

Excavation

	Description of Change	Reason for Change
1.	Section 2.2 Added sketch RAS-432-1 Previously Disturbed Areas of CFFF.	Sketch RAS-432-1 is referenced later in the Excavation Procedure.
2.	Section 2.3, added procedure RA-432, Procedures Guiding the Unanticipated Discovery of Cultural Resources and Human Remains and TRN-170 Cultural Resource Training.	Procedure RA-432 is referenced later in the Excavation Procedure.
3.	Section 3.2 added the definition for cultural resource.	To explain what a cultural resource is.
4.	Section 3.2 added the acronym and associated definition for "GPR."	GPR is referenced later in the Excavation Procedure.
5.	Section 5.1, added Item 3 and renumbered the remainder of the section	Utility location is a primary reason for using GPR to assess subsurface conditions; however it is not the only reason. Some subsurface anomalies that are not utilities could be cultural resources and/or human remains. The language added to the procedure instructs personnel how to respond if there is an anomaly or unanticipated discovery.

Department Acknowledgments:

DH GRIFFITH EXCAVATION
DH GRIFFITH RWP
EHS ENGINEERING ENV
ELR-DIKE
ELSD CONTRACTOR
MAINT
MAINT CONTRACTORS
MAINT F/I
NF PMO
T/S MODIFICATIONS ENGINEER
URRS
WM PLANNING
WM WORK MANAGEMENT

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1.0 PURPOSE AND SCOPE

1.1	Provides guidance and outlines guidance for creating and maintaining safe excavation operations, including hand digging within the CFFF site boundaries.
1.2	This procedure applies to all personnel working where excavation safety requirements are applicable.
1.3	The primary hazards with excavation operations include: <ul style="list-style-type: none"> • Cave-ins • Contact of underground utilities • Falling Loads • Hazardous Atmosphere

2.0 SUPPORTING DOCUMENTS

2.1	Controlled Forms
	<ol style="list-style-type: none"> 1. SYF-108-1, Confined Space Evaluation and Entry Permit 2. SYF-233-1, Excavation Permit 3. SYF-233-2, Excavation Daily Inspection
2.2	Controlled Sketches
	<ol style="list-style-type: none"> 1. RAS-432-1, Previously Disturbed Areas of CFFF
2.3	Reference Procedures
	<ol style="list-style-type: none"> 1. RA-432, Procedures Guiding the Unanticipated Discovery of Cultural Resources and Human Remains 2. SYP-108, Confined Space Entry Procedure 3. TRN-170, Cultural Resource Training
2.4	Procedure Basis
	<ol style="list-style-type: none"> 1. Regulatory Requirements/MAQP <ol style="list-style-type: none"> A. This entire procedure is of regulatory significance. 2. W-MS Documents <ol style="list-style-type: none"> A. NA 3. Miscellaneous <ol style="list-style-type: none"> A. 29 CFR 1926.650 - 652
2.5	Commitment Summary
	<ol style="list-style-type: none"> 1. CAPR Commitments <ul style="list-style-type: none"> • NA

3.0 TERMS AND DEFINITIONS

- 3.1 Refer to QA-014, Terms & Definitions for the following:
1. NA
- 3.2 The following Additional Terms/Definitions are used in this Procedure:
1. **Benching** - Excavating the sides of an excavation to form one or more horizontal levels or steps.
 2. **Cave-In** - The separation of soil or rock material from the sides of an excavation in sufficient quantity so that an individual could be entrapped or otherwise immobilized.
 3. **Competent Person** - An individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees and who is authorized to take prompt corrective measures to eliminate or control these hazards and conditions.
 4. **Cultural Resource** - Any prehistoric or historic remains or indicators of past human activities, including artifacts, sites, structures, landscapes, and objects of importance to a culture or community for scientific, traditional, religious, or other reasons.
 5. **Excavation** - Any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal.
 6. **GPR** - Ground penetrating radar.
 7. **Protective System** - Method of protecting employees from cave-ins.
 8. **Shielding** - Using trench boxes or other structure capable to withstand the forces imposed on it to prevent cave-ins.
 9. **Shoring** - Installing aluminum hydraulic or other types of supports to prevent soil movement and cave-ins.
 10. **Sloping** - Cutting back the trench wall at an angle inclined away from the excavation to protect employees from cave-ins. The angle required varies based on soil type, environmental conditions, and surcharge loads.
 11. **Trench** - A narrow underground excavation that is deeper than it is wide, and is no wider than 15 feet.

4.0 ROLES AND RESPONSIBILITIES	
4.1	Team Manager/Project Engineer
	<ul style="list-style-type: none"> • Determine the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, gas lines, or any other underground installation that may be expected to be encountered during excavation, prior to opening an excavation • Ensure employees have been trained on the hazards associated with the specific excavation • Monitor compliance with this procedure, including the completion of the following, by designated individuals: <ul style="list-style-type: none"> • SYF-233-1 Excavation Permit • SYF-233-2, Excavation Daily Inspection
4.2	Employees
	<ul style="list-style-type: none"> • Prior to accessing excavation, validate SYF-233-2, Excavation Daily Inspection form is completed <ul style="list-style-type: none"> • Review other hazard assessment documents including: <ul style="list-style-type: none"> • Pre-Job Brief • Confined Space Evaluation • Use and maintain equipment in a manner that is consistent with the recommendations of the manufacturer • Immediately report signs of protective system failure or soil instability • DO NOT work under raised loads • DO NOT enter an unprotected trench
4.3	Competent Person
	<ul style="list-style-type: none"> • Inspect trenches/excavations, protective systems and adjacent areas daily for hazardous conditions prior to worker entry to ensure elimination of potential hazards <ul style="list-style-type: none"> • Complete SYF-233-2, Excavation Daily Inspection form • When failures are identified remove employees from hazard areas until precautions have been taken
4.4	Industrial Safety (IS)
	<ul style="list-style-type: none"> • Review procedure as necessary • Provide oversight on permits and documents for safety standard concurrence

