hazards, and entry requirements.
viii. Collaborate with stakeholders (e.g., EHS, Facilities, NUIT, contractors) to develop and approve SOPs.
ix. Collaborate with EHS to ensure that contractor procedures comply with regulatory requirements and these guidelines.
x. Identify, shut down, and isolate hazardous energy (e.g., utilities), as necessary, to facilitate entry and work in utility tunnels.
xi. Maintain all necessary equipment in accordance with manufacturer guidelines and regulatory requirements.

xii. Assign the appropriate number of qualified individuals to maintain air monitoring equipment pursuant to the Northwestern Confined Spaces Program.
xiii. Notify EHS of changes to existing utility tunnels, the removal of utility tunnels, or the planning of new utility tunnels.
xiv. Provide employees with the required personal protective equipment (PPE).

C. **Project Managers (including those who oversee activities that involve restricted access utility tunnels)**
   i. Adhere to these guidelines.
   ii. Inform EHS and the relevant stakeholders (e.g., Northwestern units, employees, or contractors) of work that involves utility tunnels.
   iii. Provide these guidelines to contractors involved in utility tunnel operations, including any specific procedures.
   iv. Collaborate with EHS to ensure that contractor procedures are compliant with regulatory requirements and these guidelines.
   v. Collaborate with EHS, Facilities, NUIT, and others to conduct documented utility tunnel assessments to determine if they are restricted access utility tunnels, utilities present, potential hazards, and entry requirements.
   vi. Collaborate with stakeholders (e.g., EHS, Facilities, NUIT, contractors) to develop and approve SOPs.
   vii. Collaborate with the appropriate units (e.g., NUIT, Facilities, EHS) and contractors to identify, shut down, and isolate hazardous energy (e.g., utilities), as necessary, to facilitate entry and work in utility tunnels.
   viii. Notify EHS of known potential changes to existing utility tunnels, or the planned creation of new utility tunnels.
   ix. Submit completed (i.e., fully-signed) SOPs to EHS at the end of entry operations.

D. **Employees**
   i. Adhere to these guidelines.
   ii. Complete all required training (see **Section X – Training**).
   iii. Adhere to the signage requirements (see **Section VI – Identification and Access**) and SOPs.
   iv. Conduct assigned tasks in a safe manner at all times.
   v. Wear appropriate and assigned PPE correctly.
   vi. Exit utility tunnels immediately whenever:
      a) An order to evacuate is given by anyone involved,
      b) They recognize, detect, or suspect the development of a hazardous condition (e.g., utility leaks, odors),
      c) They recognize, detect, or suspect a condition that violates the SOP or is prohibited by the SOP,
      d) There is any doubt as to whether procedures are effective in keeping entrants protected from hazards, or
      e) An evacuation alarm is activated.
   vii. Report any injuries, illnesses, questions, or unsafe working conditions to supervisors.

E. **Contractors (e.g., Maintenance, Operations, Construction)**
   i. Adhere to these guidelines.
   ii. Ensure subcontractors adhere to these guidelines.
   iii. Ensure employees are adequately trained, qualified, and competent for the work and scope of activities (see **Section X – Training**).

iv. Inform employees, subcontractors, and Northwestern project managers of the location of known or suspected utility tunnels where individuals may need to enter.
v. Prohibited from entering utility tunnels without explicit approval from the Northwestern project manager, Facilities, and EHS.
vi. Obtain the utility tunnel assessment from EHS for each tunnel to be entered and coordinate all entries with Northwestern project managers, EHS, Facilities, NUIT, subcontractors, and other stakeholders, as necessary, including when employees from multiple employers (e.g., Northwestern and contractors) personnel will be conducting activities in or near utility tunnels.
vii. Collaborate with stakeholders (e.g., EHS, Facilities, NUIT, contractors) to develop and approve SOPs.
viii. Provide the necessary equipment (e.g., air monitoring instruments, PPE), adequate personnel, and resources necessary for entry into utility tunnels in compliance with these guidelines.
ix. Maintain all necessary equipment in accordance with manufacturer guidelines and regulatory requirements.
x. Conduct assigned tasks in a safe manner at all times.
xi. Provide employees with the required PPE.
xii. Adhere to group lockout/tagout, when applicable, pursuant to the Northwestern Control of Hazardous Energy (Lockout/Tagout) Program.
xiii. Submit completed SOPs and associated hot work permits, and any other relevant documents to project managers at the end of entry operations.
xiv. Inform Northwestern project managers or EHS of any hazards confronted, suspected, or created in utility tunnels.

