



MEMORANDUM

TO: Elizabeth Nijkamp, Engineer Review Manager, El Paso County

FROM: Kendra Gabbert and Karen Fox, FHU

DATE: 05/19/2021

SUBJECT: On-Call Contract #17-067H-1; PO # 8113073
Bridge Reviews
Task Order #6: Mesa Top Bridge Submittal - Second Review

This memorandum provides a list of comments for the 2nd Submittal of the Mesa Top Bridge, based on requirements in the County's Engineering Criteria Manual (ECM), 2019 CDOT Standard Specifications for Road and Bridge Construction, Current CDOT Bridge Design Manual and the Current CDOT M&S Standards Plans.

Comments

Comments on this second submittal are divided between the hydraulic calculations and report and bridge plans and calculations. Per El Paso County's list of documents typically required for the Structure Record, the following documents have not been submitted:

- Contech Independent Design Check Calculations
- Load Rating for Superstructure
- Project Provisions – It was noted with the 2nd submittal that no Project Provisions were required for the bridge substructure.

Plan Comments

The following are comments on the hydraulic report, calculations and bridge hydraulic plan sheet and bridge plans and calculations that have been incorporated in a Bluebeam Session:

Hydraulic Submittal

HEC-RAS Output and Scour Calculation comments:

1. The electronic file of HEC-RAS should be submitted.
2. Difficult to review the HEC-RAS information because the flow profiles are not labeled, and the existing and proposed conditions are not labeled.
3. Need to include HEC-RAS cross section with n-values and contraction /expansion values.
4. Verify that the contraction and expansion values have been adjusted properly in the proposed conditions for the new bridge. The bridge section in the scour calcs and the hydraulic sheets shows at least one abutment encroaching on the water surface for the 100-year event.

5. Need to show or discuss difference in existing versus proposed cross-sections. Sections 500, 600 and 700 go through the bridge, so these cross-sections cannot be set up the same way in the proposed conditions as the existing conditions. What are the upstream and downstream cross-sections of the proposed bridge? How far upstream and downstream are they located from the proposed bridge? What bridge width was modeled?
6. What design flow is used in the Contraction Scour calculations? Why isn't the 100-year being used?
 7. Pier width in Contraction Scour does not match pier width on substructure plans.
 8. Discuss in hydraulic report where grain sizes D50 and D90 come from.

Hydraulic Report:

1. There is no discussion of basins tributary to the bridge. It appears the drainage design associated with the stormwater on top of the bridge was included in the Final Drainage Report for Filing 5. If that is the case, clarify that in this report.
2. Under the Project Description section, include discussion of topography and ground cover in the project area related to the bridge.
3. Under Drainage Criteria, include information on freeboard criteria.
4. Under Floodplain Statement, specify which FIRM the bridge effects.
5. Under the Existing Drainage Conditions:
 - a. Discuss the type of floodplain delineated, i.e., Zone AE with no floodway.
 - b. Will construction require crossing the drainageway / impacting vegetation?
 - c. Expand on hydraulic model discussion, include which version of HEC-RAS was used, how the cross-sections were updated to model the proposed bridge and grading, if cross-sections were removed or shifted in the proposed condition to better model the bridge, etc.
 - d. Discuss scour analysis and scour protection. Where did the soil D50 come from that was used in the contraction scour calculations? How was the riprap sized and how were the limits determined? Discuss freeboard provided.

Bridge Hydraulic Information Plan Sheet:

1. How are the limits of riprap being defined? What are the dimensions? What is the riprap size? Is there bedding or geotextile proposed? What is the riprap thickness?
2. Show scour limits.
2. In the view for Mesa Top Drive Bridge (South Bridge HCL) (Looking Downstream), should the riprap be extended to the bottom of the slope?

Contech Superstructure Calculations and Plans:

1. Concrete Deck Design calculations does not include and should include a check of AASHTO Section 5.6.7 – Control of Cracking by Distribution of Reinforcement. Calculations and plans need to be updated.

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2. On the plans, the layered elastomeric pad has overall dimensions of 1'-3" x 6-3/4", which do not match the dimensions in the bearing calculations. The bearing calculations used 1'-3" x 10".

Substructure Calculations and Plans:

1. The maximum wingwall height on the plans is 14.08 ft and the maximum wall height used in the wingwall calculations is 13.49 ft, is the assumption the wingwall will be approximately 6 inches higher than the soil the wall is retaining? (Similar comment from previous submittal.)
2. The roadway is directly behind the wingwalls, an equivalent soil height for live load surcharge should be added to the wingwall loading, per CDOT BDM 11.3.6.2. (Similar comment from previous submittal.)
3. The current wingwall calculations require 2-#8 bars at the top of the wingwall, these are not shown on the plans.
4. Clarify X dimension in wingwall table.

Conclusions

Based on the comments above, we feel that the hydraulic report, Bridge Hydraulic Information Plan Sheet, all bridge plans and calculations should be updated and resubmitted.