

MODULE 3-06 TRENCHERS AND EXCAVATIONS

ALL EMPLOYEES ARE TO BE TRAINED PRIOR TO USING EQUIPMENT

Purpose

Maintaining a clean and safe environment for staff and visitors is an essential function of OPRD's mission. Below-ground soil disturbance involving trenching or shoring may be necessary for the installation of park utilities, drainage, or facility construction. Trenching is usually done in limited situations and may involve the use of specialized equipments. All employees, volunteers, or other personnel involved should be informed of the special hazards of trenching.

Any employee doing trenching/shoring is required to read OR-OSHA's brochure on "Excavations" which can be obtained from OR-OSHA Consultation or on-line at:

www.cbs.state.or.us/external/osha/pdf/pubs/2174.pdf - 2003-04-22 - [Text Version](#).



Significant Environmental Aspects

OPRD has developed an Environmental Management System (EMS). Trenching has the potential to cause significant environmental impact to land use and resource protection. Below-ground soil disturbance can cause damage to sensitive plant or animal species and could disturb cultural resources.

Any staff person who is preparing to do trenching or shoring must have authorization for such activity from the Park Manager. The staff person must know before starting that soil disturbance has been reviewed, is authorized, and is truly necessary. Without that knowledge, the staff person cannot proceed.

Definition

An excavation is any man-made cut, cavity, trench, or depression in an earth surface that is formed by earth removal.

A trench is a narrow excavation made below ground level in which the depth is greater than the width (measured at the bottom). The width cannot exceed 15 feet. The depth cannot exceed 20 feet.

Anything over 20 feet deep requires a safety system designed by a registered professional engineer.

In any excavation more than 5 feet deep, employees must be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

Before any sloping, benching, or support system is selected, a competent person must classify the soil type.

I. Pre-Operation

A. Read Operators Manual prior to use.

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B. Inspection/Service

- **Walk Around Machine** – Inspect for broken or damaged cutters, drive chain, digger bar, flat tires, broken welds, oil leaks.
- **Analysis** – Complete and have on site safety/health/jobsite analysis. How deep is the trench anticipated to be? What sloping, benching, supporting or shield system design will be used to protect employees if the trench will be more than 5 feet deep?
- **Red tag** any tools or non-energized equipment requiring replacement or repair and remove from service.
- **Lockout/Tag-out (LO/TO)** any energized tools or equipment if repairs are needed, in accordance with Procedure Module 09-04, Lockout/Tag-out.

C. Site Inspection



- **Surface Hazards** - Check for surface obstacles that may create hazards and remove or flag.
- **Underground Hazards** – Locate and mark known underground water, sewer, electrical lines, rocks, stumps, etc. Flag for visibility when working.



Locate underground utilities →

- **Conditions** – Evaluate structures and their conditions, vehicular and pedestrian traffic, soil type(s), surface water, groundwater, the water table at time of digging, and anticipated weather conditions at time of digging.

Fighting flooding from both ground water and heavy rain water while placing a manhole at Fort Stevens.



- **Slope/Grade of Ground** –

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To identify risk of rolling, sliding, falling debris and protect workers by developing a barrier system ahead of time.

- **Cut & remove** pavement before trenching if necessary.

Heavy rain all day long makes a mess of this work site at Fort Stevens.



- **Water Accumulation** – If water is likely to build up, adequate protection must be taken, such as diversion ditches, dikes, or other suitable means to prevent surface water build up in an excavation. If water removal equipment is used to control or prevent water from accumulating, equipment operations must be monitored by a competent person to ensure proper use.



- **Utilities** – Check for overhead and underground utility locations. Call the Oregon Utility Notification Center (503)246-6699 (Portland), or 1-800-332-2344 for all other parts of the state. Allow two business days in advance of the digging for locates to be done.
- **Hazardous Atmosphere** – If excavation is greater than four feet deep, the atmosphere must be

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tested by a competent person before staff persons can enter. Hazardous atmospheres can also occur near old landfills, primitive or pit toilets, sewer lines and confined spaces. If a hazardous atmosphere develops or exists in an excavation, emergency rescue equipment must be on hand (e.g., breathing apparatus, a safety harness and line, basket stretcher, etc.) and a competent person must test for oxygen deficiency and hazardous atmospheres before employees may enter.

II. Sustainable Operation

A. Resource Clearance Form- Many parks protect sensitive natural or cultural resources. Digging can disturb or harm these resources. Make sure that the area that you are digging in has been cleared for below ground soil disturbance.