V. Assessments

A. No utility tunnel may be entered until EHS, or a qualified firm or individual under the supervision of EHS, conducts a documented baseline assessment to identify the characteristics of the tunnel, utilities present, potential hazards, ventilation, access points, entry requirements, and classification (e.g., restricted access).
B. Tunnel assessments are available by contacting EHS at ehs@northwestern.edu and on the EHS SharePoint website for authorized Northwestern units.
C. In addition to the requirements of **Section V.A-B.**, utility tunnels must be evaluated prior to any entry, utilizing information from the baseline assessment, scope of work, nearby activities or conditions, safety data sheets (SDSs), weather, and any other information that may be relevant to ensure entries are compliant with these guidelines. This evaluation will typically be performed during the development of SOPs (see **Section VIII – Restricted Access Utility Tunnel Entry**).
D. During entries, reasonable efforts must be made to inspect, assess, and document (e.g., pictures) the conditions (e.g., piping, valves, structural integrity) inside utility tunnels, and identify and report issues (e.g., suspected or observed leaks or damage) to EHS. In such instances where issues are discovered that are not addressed by an SOP, or where potential hazards exist to the entrant, the tunnel must be evacuated immediately and EHS contacted. If emergency conditions are detected or suspected (e.g., natural gas leak) emergency services must be contacted (e.g., 911).

E. Documented reassessments are required when there are changes to existing restricted access utility tunnels (e.g., new utilities, new hazards, configuration changes), including when non-restricted access utility tunnels may be reclassified as restricted access or confined spaces.

VI. Identification and Access

A. Restricted access utility tunnels must have appropriate danger signage posted at the entry portal, hatch, cover, or equally effective location, when feasible. Refer to **Appendix A** for an example.
B. When feasible, provide locks on utility tunnel access points. When locks are not feasible (e.g., manhole covers), tunnel access must require the use of special tools.
C. Authorized employees from Facilities, University Police, NUIT, and EHS have unrestricted access to the utility tunnels so long as there is no reasonable probability of hazardous conditions that may cause harm (e.g., steam leak, structural issues).
D. Unauthorized employees, contractors, and others must request access from an authorized employee, who is responsible for ensuring unauthorized individuals adhere to these guidelines.

VII. General Safety Requirements

A. Adhere to posted signage in **Section VI – Identification and Access**.
B. Smoking is prohibited in utility tunnels and near access points.
C. Standing water must be pumped out of utility tunnels prior to the commencement of work; if standing water is present and in contact, or presumed to have come in contact, with any electrical equipment (e.g., conduit, receptacles), the utility tunnel cannot be entered until the appropriate hazardous energy isolations are performed.
D. Gasoline or diesel-powered vehicles or equipment are prohibited in utility tunnels and must not be continuously operated near utility tunnel access points and ventilation equipment.
E. No one may enter a restricted access utility tunnel until all identified hazards are eliminated or controlled and acceptable entry conditions have been established pursuant to these guidelines (i.e., SOP, and hazardous energy isolations).
F. Only appropriately trained and authorized individuals may enter and perform work utility tunnels.
G. Utility tunnels may contain high temperatures. The Northwestern Heat Illness Prevention Program must be followed when the heat index is 80° Fahrenheit (F) or higher.
H. Individuals must wear all appropriate and assigned PPE pursuant to the Northwestern Personal Protective Equipment (PPE) Program when in utility tunnels (e.g., hard hats, long pants and sleeves, gloves, safety footwear, eye protection, hearing protection).
I. Prior to the commencement of work, all access and egress points must be identified and confirmed available (i.e., operable and accessible) in the event of an emergency requiring immediate evacuation.
J. The activities performed in the tunnel must not compromise the flowable system components or any other equipment and must not expose workers to hazardous energy (e.g., steam, fire protection water).
K. All work must be conducted away from any possible contact with energized electrical circuits.

