

# Basics of Trench Safety

---

Jason Gagnon  
2021 NHWWA Training



# Disclaimers & My Background

---

- Deep Topic - High Level Overview
- No Substitute for Official OSHA Training
- My Background:
  - Excavation Contracting
  - Engineering
  - Public Works



# OSHA News Release - Region 6

U.S. Department of Labor

Please note: As of January 20, 2021, information in some news releases may be out of date or not reflect current policies.

July 22, 2015

## **Trench collapse seriously injures worker, leads to \$424K fine for employer *Hassell Construction cited for egregious safety violations in Richmond, Texas collapse***

**HOUSTON** - One minute he was working in the 8-foot trench below ground. The next, he was being buried in it. His co-workers came to his re hands. Moments after they pulled the injured man to safety, the unprotected trench collapsed again. His injuries were serious and led to his h

The man's Houston-area employer, Hassell Construction Co. Inc. knew the Richmond, Texas [excavation](#) site was dangerous, but failed to prot

Today, the U.S. Department of Labor's [Occupational Safety and Health Administration](#) cited Hassell Construction for 16 safety violations, inclu failing to protect workers inside an excavation from a cave-in. The company faces penalties totaling \$423,900.



"For more than 2,500 years, man has known how to prevent deadly trench collapses. It is absolutely unacceptable that employers continue to trenches," said [Assistant Secretary of Labor for Occupational Safety and Health Dr. David Michaels](#). "An employer is responsible for providing Construction failed to do that in this case."



# What are rules around trench safety

---

- OSHA Regs
  - 29 CFR Part 1926, Subpart P
- Cheat Sheets:
  - OSHA 2226-10R Trenching and Excavation Safety
  - OSHA Fact Sheet: Trenching and Excavation Safety
- NH requires 10-hour training for all employees on publicly funded projects over \$100,000 (RSA 277:5-a)
  - \$2,500 fine plus \$100 per employee per day



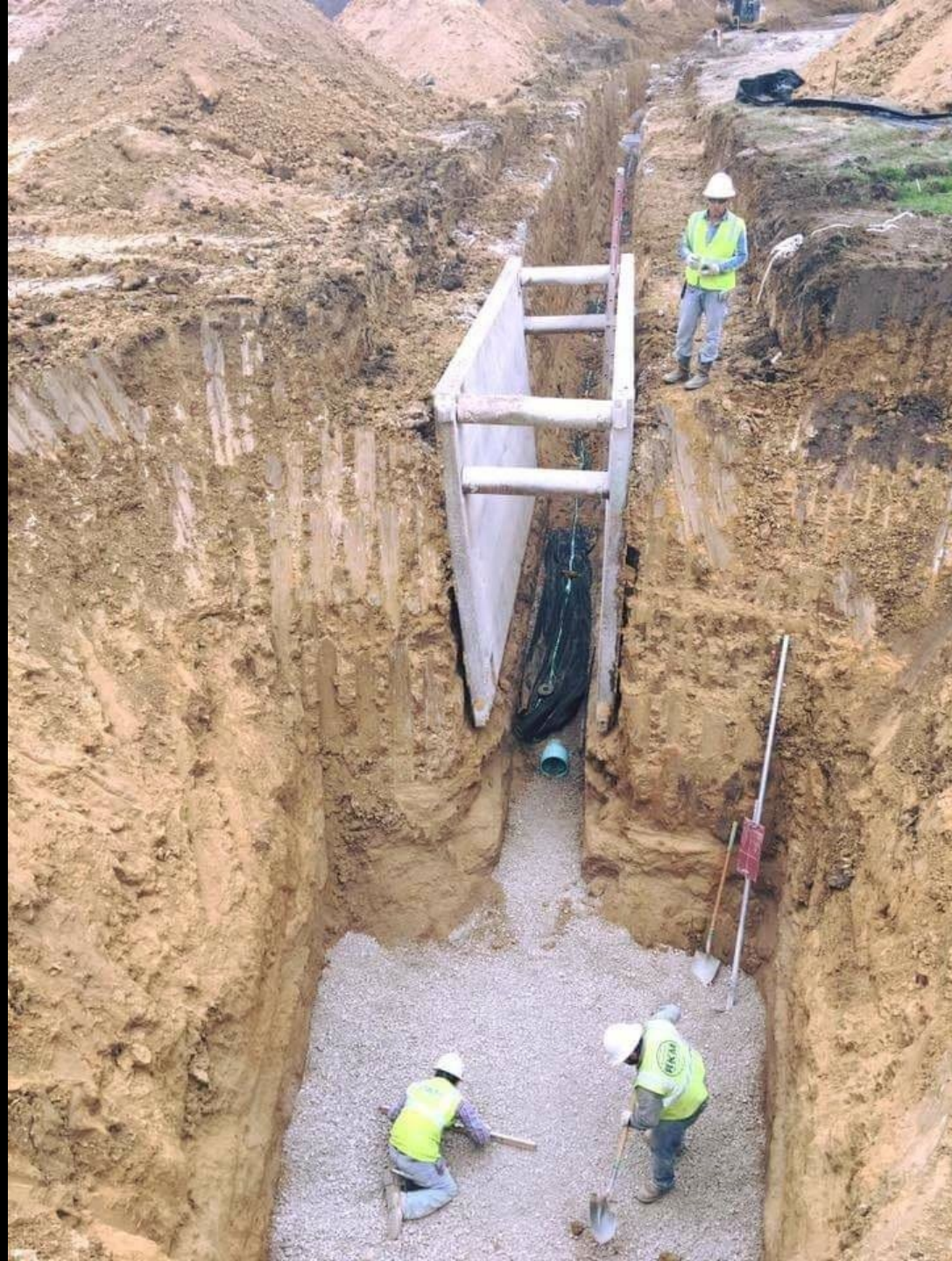
So, what is a safe  
trench???















