

Affix a self-adhesive identification label to this space. Do not obscure other parts of this page with the label. If you do not have a self-adhesive identification label, please complete the following information. Write your name as it appears on your badge.

Name: _____

Participation number: _ _ _ _ _ 0 _

Do not write in this box.

Judges, after this skill sheet has been scored and double checked, write the total score for this activity in the blank below.

Skill Activity Score: _____

Judges Initials: _____

**2023 National Agricultural Technology & Mechanical Systems Career Development Event
Environmental and Natural Resources**

Round all numbers to the second decimal place at every step.

Please provide the proper units in your answer.

Scenario: You are currently a designer and planner for ATMS Earth Works and have been contracted to consult on a potential development. The area of land (see maps) is currently being used as mix timber dense woodland in the southeastern region of the United States. Your client has asked that part of this property be converted into a potential Real Estate development. That area is being divided into three areas, labeled A, B, and C. Area A will be developed first, followed by B, area C will be left “as is”. To develop the sites, they will be completely cleared of trees by harvesting timber then completely removing stumps. You are responsible for determining the erosion mitigation needed for this project.

The area labeled A is the primary area of concern and will be the focus of the first portion of this.

1. What is the total acreage being converted in field A? _____
2. Use the large map at the front of the space. Please tell me which Section, Township, and Range this property is primarily located (noted with a pin).

Section: _____ Township _____ Range: _____

3. What is the difference in elevation between contour lines? _____
4. What is the elevation change from the highest point to the lowest point in Field A? _____
5. If measured in a straight line from the center of the southern line of field A to the center of the northern line of field A, what is the percent slope of field A? (Assume a uniform grade) _____ %
6. What is the highest elevation of this site (field A)? _____
7. What is the lowest elevation of this site (field A)? _____
8. What cardinal direction will the creek running through field A travel toward when flowing? _____
9. Using the soil maps and charts provided, name the 2 soil types most likely to be found on the site of field A.
_____ & _____

10. Using the charts provided, and the revised universal soil loss equation, what is the current annual soil loss per acre before any changes to the timber for the area labeled A (use total field slope and if multiple soils are present use soil with highest erodibility)? _____

11. After the clearing phase when no ground cover is present what is the maximum potential soil loss for the area labeled A (use total field slope and if multiple soils are present use soil with highest erodibility)?

The ultimate plan is that both Fields A and Field B will be developed similarly. The following questions are to be done with this in mind.

Using the map labeled “zoomed in map” provide answer the following tasks on that sheet.

12. Which field has the least change in elevation? _____

13. Please carefully draw an arrow starting at the highest point in field A indicating the travel of runoff from that point. (an arrow needs a pointed head and a tail, the point indicates the direction of travel)

14. Please carefully draw an arrow starting at the highest point in field B indicating the travel of runoff from that point. (an arrow needs a pointed head and a tail, the point indicates the direction of travel)

15. Please indicate with an X where the “most common drainage location” for Field A and Field B would likely be. (one spot where most of the water from both fields will drain).

Based on the soil loss figures you provided, the county engineering office, your NRCS representative and the county engineering department have determined that you need to install a sediment control device for the development of this property. You have determined that you will use a Sediment Basin with both riser (principal spillway) and emergency spill way. According to NOAA the peak 2-year storm is estimated to be 4.15” in 24 hrs. and the peak 25-year storm is 6.88” in 24 hours. The soil has been tested to have an average diameter of .00023’ (2.3×10^{-4}) and has a settling velocity of 0.012 ft/sec. Due to the likelihood of disturbed soil the land has a runoff coefficient of 0.58.