L. Adequate lighting must be established before commencing work.
M. Effective communication must be established and verified pursuant to **Section IX – Communication**.
N. Activities including, but not limited to, welding, drilling, cutting, and working with chemicals that produce potentially hazardous atmospheres or conditions (e.g., dust, fumes) require the use of ventilation equipment, specialized PPE, and other equipment or safety measures as necessary to ensure worker safety.
O. Tunnels that contain flammable gases (i.e., natural gas piping) present the potential risk for explosive atmospheres and as such must be continuously monitored for flammable gases for the duration of the entry. If the LEL exceeds 10% at any given time, the tunnel must be evacuated immediately, and EHS must be contacted to evaluate the conditions and ensure appropriate measures are implemented before re-entry.

VIII. Restricted Access Utility Tunnel Entry

A. Planning (Safe Operating Procedure Development)
    i. Notify EHS at ehs@northwestern.edu if an entry and work in a utility tunnel is needed or anticipated, with as much advanced notice as possible.
    ii. SOPs are required for all entries where work is anticipated to occur and may be used to consolidate multiple entries, days, and tunnels, at the discretion of EHS.
    iii. SOPs are typically not required for entries by authorized personnel when no work is to be performed in the tunnel (e.g., visual inspection only) unless there is a reasonable probability of hazards that may cause harm in the tunnel; in such instances, an SOP may be required at the discretion of EHS.
    iv. SOPs are developed in advance, typically at least a few days before work commences.
    v. SOPs are developed based on information from the utility tunnel assessment, utilities present, worksite conditions, scope of work, parties involved, impacted buildings or equipment, weather, and any other relevant information to determine the entry and permit requirements, including if there is a possibility of a release of hazardous energy, in which case appropriate lockout/tagout procedures must be utilized pursuant to the Northwestern Control of Hazardous Energy (Lockout/Tagout) Program.
        a) SOP Guide
        b) SOP Template
    vi. SOPs must include assigned responsibilities, all parties involved (e.g., contractors, subcontractors, Facilities), emergency procedures (e.g., egress), methods of communication, utilities present, hazardous energy isolation procedures, other permits (e.g., hot work), notifications to stakeholders, required safety measures (e.g., training, PPE, preventing unauthorized access), and any other measures deemed necessary by EHS.
    vii. The following individuals, or their designees, must review and sign the SOP prior to the commencement of work:
        a) Northwestern unit supervisor and their director,
        b) Northwestern EHS director, and
        c) Contractor and subcontractor supervisor and their safety director (or equivalent position)

viii. Approved SOPs must be communicated to all stakeholders, including the Facilities Chief Engineer, or designee.

B. Pre-Entry
   i. All parties involved must review, acknowledge, and agree to comply with all the procedures and safety requirements in the SOP by signing it prior to the commencement of work during a pre-work briefing.
   ii. Inspect all equipment, tools, and PPE for proper function before use.
   iii. Test air monitoring equipment in accordance with the Northwestern Confined Spaces Program.
   iv. Verify worksite conditions to ensure the work can proceed as planned.
   v. Protect all tunnel openings with barriers (e.g., guardrails) when hatches, covers, or lids are removed to protect individuals from hazards such as dropped objects and falls.
   vi. Implement measures to prevent unauthorized entries or access to the work area, such as barricades.
   vii. Complete the necessary steps in the SOP to verify safe conditions, hazardous energy isolations, communication, emergency egress, and equipment.
   viii. Notify EHS and University Police prior to entry into a restricted access utility tunnel:
      a) Evanston Campus: (847) 491-3254
      b) Chicago Campus: (312) 503-3456

C. Entry
   i. Adhere to the requirements of the SOP, and all other requirements (e.g., hot work permit) and these guidelines during entry operations.
   ii. Upon entry, entrants must evaluate the conditions of the tunnel; in the event a hazardous atmosphere or condition is observed or suspected, or if anyone involved in the operation is in doubt as to the effectiveness of the procedures that may compromise the safety and health of anyone involved, at any time, the tunnel must be immediately evacuated and EHS must be notified to evaluate the situation and ensure measures are implemented to control or eliminate the hazard(s) before any subsequent entries take place. This may result in the need for a new SOP at the discretion of EHS.
   iii. Communication must be maintained pursuant to **Section IX – Communication**.
   iv. In the event of an emergency such as an injury where the entrant is unable to evacuate the tunnel and a rescue becomes necessary, immediately activate the nearest emergency phone in the tunnel (if available), call 911, or summon emergency responders by other effective means (e.g., UHF radio) to report a "tunnel rescue" and provide information, guidance, and assistance as necessary, and adhere to emergency procedures in the SOP. All other tunnel entries are immediately suspended until EHS determines entries can resume.

D. Post-Entry
   i. When all work is complete and the tunnel is vacated:
      a) The worksite must be returned to safe conditions (e.g., access point closed and secured),
      b) University Police and EHS must be notified that the entry has been completed, and
      c) Any issues encountered during the entry are documented and communicated to EHS.

ii. Completed (i.e., fully-signed) SOPs must be submitted to EHS for post-entry review to ensure that those participating in entry operations are protected from utility tunnel hazards and compliance with these guidelines, which includes but is not limited to:
    a) Ensuring SOPs were completed properly,
    b) Ensuring all personnel involved signed the SOP, and
    c) Providing immediate feedback and guidance for any deficiencies, efficiencies, or opportunities for improvement identified.

IX. Communication

A. Effective two-way communication must be established, verified, and maintained during all restricted access utility tunnel entries:
    i. Between those inside the tunnel,
    ii. Between those inside the tunnel and those outside the tunnel, and
    iii. To summon emergency responders (e.g., fire department) in the event of an emergency.
B. Examples of acceptable forms of communication are:
    i. UHF portable radio,
    ii. Cellular phone,
    iii. Verbal,
    iv. Fixed telephone, if available, and
    v. Visual (e.g., hand signals).
C. Careful consideration must be given to the selection of communication methods as cellular service and UHF radio coverage may be limited in certain tunnels at Northwestern.

X. Training

A. Northwestern employees and contractors must be adequately trained, qualified, and competent for the work and scope of activities to be performed, and in accordance with applicable regulatory requirements. Examples include but are not limited to, PPE, utility (e.g., steam, electrical) work, welding, lockout/tagout, and heat illness prevention.
B. Additional training may be required, including but not limited to:
    i. When there is a change in a tunnel that presents hazards(s) to which the employee has not been previously trained,
    ii. Changes to procedures,
    iii. New hazards, or
    iv. Observed inadequacies in an employee's knowledge or execution of procedures.
C. EHS will collaborate with the local fire department to provide opportunities, when practical and feasible, to utilize utility tunnels at Northwestern for training exercises.

XI. Recordkeeping

A. EHS
    i. Maintain the database of tunnel assessments and ensure accessibility to stakeholders.
    ii. Document changes to existing utility tunnels, including when classifications or hazards change.

iii. Maintain all completed (i.e., fully-signed) SOPs for at least 5 years.
iv. Maintain training records in myHR Learn for the duration of employment, plus 1 year.

B. Northwestern Units
   i. Maintain air monitoring instrument records in accordance with the Northwestern Confined Spaces Program.
   ii. Maintain and provide relevant system drawings, schematics, and other information to support tunnel entries.
   iii. Submit all completed (i.e., fully-signed) SOPs to EHS at the completion of work.

C. Contractors
   i. Submit all completed (i.e., fully-signed) SOPs to Northwestern at the completion of work.
   ii. Maintain records (e.g., training records) as required by regulations.

XII. Regulatory Authority

Northwestern and its contractors will comply with the Occupational Safety and Health Administration's (OSHA) standards and any other applicable codes and standards, including:

Tunnel Assessments (SharePoint)
NFPA 101 – Life Safety Code
Northwestern Confined Spaces Program
Northwestern Contractor Safety Program
Northwestern Control of Hazardous Energy (Lockout/Tagout) Program
Northwestern Fall Protection Program
Northwestern Heat Illness Prevention
Northwestern Personal Protective Equipment (PPE) Program
Northwestern Safe Operating Procedure Guide
Northwestern Safe Operating Procedure Template
Northwestern Welding, Cutting, and Brazing (Hot Work) Program

XIII. Contact

For questions, contact Environmental Health and Safety at ehs@northwestern.edu.

Appendix A – Restricted Access Utility Tunnel Signage Example