B. Resource Disturbance – In some instances, discovery of cultural artifacts in areas previously cleared is possible. If this happens **YOU MUST CEASE WORK IMMEDIATELY AND CONTACT PARK MANAGER.**



C. Other Resource Concerns – Excess soil and open trenches can have negative impacts on visitor safety and resource protection. Cover and mark with appropriate hazard warning signage all excess materials or open trenches or holes if you leave the work site.

III. Operation

A. Starting Pre-Movement

- **Check fluid levels** – Add oil, hydraulic fluid and fuel as needed.
- **Start Engine** -Check gauges, hydraulics, hydrostatic transmission and brakes both hand and foot brakes.



B. Personal Protective Equipment (PPE)

- **Visibility** – Orange or yellow safety vest with reflection tape.
- **Eye Protection** – Safety goggles/glasses or face shield.
- **Hearing Protection** – Ear plugs or muffs are required.
- **Hand Protection** – Gloves are required.



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- **Head Protection** – A hard hat must be worn by anyone working in a trench with a risk of equipment or debris falling down on the head.

C. Operation Includes

- **Barricade** or flag off area.
- **Mark** anticipated trenching line with paint or string.



Start Engine and engage cutters. Run engine full throttle when trenching.

- **Lower** cutters to desired depth.
- **Engage Transmission** - Forward on rider, reverse on walk behind. If using a walk behind system, be alert to hazards. If possible, have another person act as a ground guide and to watch for pedestrians, vehicles and other hazards.
- **Hitting Underground Object** - Raise cutters to clear. Check to see what may be obstructing cutting blade, clear obstructions, then continue with trenching.
BE SURE cutter is disengaged before putting your hands anywhere near the obstruction.

IV. Post-Operation

A. Clean Up, Hazard Warnings, Storage

- Clean area where trenching was done.
- Place hazard signs/tape to identify any park hazard for the safety of staff and visitors.
- Clean and inspect tools and equipment for damage or needed maintenance.
- Red Tag any non-energized tools or equipment damaged during work project.

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**Properly marked trench at Vista House, Crown Point,
Columbia River Gorge**

- Complete Lockout/Tag-out process for any energized tools or equipment damaged during work.
- Schedule repairs or replacement on damaged tools or equipment.

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MODULE 3-06 SAFE PRACTICES CHECKLIST

<http://www.cbs.state.or.us/external/osha/pdf/pubs/2174.pdf>

All your answers to this list should be Yes!

- 1.** A designated competent person at the excavation site understands visual and manual soil test methods, use of protective systems (Shields and shoring), the hazards of excavation work, and the requirements of OR-OSHA's excavation standards.
- 2.** A designated competent person inspects the excavation, adjacent areas, and protective systems daily before work begins, as necessary throughout the shift, and after rain or other conditions that could increase the risk of a hazard.
- 3.** A designated competent person has authority to immediately correct hazards and to order employees to leave the excavation until the hazards have been corrected.
- 4.** Sewer, telephone, fuel, electric, or water lines near the site have been located and clearly marked. Contact the Oregon Utility Notification Center for help in locating underground utility lines. In the Portland metro area: (503) 246-6699. Outside the Portland metro area: (800) 332-2344.
- 5.** Hard hats are required whenever there are overhead hazards.
- 6.** Debris and other unnecessary material have been cleared from the site.
- 7.** Employees who are exposed to highway traffic are provided with and wear high-visibility garments.
- 8.** Excavations at remote sites have appropriate warning barriers.
- 9.** Employees are protected from loose rock or soil that could fall into the excavation.
- 10.** Employees are prohibited from working or standing under suspended loads.
- 11.** Employees are required to stand away from vehicles that are being loaded or unloaded.
- 12.** Employees are prohibited from working on the faces of sloped or benched excavations when other employees are below them.
- 13.** Mobile equipment operators have an effective way of knowing when they are too close to the edge of an excavation. Examples include barricades, hand or mechanical signals, stop logs, or grading away from the excavation.
- 14.** Spoils, equipment, and tools are at least 2 feet from the edge of the excavation.
- 15.** Walkways that cross over excavations more than 6 feet deep and 30 inches wide have standard guard rails and toe boards.
- 16.** Underground installations are protected, supported, or removed when the

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excavation is open.

