

Indiana State University
CNST 418 – Design of Temporary Structures
Course CRNs: All

HW #1 – Site Conditions

Module 3

Due Date: 11:59 PM EST on the date given in on Blackboard Schedule

Go to Syllabus – Schedule or to Assessment Quick Links – Schedule to find the exact date.

Point Value: Max. 50 points

This assignment counts towards your homework grade.

Purpose

You will

T.1 Evaluate & Design site conditions and temporary earth retention systems (TERS).

- a. Describe warning signs of soil slope failure.
- b. Evaluate OSHA site soil excavation lay back, setback and spoil pile constraints.

Task & Criteria for Assessment

The available points for each part are given in (yellow highlighting).

You have been tasked with evaluating the site described in the attached geotechnical report.
Assume the following site conditions:

- a) There will be a basement requiring excavation down to approximately 15 ft below the existing finished grade. See soil boring B-1 through B-6.
- b) The worst soil layer type defines the excavation parameters, SW.
- c) SW (well-graded sand) is not very cohesive and is predominately granular.

Answer all of the following questions using **complete sentence answers**:

1. Shoring Requirements:

- 1.1. Does this excavation need to be shored? (the site should be excavation should be shored. 2 points) Justify your answer (this is because it has been classified as type C which is comprised of dense soil and soft rock, this would be risky to the safety of the building 2 points) in a complete sentence. (1 points)
- 1.2. Does the excavation protection system have to be designed by a Professional Engineer? (the excavation will require approval of a professional engineers. 2 points) Justify your answer (this is because the according to the standards and regulation of OSHA all excavations deeper than twenty feet should be subject to approval of a professional engineer. 2 points) in a complete sentence. (1 points)

Note : page 2.9 of your textbook has a typo. Use my lecture content or go directly to the source document (OSHA Section 1926.652).

2. OSHA Soil Classification Type:

- 2.1. What soil classification would OSHA categorize this type as? (this soil would be

classified as type C. (2 points) Justify your answer (this is because the soil is made up of soft rocks and dense soil making it less stable compared to other resources. (2 points) in a complete sentence. (1 points)

3. OSHA Required lay back:
 - 3.1. What is the allowable slope for the OSHA classification you determined to be appropriate? (the allowable slope for the OSHA classification is the positive slope. **2 points**) Justify your answer (the soil for excavation has been classified as type C and the excavation will also go beyond 20ft as designed by a professional engineer. **2 points**) in a complete sentence. (**1 points**).
4. OSHA Required setbacks: Assume you have the space on site and a perfectly level grade to perform the open cut excavation.
 - 4.1. What does OSHA require the minimum setback to be for the excavation before the spoil pile begins accumulating? (employer should ensure they install portable section of guardrail which will comply with minimum regulations of OSHA. **2 points**) Justify your answer (the parapet height will be above 29 inches and this exposes employees to falling objects. **2 points**) in a complete sentence. (**1 points**).
 - 4.2. What does geotechnical engineers require the minimum setback to be for the excavation before the spoil pile begins accumulating? (tops of cut slopes and toes of fill slopes would be a setback from the outer property boundaries including the assessment of the slope. **2 points**) Justify your answer (the tops and toes shall be setbacks to the structures as far as necessary for foundation of the project. **2 points**) in a complete sentence. (**1 points**).
 - 4.3. If there is a difference which one should govern? (if there is a difference the regulations of OSHA should be used. **2 points**) Justify your answer (the geotechnical requirements are only opinions of the specialist and the OSHA requirements are established and agreed upon by many stakeholders. **2 points**) in a complete sentence. (**1 points**).
5. Evidences of Soil Failure: Use the trench soil collapse video (found in the Module 4 folder), PowerPoint presentations (found in the Modules 3 and 4 folders).
 - 5.1. Explain at least three signs of excavation slope failures that could occur. (excavations begin cracking alongside an angle and this signifies failure of the slope. The excavation may also begin sagging losing the main support system of the slope. The third sign is bulging of the trench walls signifying the slope has failed. **9 points, 3 points for each sign (1 for complete sentence, 2 for correct sign)**)
 - 5.2. Explain at least two precautions that could be taken to avoid excavation slope failures. (one should move extra excavation two feet away from the site it is like to occur. On should also ensure that all equipment are kept away from the site. **6 points, 3 points for each precaution (1 for complete sentence, 2 for correct precaution)**)

Materials and Technology Needed

You may review a [Blackboard Tutorial](#) as needed.

You will need to upload a PDF of the final homework. This can be done in many ways. One way is given in Module T.1-Module 4-Module 4 Assignments. Please do not upload .jpg, .zip or .doc files for this assignment. If you convert your document to PDF from a photo please start by taking one photo of each single page with the camera looking straight on and not at a skew to the page. Use good lighting and capture the whole page no more no less. If I cannot read it I will grade it a zero and tell you to try to upload the file again.

Additionally, there is a helpful video called “How to Avoid Homework Upload Errors” that. Can be found in Module T.1-Module 4-Module 4 Assignments that will aid you in making sure you

upload your homework assignment correctly.

Examples: One good – one bad

none