TITLE: EXCAVATION
TYPE: REFERENCE USE
DATE: 04-08-21

PROCEDURE NO:
REFERENCE NO:
REVISION:

SYP-233
NONE
3

5.0 INSTRUCTIONS		
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5.1 General Requirements

1. An SYF-233-1, Excavation Permit shall be completed by a designated engineer prior to the start of work in the excavation.
 - A SYF-233-2, Excavation Daily Inspection form shall be completed by a designated Competent Person each day that employees will be entering an excavation/trench
 - Forms shall be posted at or near the excavation access
2. Determine and mark the estimated location of utility installation prior to opening an excavation.
3. Previously **undisturbed** areas of the CFFF property **require** the identification of subsurface anomalies by GPR (and other alternate methods as applicable) prior to the start of work **for the purpose of preserving cultural resources** per RA-432, Procedures Guiding the Unanticipated Discovery of Cultural Resources and Human Remains.
 - Previously disturbed areas of the CFFF property are identified in RAS-432-1, Previously Disturbed Areas of CFFF
 - Typical cultural resources that may be found at the CFFF site are included in TRN-170, Cultural Resource Training
 - If site surveillance, GPR, or excavation activities identify an unknown anomaly in an area of the site, **STOP WORK** and contact EHS Environmental Engineering for evaluation per procedure RA-432, Procedures Guiding the Unanticipated Discovery of Cultural Resources and Human Remains
 - An unusual object or soil deposit should be assumed to be a cultural resource until determined otherwise by qualified personnel as described in RA-432
4. Use reference markers to positively identify the perimeter of the area to be excavated and depth requirements.
5. All employees who are exposed to moving vehicle traffic must wear high-visibility vests/shirts.
6. Prior to entering into an excavation that is greater than 4 feet in depth, air sampling for the following must be performed per SYP-108, Confined Space Entry and documented on SYF-108-1, Confined Space Evaluation and Entry Permit:
 - Oxygen
 - Carbon monoxide
 - Flammable gases/vapors
 - Other toxic substances reasonably expected within the space
- A. Emergency rescue equipment shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation
7. Adequate precautions must be taken to protect workers where water accumulation is a potential hazard in the excavation. Mitigation measures include:
 - Water removal equipment
 - Design protective systems
 - Safety harness/lifeline
 - Diversion ditches or dikes

5.1 Continued	<p>8. Safe access and egress must be provided to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper.</p> <ul style="list-style-type: none">• These devices must be located within 25 feet (7.6 meters) of all workers• Structural ramps used for access/egress shall be designed by a competent person qualified in structural design and built in accordance with the design <p>9. Excavations below the level of the foundation footing or a retaining wall that could reasonably be expected to pose a hazard shall not be performed unless:</p> <ul style="list-style-type: none">• A support system, such as underpinning, is provided• The excavation is in stable rock• A registered professional engineer has determined in writing that the structure will be unaffected by the activities and will not pose a hazard to employees <p>10. Employees shall be adequately protected from loose materials that could pose a hazard by falling or rolling from the excavation face:</p> <ul style="list-style-type: none">• Keep heavy equipment away from trench edges• Surcharge loads should be a minimum of 2 feet (0.6 meters) from trench edges <p>11. Completed permits and associated inspection forms shall be returned to IS for retention following the completion of the work.</p>
5.2 Protective Systems	
	<p>1. Each employee working in an excavation shall be protected from cave-ins by an adequate protective system, except when the excavation is:</p> <ul style="list-style-type: none">• Made entirely in stable rock• Less than 5 feet in depth and examination of the ground by the competent person provides no indication of potential cave-in <p>2. Protective Systems shall have the capacity to resist without failure the loads that are intended or are reasonably expected to be applied to the system.</p> <p>3. Slopes and Benching systems shall be selected and constructed with one of the following options:</p> <ul style="list-style-type: none">• Option 1 - Sloped at an angle not steeper than one and one half (34 degrees measured from the horizontal)• Option 2 - Determined in accordance with the conditions set in 29 CFR 1926 Subpart P Appendix B• Option 3 - Designed by a registered professional engineer and retained as a PSE document with Industrial Safety Approval<ul style="list-style-type: none">• A copy of the written design must be maintained near the excavation site <p>4. Shielding, Shoring and other support systems shall be selected and constructed using one of the following options:</p> <ul style="list-style-type: none">• Option 1 - Purchased from a manufacturer as a designed system with tabulated data and installed in accordance with manufacturer's specifications• Option 2 - Determined in accordance with the conditions set in, 29 CFR 1926 Subpart P Appendix C or Appendix D• Option 3 - Designed by a registered professional engineer and retained as a PSE document with Industrial Safety Approval<ul style="list-style-type: none">• A copy of the written design must be maintained near the excavation site