# Basic Concepts of A Safe Trench & Work Site

---

- OSHA Competent Person
- Site conditions
- Depth of work
- Soil type & history
- Water – above and below ground
- Shoring & trench support
- Egress & access
- ???

# OSHA Competent Person

An individual, designated by the employer, who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to workers, and who is authorized to take prompt corrective measures to eliminate them.

## **Tasks Performed:**

- Classifying soil
- Inspecting protective systems
- Monitoring water
- Inspecting equipment
- Inspecting Access/Egress
- Determine slope



# Planning Ahead: Site Conditions

Prior Planning Prevents Piss-Poor Performance *and* People Perishing  
(Perhaps?)

- Know your job site

- Traffic patterns
- Utilities location
- Drainage patterns

- Know your soils

- Soil type
- Excavation history

- Work Plan

- Construction access
- Sequencing
- Time constraints
- Materials handling

- Toolbox Talks

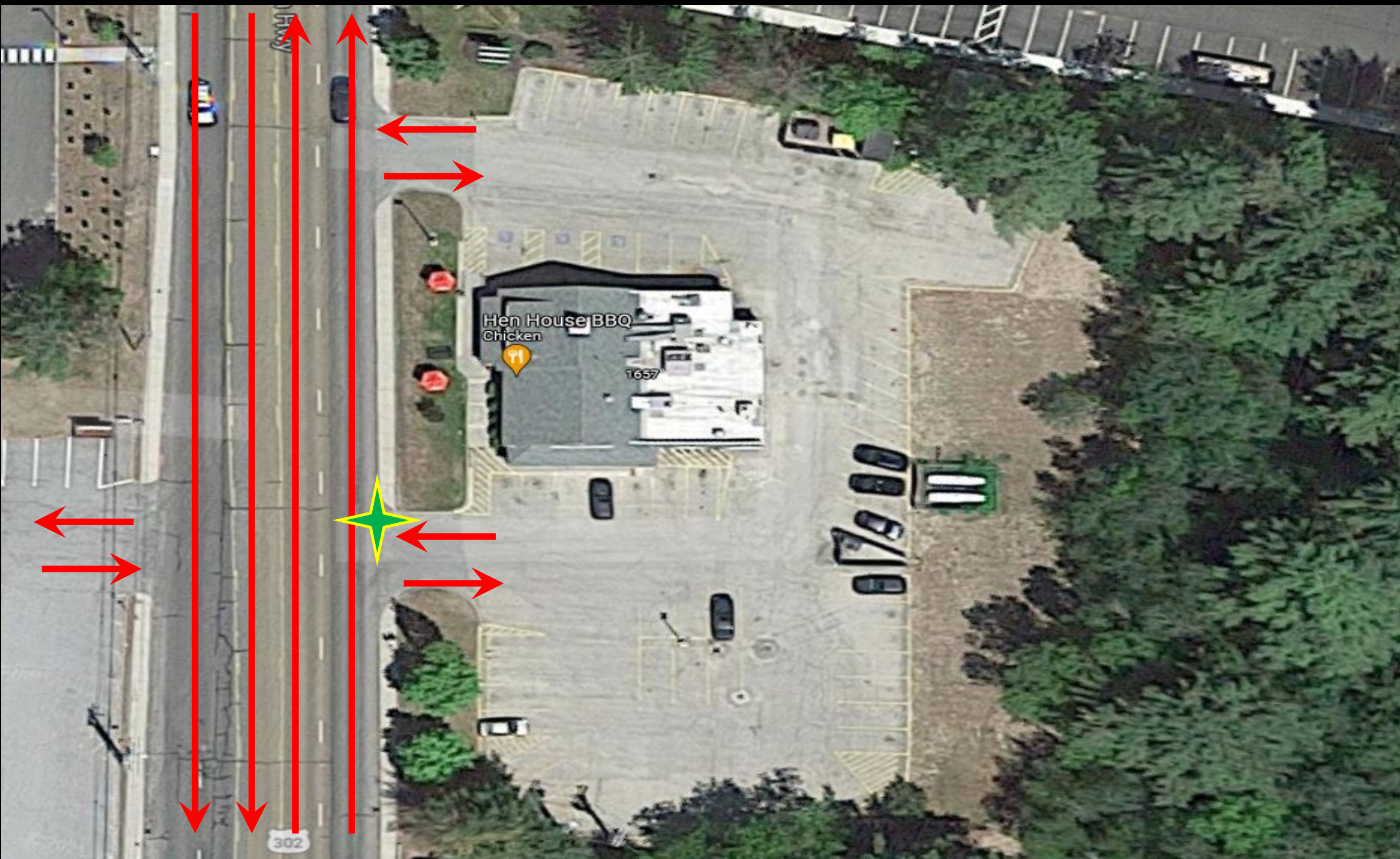
- Maintain Awareness



# Job Site Awareness

- Traffic flow & Safety
  - Vehicle travel patterns
  - Pedestrian travel patterns
  - Avoid distraction
- Signage & warnings
  - MUTCD Regs
  - Communication is key!





