**Lawson Creek Bridge assignment**

The Lawson Creek Bridge has been rated Structurally Deficient and needs to be replaced with a new bridge. Refer to the engineering report and the drawings provided, and answer the following questions. You may create space in the document below and type your answers.

When you done, submit your work as an email attachment.

Part 1: Refer to “Condition Report for Lawson Valley Road Bridge over Lawson Creek”

1. What firm prepared this report?
2. Who was this report prepared for?
3. Who was the registered professional engineering who signed/stamped the report?
4. Refer to the Executive Summary on p. 3. When was the original bridge over Lawson Creek built?
5. When was the original bridge replaced with the current bridge?
6. Who has identified this current bridge as needing repairs?
7. What did they do as a temporarily fix? (see paragraph 1)
8. Why did San Diego County hire Boyle Engineering? (see paragraph 2)
9. Refer to photos S-1 and S-2. Describe the current bridge in your own words. Be specific, using as many details as possible.
10. Refer to photos S-3 and S-4. The roadway deck is made of concrete. The concrete deck is supported by several steel girders (the red girders). Approximately what dimensions are the steel girders? (just estimate carefully by looking at the photos). \_\_\_\_\_\_\_inches high X \_\_\_\_\_\_\_\_ inches wide.
11. What is wrong with the left-side foundation for the bridge? Be specific and use as much descriptive detail as possible.
12. Why was the temporary wood bracing added to the bridge structure? What is its purpose? Be specific.
13. What would happen to the bridge if the left-side foundation collapsed? Don’t just say “it would fall”. That’s not what I want. I want you to try to imagine and explain what might happen to the roadway if the left abutment wall tipped any further. Look at the photos and try to explain the sequence of events.
14. Refer to photos S-5 through S-8. How thick is the concrete roadway deck? \_\_\_\_\_\_ inches
15. What do the red steel girders rest on at each end? What do they sit upon at each end of the bridge?
16. Where is the bridge cracking? Be specific, there are at least 2 major cracks.
17. What is preventing the left end of the bridge from completely collapsing? Be specific and detailed. Several things are working together to hold it up. What are they?
18. The big rocks in photo S-7 are called “rip-rap”. What is their purpose? Why would you pile up big rocks like this for a bridge over a creek?
19. Refer to photos S-9 through S-12. Do you think the wing walls in S-9 look okay?
20. Who has spray painted their name under the bridge?

Part 2: Refer to the Construction Plans (you are provided with 7 sheets)

1. Refer to sheet 1: When were the plans prepared?
2. How many sheets are in the full set of construction plans?
3. There are 3 groups or categories of plans in the full set. What are the 3 groups?
4. This project is in what area of San Diego County?
5. This bridge is located on what road?
6. Refer to your sheet 2 (actual sheet 3 of 39): The gray, squiggly lines running all over the land are known as “contour lines”. They show the elevation, for example 1760, 1765, etc. How much do you rise or fall by going from one line to the next? (be careful)
7. What is the elevation above sea level of the creek bed as it passes right under the bridge? Do your best to trace it to one of the contour lines. \_\_\_\_\_\_\_ feet above sea level.
8. On the drawing you will see a dashed line called “PIA”. What does this stand for?
9. You will also see a dashed line called “ESA”. What is this area?
10. Read the “Environmental Alert”: What is the purpose for the PIA and ESA boundaries? Be as specific as you can.
11. Refer to your sheet 3 (actual sheet 12 of 39): This sheet shows the new bridge. How long is the new bridge span?
12. How wide is the new bridge span? (see Typical Section).
13. How thick is the new bridge deck?
14. What kind of guard railings will be used on the new bridge? (see Typical Section)
15. Refer to the “Order of Work” roughly in the middle of the page. What is the first step in building the new bridge?
16. Which half of the bridge will be constructed first? The northern half, or the southern half?
17. What is the last step, according to the Order of Work?
18. Why do you think only half of the bridge will be replaced at a time? Why not the whole thing all at once? Think about this for a while.
19. Refer to Stage 1 and Stage 2 details on sheet 3: Write a brief paragraph explaining how the new bridge deck will be constructed. Explain the steps.
20. Refer to your sheet 4 (actual sheet 14 or 39): This is the bridge foundation plan. The right-side bridge foundation will use numerous concrete pilings, some 24” diameter and some 16” diameter. If a concrete piling is 2 ft. diameter X 10 ft. long, how many cubic feet of concrete does it have? (hint: volume of a cylinder is V = πr2 x L) \_\_\_\_\_\_\_\_\_\_\_\_\_ cubic ft.
21. How many cubic yards is this? (There are 27 cubic ft in 1 cubic yard) \_\_\_\_\_\_\_\_\_\_\_\_\_\_ cubic yds.
22. How are these concrete pilings put into the ground? We discussed this in class. There are clues on the drawing.
23. What is the purpose of all these concrete pilings? We discussed this in class. You may need to do some Internet research if you forgot.
24. Refer to your sheet 5 (actual sheet 20 of 39): What type of guard railings does the new bridge use? Be specific.
25. How are the railings attached to the new bridge deck? Look carefully at the drawing.
26. What are the dimensions of the final “Closure Pour” in the roadway deck? Look carefully at the drawing. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ wide X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ high
27. Refer to your sheet 7 (actual sheet 24 or 39): The sides of the bridge approach are covered with a nice looking architectural material. What is this material? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Be very specific.

What is the brand name and pattern number? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. If the new concrete bridge deck is 62 ft long X 32 ft wide X 2 ft thick, how many cubic feet of concrete is needed for this? (volume of a cube is L x W x H)
2. How many cubic yards of concrete is this? There are 27 cubic ft in 1 cubic yd.
3. How much does the bridge deck weigh, if concrete weighs 4,000 lbs per cubic yd?