- **17.** Excavations that have a depth of 4 feet or more have ladders or other means of safe access within 25 feet of employees.
- **18.** Ladders are secured and extend 3 feet above edge of the excavation.
- **19.** A designated competent person designs the structural ramps that employees use to enter and exit the excavation.
- **20.** Structural ramps have nonslip surfaces.
- **21.** Employees are prohibited from entering an excavation that shows signs of water accumulation unless they are protected from the risk of a cave-in.
- **22.** A competent person monitors the methods used to control water from accumulating in an excavation.
- **23.** Surface water or runoff is diverted away from the excavation.
- **24.** The atmosphere in an excavation is tested when the possibility of a hazardous atmosphere exists.
- **25.** Employees are protected from hazardous atmospheres or atmospheres containing less than 19.5 percent oxygen.
- **26.** Emergency rescue equipment is available when hazardous atmospheres could exist in an excavation.
- **27.** Employees who work in excavations are trained to use appropriate personal protective equipment.
- **28.** A designated competent person has classified soil at the excavation site with at least one manual test and one visual test.
- **29.** Materials and equipment used for protective systems at the excavation site are chosen based upon soil analysis, excavation depth, and expected loads.
- **30.** Materials and equipment used for protective systems are inspected regularly and in good condition.
- **31.** Damaged equipment is removed from service immediately.
- **32.** Protective systems are installed without exposing employees to the risk of cave-ins.
- **33.** Structures, roadways, and sidewalks adjacent to the excavation are adequately supported.
- **34.** Excavations are backfilled when protective systems are removed.
- **35.** Appropriate sloping, shoring, or shielding protects employees who work in excavations 5 or more feet deep.
- **36.** A designated competent person determines the type of shield used at a site by considering factors such as the nature of the work, excavation dimensions, soil characteristics, and equipment used to lower or position the shield.
- **37.** Employees in excavations more than 20 feet deep are protected by a system

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designed by a registered professional engineer.

- **38.** Shields are installed so that they do not move laterally.
- **39.** Employees are not allowed in shields that are moved vertically.

V. Demonstration of Proficiency

Anyone expected to use a trencher, or work in or around excavations must be trained in that process and is required to demonstrate proficiency prior to signing training ledger.

MODULE 3-06 TRENCHERS AND EXCAVATIONS TEST

I. Multiple Choice

Any staff person who is preparing to do trenching or shoring must know below-ground soil disturbance can cause damage to sensitive plant or animal species and could disturb cultural resources.

Get authorization for such activity from the Park Manager. Know before starting that soil disturbance area has been reviewed, is authorized, and is truly necessary.

1. When doing pre-inspection you look for:
 - a) Bent/broken cutters.
 - b) Un-serviceable Chain digger bar.
 - c) Flat tires.
 - d) Broken welds.
 - e) Oil leaks.
 - f) All of the above.

2. When operating the trencher, what PPE needs to be used?
 - a) Eye protection, respirator, and hardhat.
 - b) Hearing protection, hardhat, and gloves.
 - c) Visibility vest, eye protection, hearing protection, gloves and hard hat if risk of objects falling on head.
 - d) None of the above.

3. When conducting a site assessment, you need to:
 - a) Check for surface and overhead hazards.
 - b) Mark all known underground water, sewer, and electrical lines.
 - c) Contact the public information office for location of water, sewer and electrical lines
 - d) Evaluate nearby building structures, water table, traffic flow and weather projection for date of excavation
 - e) All the above
 - f) A, b, d only

II. True/False

4. _____ **In any excavation more than 3 feet deep**, employees must be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

5. _____ Before any sloping, benching, or support system is selected, a competent person must classify the soil type.

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6. _____ You don't need to check the fuel or oil level in the trencher before you start because the person who used it last is supposed to do that.
7. _____ You need to check the hand and foot brakes prior to operation.
8. _____ When conducting a site assessment, the slope, soil type and grade of the work site is not important.
9. _____ You should run the engine at full throttle when trenching.
10. _____ Benching and shielding are essential parts of excavation work. Employees must have adequate seating and privacy shielding for workers to take breaks according to OSHA rules on excavations.
11. _____ You should set barricades or flag off the area to be trenched.
12. _____ You don't need to do a walk around inspection of the trencher prior to start up because the person who used it last was supposed to check it before putting it back.
13. _____ When you complete an excavation, you should re-seed, or replace asphalt and attempt to restore the area to its original condition (or better).
14. _____ The Oregon Utility Notification Center's primary role is to notify us when power/ gas/ fiber optic cables/ telephone and other underground lines are severed so OPRD trencher and backhoe operators can make clean and fast cuts through the terrain and save OPRD money.
15. _____ If you discover cultural artifacts in areas previously cleared **YOU MUST CEASE WORK IMMEDIATELY AND CONTACT PARK MANAGER.**
16. _____ Hazardous atmospheres can also occur near old landfills, primitive or pit toilets, sewer lines and confined spaces.