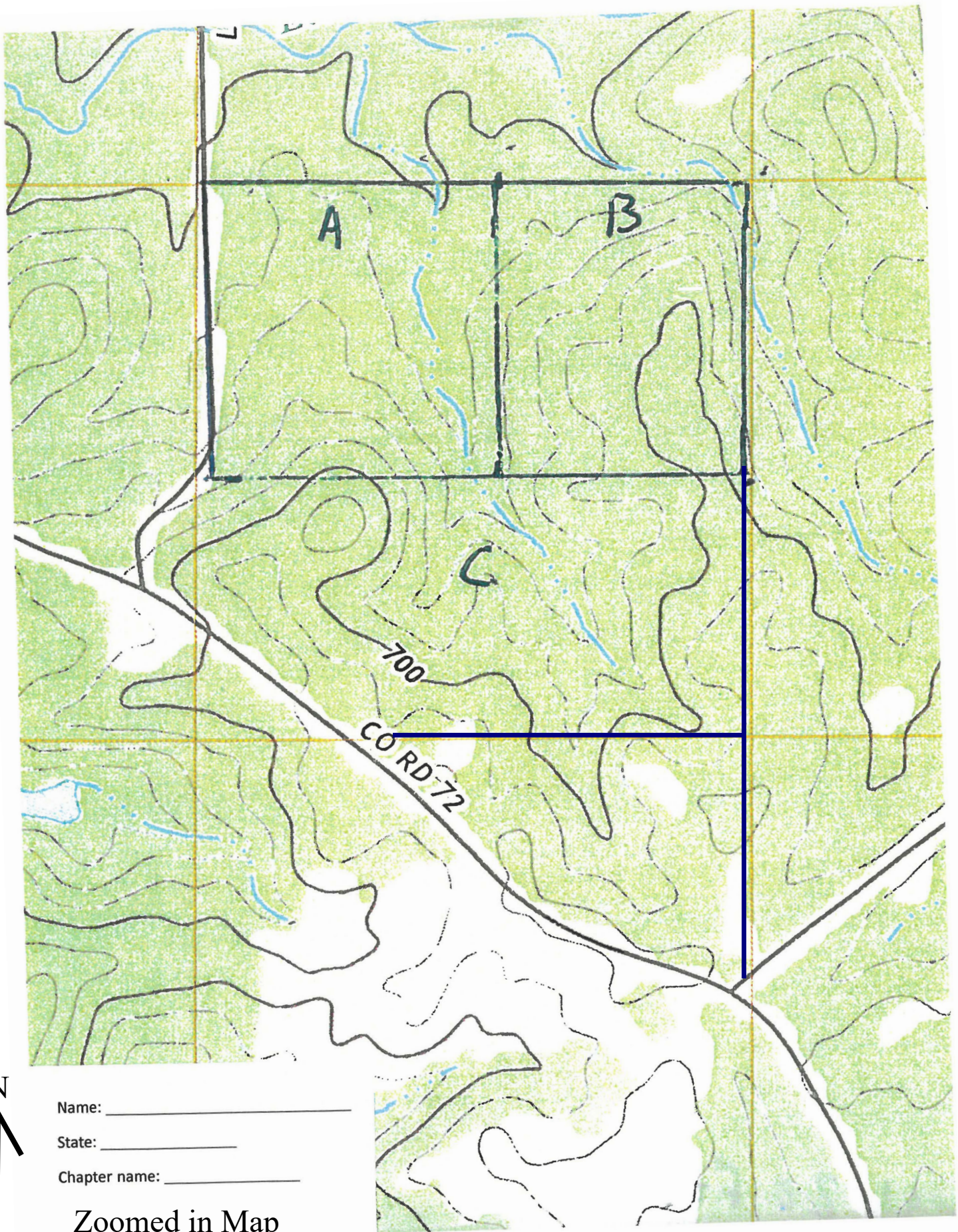
16. What is the minimum surface area of a shared sediment basin that will work for both of these fields in acres to compensate for a 25-year storm? _____

17. What is the minimum Dry Storage volume needed to compensate for a 2-year storm according to the formula. _____

18. Using all the information available, what is the deepest we can likely dig a sediment basin in the prime location without hitting a restrictive feature/bedrock? _____

19. Would you be able to dig to the restrictive feature to install a sediment basin? _____

20. What soil properties and qualities justifies your answer? _____



Name: _____

State: _____

Chapter name: _____

Zoomed in Map

Formulas and conversions:

$$43560 \text{ ft}^2 = 1 \text{ acre}$$

$$1 \text{ mile} = 5280 \text{ ft}$$

$$1 \text{ yd}^3 = 27 \text{ ft}^3$$

$$1 \text{ mile} = 1.069 \text{ km}$$

$$\text{RUSLE: } A = R \times K \times LS \times C \times P$$

$$\text{Storage Area in ft}^2 = SA = (1.2) \frac{(100 \times Q_{\text{out}})}{\text{Settling velocity of particle}}$$

$$\text{Peak discharge in ft}^3/\text{sec} = Q_{\text{out}} = \text{runoff coefficient} \times \text{inches of precipitation per hour} \times \text{total area drained in acres}$$

$$\text{Storage Volume of dry storage in ft}^3 = SV = (2.4) \frac{(Q_{\text{out}})}{\text{Settling velocity of particle}}$$

SCRATCH PAPER: