

# Contractor Safety Steering Committee

## Excavation Best Practice Subcommittee

### Report 02 - Excavation Best Practice

#### **Purpose**

Outline of excavation best practices to minimize utility damages and improve safe digging practices. Document to be used as a guide for field personnel performing any excavating/trenchless practices.

*(Note: This document is a best practice, not a policy/training document and **does not** supersede your company policy or any federal, state, or local regulations/requirements)*

#### **Planning**

Before arriving at a jobsite, ensure a complete job packet has been obtained. This job packet, at the very least, should contain blueprints, dig ticket, description of work, permits and traffic control plan (if applicable).

Ensure 811 has been contacted and appropriate response time has been observed prior to starting any excavation. If submitting locate requests provide clear marking instructions, add reachable contacts and if possible, mark the dig site with white flags/paint as this will improve the utilities' ability to complete a fast and accurate locate. In general, the volume of 811 tickets should be managed with the pace of work. This should avoid the possibility of excessive tickets and a delay in the start of the work before ticket expiration. Federal law requires an emergency plan for a release of hazardous materials. (natural gas, petroleum, ammonium, etc.) If a release occurs, contact 911, affected utility and 811.



**Missouri**

<https://missouri-811.org>

**Visit these websites for your state's dig laws**





**Illinois**

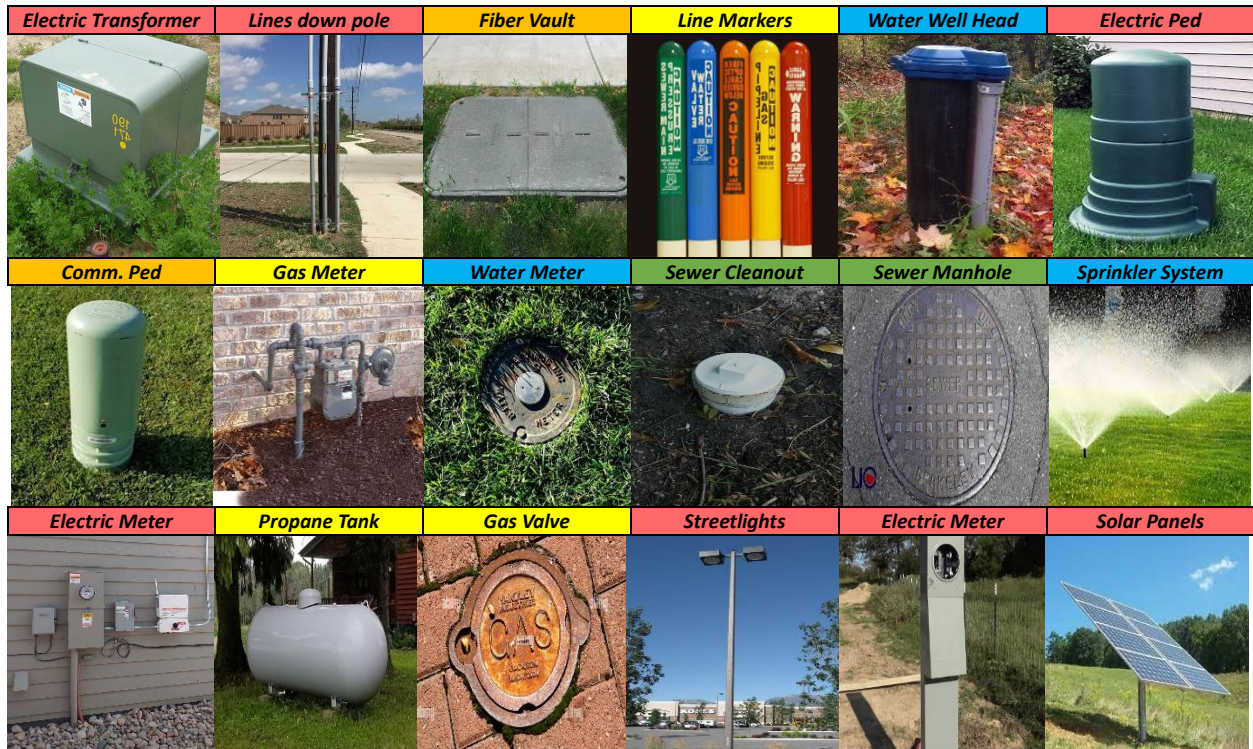
<https://www.illinois1call.com>

Upon arrival on the jobsite, complete a job briefing, designate a competent person and walk proposed excavation area ensuring the observations match the locate ticket status. If there are any signs of



unmarked utilities or the possibility of private utilities, contact the appropriate locate authority to have the facilities marked.

*Below are some but not all, signs that a utility may be in the area;*



While walking the jobsite, take photos and videos of the marked facilities, driveways, and sidewalks for documentation in case of damage. Remember any photos of marked facilities may not be used as reference to dig on. Document, on the job briefing, the proper excavation tools being used and inspect the tools to ensure they are in good working order. Check that all crew members have the appropriate PPE.



Determine access point for the excavating/boring equipment that will be used, ensuring there is sufficient room for the equipment. Plan for spoil placement, bore mud removal and frack out diversion to avoid runoff into waterways and storm/sanitary sewers. If digging into or near a structure, make sure the excavation does not impose additional risk to the structure.

## **Daylighting**

When daylighting utilities, crews must use calculated and prudent efforts to confirm the horizontal and vertical location of the utility. The preferred techniques for daylighting utilities are hydro-excavation, air knife and hand digging. While utilizing hydro or air knife methods, ensure the pressures are set



accordingly to prevent utility damage. While hand digging, place shovel blade parallel with utility, avoid striking/stabbing action and avoid prying against the utility. Always use good ergonomics while hand digging. When cutting any roots, verify the entire perimeter of the root before cutting. Once utility is exposed, support the facility appropriately and if there is any damage to the utility, including the coating, contact the supervisor, utility owner, and 811. Ensure all unattended daylight excavations are secured.

<b>Acceptable Securement</b>	<b>Unacceptable Securement</b>
<input type="checkbox"/> Excavation is secured <b>before</b> crew moved away from daylighted utility.	<input type="checkbox"/> Excavation was left unattended and unsecured.
	

Type of Digging	Shovel Type For Conditions			
	Sharp Shooter	Round Point	Flat Shovel	Wrecking Bar
Daylighting/Spotting	Yes	Yes	No	No
Cleaning Out Hole	No	Yes	Yes	No
Normal Soil	Yes	Yes	No	No
Rocky Soil	Yes	No	No	Yes

## **Equipment Operating**

Before operating ensure the operator has the knowledge and skill to operate that piece of equipment, check operator qualifications if applicable. Be aware of the surroundings near the operation of the equipment, this includes but is not limited to equipment swing radius, pedestrian traffic, overhead hazards, equipment blind spots and pinch points. Always utilize a spotter when digging with a backhoe or excavator. A spotter may also be necessary with other mechanized equipment while digging or driving/operating in tight areas. While excavating, avoid having personnel in the trench or excavation. When digging on a facility that has been daylighted, dig along the side of the facility to prevent the equipment from grabbing the facility with the teeth of the bucket. Never assume the utility depth or direction stays consistent. Utility depth and location can change abruptly.



## **Boring**

If performing any boring operations, calibrate the beacon/sonde with the locator at least once a day to ensure an accurate locate. Once the bore machine is setup, place the ground stake and test the strike alert. Walk the bore path to verify all daylighting has been completed correctly. All utilities, that will be crossed using trenchless technology, must be spotted. Utilities shall be spotted the entire length of the excavation and extend outside the tolerance zone. Ensure utilities are daylighted at the point of crossing. If crossing beneath the utility, the spot hole shall extend past the tolerance zone below the utility or to the proposed depth of bore path. If crossing above the utility, then the spot hole does not need to extend below the utility. Test the communication methods between the operating and locating personnel. Ensure all utility crossings are visually observed while tooling passes utility, whether boring out or pulling back. After an extended idle time throughout the day, reverify all electronics are functioning properly. When changing tooling, batteries or attaching product ensure bore machine is locked out.

Refer to the table below when boring parallel to a facility.

<b><i>Parallel Boring</i></b>		
<b><i>Distance From Utility</i></b>	<b><i>Minimum Daylighting Frequency</i></b>	<b><i>Minimum Tracking Distance</i></b>
$\leq 3'$	At Least 25'	Locate Head Every 5'
3'-5'	At Least 100'	Locate Head Every 10'

*(Spotting more frequently should be considered depending on field conditions, facility type, and locate accuracy.)*



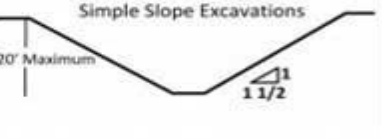
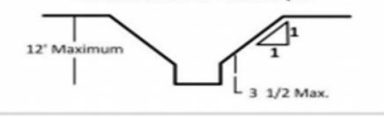