302

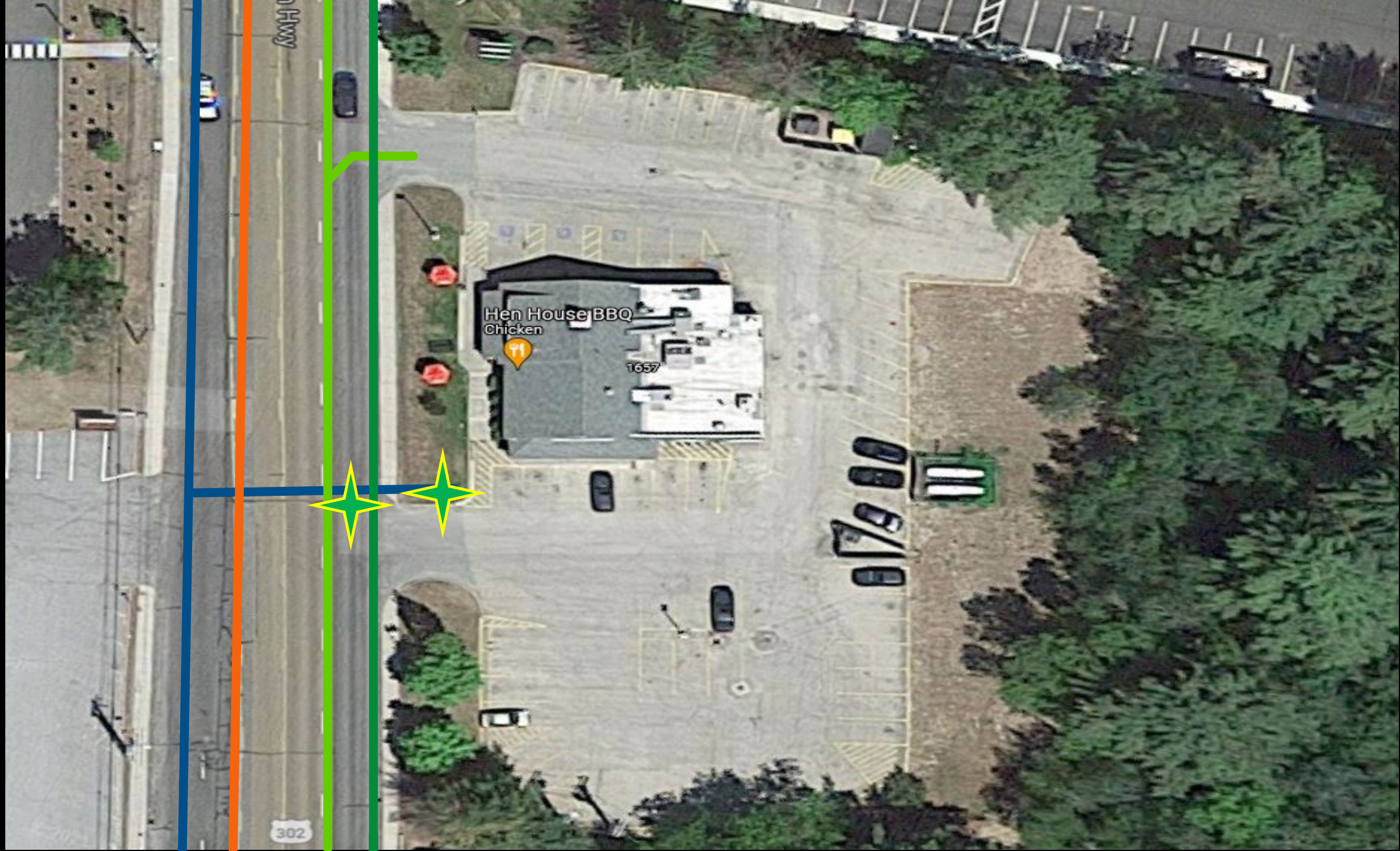
Hen House BBQ  
Chicken

1657

# Existing Utilities

- Other Utilities
  - Water, sewer, telephone, electric, drainage
  - Crossings
  - Limits of previous disturbance
  - Overhead utilities
- Dig Safe
- Direct utility contacts
  - GIS Data





HWY

Hen House BBQ  
Chicken

1657

302

# Develop a Work Plan

- Where is my excavation?
- What is my work sequence?
- How will equipment access the excavation?
- Where will backfill materials be staged?
- Where will tools be staged?
- When I dig, where are my spoils going to go?
- Are there schedule considerations?





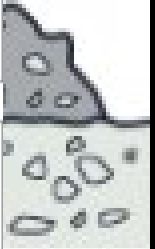
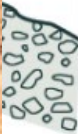
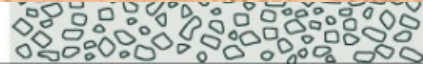
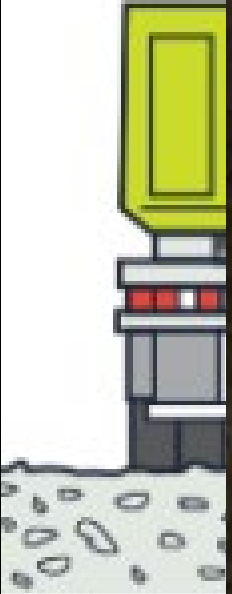
Put the excavated



w

ed

w



# How Does Soil Type Impact a Safe Trench?

- Different soils are more/less likely to collapse
- You may encounter more than one soil type
- Virgin vs. previously excavated

# Know your soils

---

**Table 2. Excavation Soils Unconfined Compressive Strength by Soil Type**

OSHA Cohesive Soil Type	Soil Description	Unconfined Compressive Strength (tons per square foot)
Stable Rock	Bedrock, basalt, limestone, granite, sandstone kaolinite or other sedimentary metamorphic and igneous rock formations	From 4 to 3,500
A	Clay, silty clay, sandy clay, clay loam, caliche, hardpan, some silty clay loam, sandy clay loam	Greater than 1.5
B	Granular cohesive soils such as angular gravel, silt, silt loam, sandy loam, some silty clay loam, sandy clay loam	0.5 to 1.5
C	Granular soils such as gravel, sand, loamy sand, submerged soil from which water is freely seeping	Less than 0.5



Fissure identified by Compliance Officer. Entire area around fissure collapsed into trench within minutes of initiating the inspection.







