

Appendix G

Response to Pennoni Associates, Inc. Comments Dated December 4, 2008

Response to FHWA Comments Dated December 5, 2008



SR1/I-95 Interchange

Preliminary Foundation Report - Bridges and Associated Wing Walls

CONTRACT NO. 28-090-03

REVIEWER: Ahmad W. Faqiri, P.E.

REVIEW COMMENTS

Sheet No.	Comment	Made By	Date	Action	By	Date
General	Provided this was a Preliminary Foundation submission, there is ample detailed information in the report. Sound arguments have been made in recommending pipe piles and some H-piles. Some of the valid reasons to use pipe piles and H-piles include: effectiveness in being driven in tight spots; minimal ground disturbance; and most important of all, ease of splicing and cutting, which is crucial for this project because of the uncertainty of the pile length and pile tip elevation from location to location.	AWF	12/4/08	No response needed.	RK&K	12/9/08
31	Section 4.4 - the bulleted list has incorrect numbers for Structures S6 to S8.	AWF	12/4/08	Section numbers have been updated.	RK&K	12/9/08
31-43	Data presentation for Structure S1 to S5 is inconsistent with that of structures S6 to S7. Soil parameters are tabulated for structures S6 and S7.	AWF	12/4/08	At the time of the report, the generalized soil parameters presented in Table 4.1 were used for Structures S1 to S5. For Structures S6 and S7, location specific soil parameters were developed.	RK&K	12/9/08
33	For Structure S2 - There are soil borings that are anywhere from 20 to 70 feet away from their associated substructures. In cases where the soil borings are around the parameter of the substructure one can argue that the information at the foundation location can be interpolated. However, is there a limit beyond which the soil boring information is not representative of the soil under the foundation?	AWF	12/4/08	The boring locations were limited due to difficult site access, specifically due to traffic and existing slopes. Boring data was interpolated from the closest available boring. As structures have been moved multiple times during the design process it was not economical to re-drill borings at the final structure locations. There is a reasonable level of consistency between local borings.	URS	12/30/08
34	For Structure S3 - There are soil borings that are anywhere from 20 to 80 feet away from their associated substructures. See the previous comment for the actual question.	AWF	12/4/08	The boring locations were limited due to difficult site access, specifically due to traffic and existing slopes. Boring data was interpolated from the closest available boring. As structures have been moved multiple times during the design process it was not economical to re-drill borings at the final structure locations. There is a reasonable level of consistency between local borings.	URS	12/30/08
36	For Structure S4 - The two are soil borings IBR 43 and IBR 20 are 30 and 50 feet away from pier 1 substructure. See the previous comment for the actual question.	AWF	12/4/08	The boring locations were limited due to difficult site access, specifically due to traffic and existing slopes. Boring data was interpolated from the closest available boring. As structures have been moved multiple times during the design process it was not economical to re-drill borings at the final structure locations. There is a reasonable level of consistency between local borings.	URS	12/30/08
37	For Structure S5 - There are soil borings that are anywhere from 30 to 70 feet away from their associated substructures. See the previous comment for the actual question.	AWF	12/4/08	The boring locations were limited due to difficult site access, specifically due to traffic and existing slopes. Boring data was interpolated from the closest available boring. As structures have been moved multiple times during the design process it was not economical to re-drill borings at the final structure locations. There is a reasonable level of consistency between local borings.	URS	12/30/08
39	For Structure S6 - There are soil borings that are anywhere from 45 to 150 feet away from their associated substructures. See the previous comment for the actual question.	AWF	12/4/08	The subsurface exploration program was developed based on the proposed structural element location and with respect to drill rig access. For the field crews to have drilled at the exact location of the piers, a shoulder and two travel lanes would have needed to be closed. At most one travel lane was allowed to be closed for this work. It is our opinion that a significant site characterization was developed for this project and the offset borings for these elements can be justified. Also, the offset borings encountered reasonably uniform soils. This topic is addressed in Section 3.5 of the report.	RK&K	12/9/08
49	For the bridge wing wall foundation alternatives, is it possible to consider other systems such as: post and plank walls, sheet piles with concrete cap, T-walls, Conspan anchored walls, etc.	AWF	12/4/08	A section has been added to the report to address the wall alternatives indicated in the comment.	RK&K	12/9/08