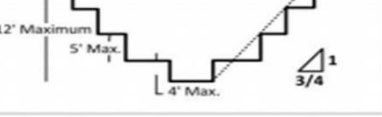
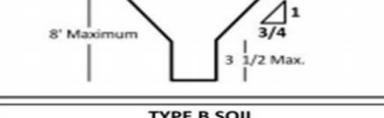
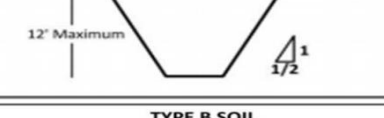
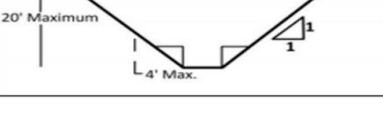
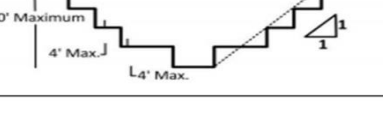
## **Competent Person**

Any person performing excavating/trenchless operations must designate an excavation competent person. A competent person is 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. They must be onsite and inspect the excavation before any crew members enter excavation. Remember even holes less than 5' in depth may need to be protected by shoring/sloping before crew members enter excavation. Before sloping/benching the competent person must classify the soil. If a protective system is used, there must be tabulated data onsite for the type of system being used. The competent person determines and inspects the type of access/egress used for the excavation. While working at depths greater than 5', the atmosphere should be continuously tested. Any water removal that takes place must be monitored by the competent person. If personnel are leaving the excavation, the competent person is responsible in securing the excavation to keep anyone from entering. If the competent person is leaving the jobsite, there needs to be a transfer of the competent person's responsibilities documented on the JSA.





(**Note:** Any previously disturbed soil is automatically classified as Type C.)

Soil Type	Minimum Slope Angle	Bench Type
A	$\frac{3}{4}$ :1 53 Degrees	$\frac{3}{4}$ :1
B	1:1 45 Degrees	1:1
C	$1\frac{1}{2}$ :1 34 Degrees	No Benching Allowed
<b>(1st bench must be twice the height of 1st bench depth)</b>		
<b>TYPE A SOIL</b> Simple Slope Excavations 20' Maximum 	<b>TYPE B SOIL</b> Simple Slope Excavations 20' Maximum 	<b>TYPE C SOIL</b> Simple Slope Excavations 20' Maximum 
<b>TYPE A SOIL</b> Unsupported vertically sided lower portion Maximum 12 Feet in depth 12' Maximum 	<b>TYPE A SOIL</b> Simple Bench Excavation 20' Maximum 4' Max. 	<b>TYPE A SOIL</b> Multiple Bench Excavation 12' Maximum 5' Max. 4' Max. 
<b>TYPE A SOIL</b> Unsupported vertically sided lower portion Maximum 8 Feet in depth 8' Maximum 	<b>TYPE A SOIL</b> Simple Slope – Short Term 12' Maximum 	
<b>TYPE B SOIL</b> Single Bench Excavation [Permitted in cohesive soil only] 20' Maximum 4' Max. 	<b>TYPE B SOIL</b> Multiple Bench Excavation [Permitted in cohesive soil only] 20' Maximum 4' Max. 4' Max. 	<b>TYPE C SOIL CAN NOT BE BENCHED</b>

### Excavation Rules to Live By;

1	Competent Person
2	$\geq 2'$ spoil, equipment, & tool placement
3	Ladder 3' above landing and secured
4	Ladder needed @ 4' and deeper: Shoring needed if working under OSHA 1910
5	Protective system @ 5' and deeper
20	Engineer must design protective system @ 20' or deeper
25	Access/Egress must be within 25' from workers in excavation.
Water	Water must be removed before entry of excavation and must be removed at a faster rate of which it is flowing into excavation. All water removal must be continuously monitored by competent person.



Additional resources:

- [Trenching and Excavation Safety](#). OSHA Publication 2226, (2015). Highlights key elements of the standards and describes safe work practices that can protect workers from cave-ins and other hazards.
- [Trenching and Excavation Safety](#). OSHA Fact Sheet (Publication 3476), (2011). Also available in [Spanish](#).
- [Working Safely in Trenches](#). OSHA QuickCard™ (Publication 3243), (2011). Also available in [Spanish](#).
- [Preventing Deaths and Injuries from Excavation Cave-Ins](#). U.S. Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 85-110, (July 1985). Provides several case reports, OSHA standards that apply to these cases, and recommended courses of action.
- [Horizontal Directional Drilling Best Practices for Operators](#). OSHA and the American Pipeline Contractors Association (APCA) Alliance, (February 2008). Also available in [Spanish](#). Addresses issues associated with the operation of horizontal directional drilling equipment such as pre-and post-operation procedures and safe operation considerations.