# Slope Safety

**To Prevent Cave-In During Excavation,  
Use the Proper Slope Angle for Different Soil Types**

**Soil Type: Stable Rock**  
**Max. Slope (H:V) Vertical**  
**Slope Angle (Degree): 90**



**Soil Type: Type A**  
**Max. Slope (H:V) 3:4 : 1**  
**Slope Angle (Degree): 53**



**Soil Type: Type B**  
**Max. Slope (H:V) 1 : 1**  
**Slope Angle (Degree): 45**



**Soil Type: Type C**  
**Max. Slope (H:V) 1-1/2 : 1**  
**Slope Angle (Degree): 34**

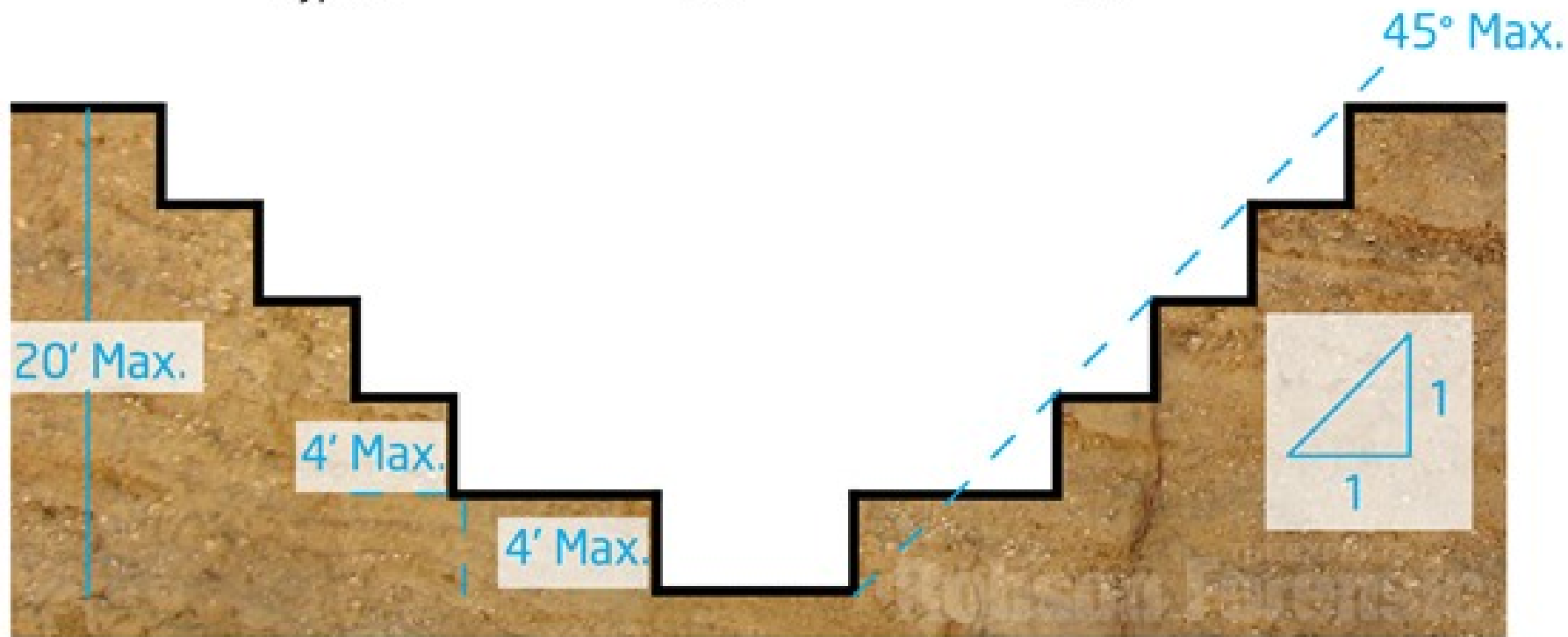


**Means of Egress: Must be Within 25 FT From  
Where Employees are Working.**

# Depiction of Benching

## Benching Slope Varies by Soil Type

Soil Type	Max. Slope (H:V)	Slope Angle (degrees)
Type A	3/4 : 1	53
Type B	1:1	45





# Shoring and shielding

- Required when trench cannot be benched/sloped
- Shoring:
  - Uses structural members or hydraulic pressure to hold wall back
- Shielding
  - Pre-sized protection that protects when walls cave in



# Shoring vs. shielding







# Access & Egress

---

- Required for trenches deeper than 4 feet
- Must be located no more than 25 feet from workers
- Ladders must extend 3 feet above excavation
- Structural ramps must be designed by Competent Person





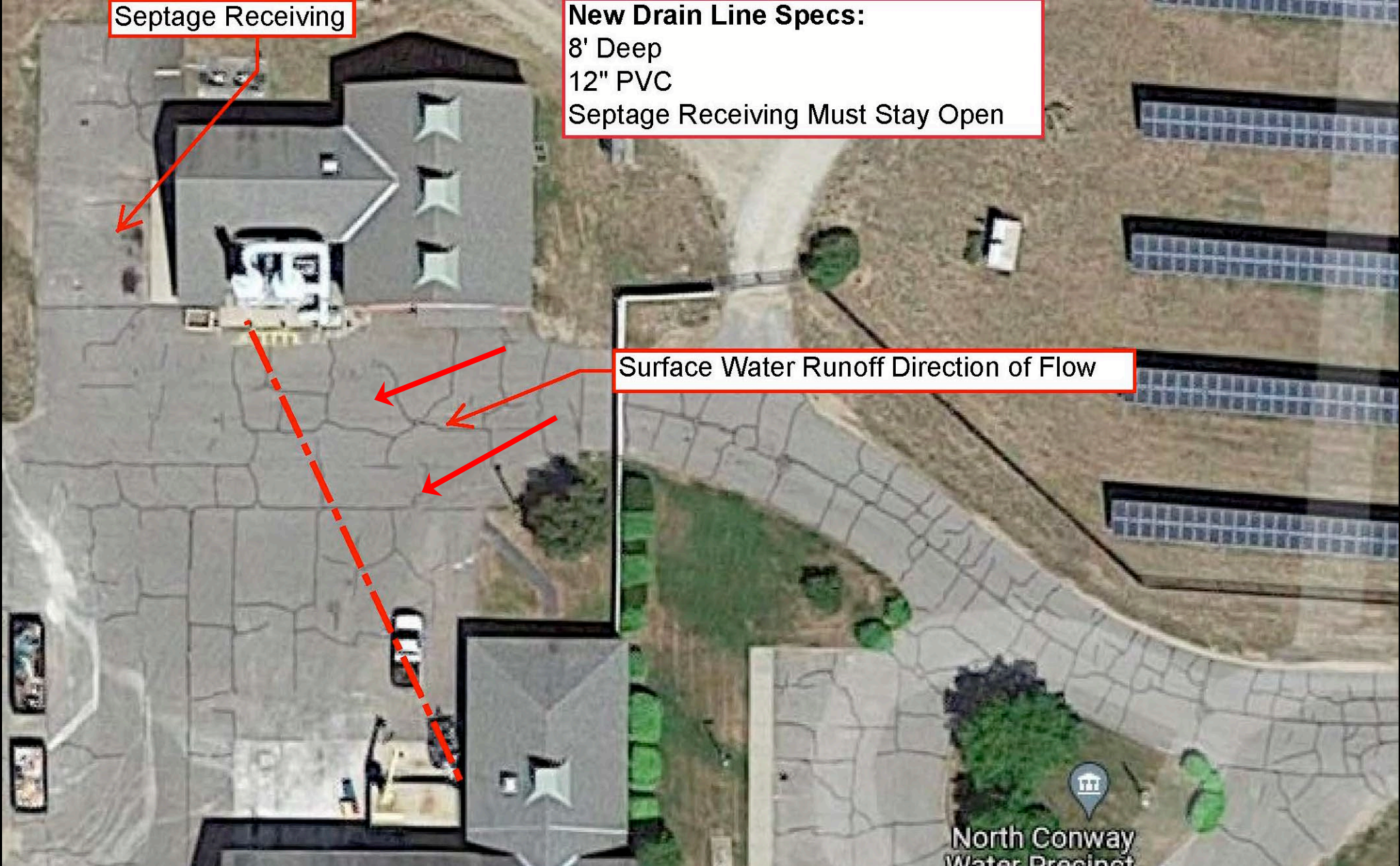




Septage Receiving

New Drain Line Specs:  
8' Deep  
12" PVC  
Septage Receiving Must Stay Open

Surface Water Runoff Direction of Flow



Exercise: Lay Out Your Work Site



# List of Training Resources – in person

- OSHA Training Institute – Keene State College  
(800) 449-6742  
[oshaed@keene.edu](mailto:oshaed@keene.edu)
- The New England Consortium – UMass Lowell  
(978) 934-3257  
[tnec@uml.edu](mailto:tnec@uml.edu)
- UNH Professional Development & Training  
(603) 862-7380  
[professional.development@unh.edu](mailto:professional.development@unh.edu)