SR1/I-95 Interchange

Preliminary Foundation Report - Bridges and Associated Wing Walls

CONTRACT NO. 28-090-03

REVIEWER: Ahmad W. Faqiri, P.E.

REVIEW COMMENTS

Sheet No.	Comment	Made By	Date	Action	By	Date
51	For Structure S7's retaining walls - has other systems such as post and plank walls and sheet pile walls been considered?	AWF	12/4/08	For S7, a soldier pile and lagging wall was considered for design, however, due to the exposed wall height, tiebacks would have been required. Based on the subsurface exploration and expansive clays in this area, tiebacks are not recommended. Section 5.2.4 - Other wall types was added to the report to discuss the construction of top down walls.	RK&K	12/9/08
52 - 54	The claim that "pipe piles are more cost efficient per ton of axial load than H-piles" - Is it based on historic information or cost comparison conducted for this project. Also in page 53 pipe piles are recommended for Structure S4 based on the economy of scale. Is that a fair bases for this recommendation, because H-pile is already been used for Structure S7. Also because of the large number of piles used for this project, several types of piles can be used without affecting the economy of scale.	AWF	12/4/08	A preliminary cost comparison was conducted and included in Appendix F. Also included is a preliminary calculation for determining the number of installed piles required for a static load test to increase the economy of scale.	URS	12/30/08
App - A	Sheets A-3a to A-3e and A-4a to A-4j - Add Structure Numbers in the title box.	AWF	12/4/08	Will Comply	RK&K	12/9/08
App - A	Provide Soil Profile, depicting soil stratus, for Structures S6 and S7.	AWF	12/4/08	Will Comply	RK&K	12/9/08
App - A	Sheets A-3a to A-3e and A-4a to A-4j - Provide estimated pile tip elevation.	AWF	12/4/08	Estimated Pile tip elevations will be added for the Final Foundation Report submission.	RK&K	12/9/08
App - E	Figure E-1 (Settlement Monitoring Location plan with Structure Location) is missing.	AWF	12/4/08	Figure E-1 will be added for the Final Foundation Report submission.	RK&K	12/9/08
TS&L PLANS	TS&L Submission Plan Sheets No. 7, 12, 16, 20 and 24 are missing soil boring markers.	AWF	12/4/2008	The soil boring targets and names appear to be shown these sheets.	RK&K	12/9/08

Abbreviations:



SR1/I-95 Interchange

Preliminary Foundation Report - Bridges and Associated Wing Walls

CONTRACT NO. 28-090-03

REVIEWER: Justice Maswoswe

REVIEW COMMENTS

Sheet No.	Comment	Made By	Date	Action	By	Date
General	Reference figures and supporting calculations within the text; and provide basis/source for recommendations and/or assumptions.	JM	12/5/08	Will comply.	RK&K	12/29/08
General	Provide supporting calculation with all assumptions clearly stated, copies of relevant references attached and all pages sequentially numbered for ease of reference within the text.	JM	12/5/08	The supporting calculations are provided in Appendix F of the report.	RK&K	12/11/08
General	The reports can be significantly shortened by combining recommendations common to all structures in one subsection and then only describing the differences for each structure in other subsections. The two reports also share the same subsurface data. Therefore, unless there are contractual reasons for not doing so, the two reports could be easily combined into 2 or 3 volumes instead of the current 4 volumes.	JM	12/5/08	DelDOT requested separate reports for bridge and wingwall structures and retaining walls.	RK&K	12/11/08
General	There appears to be no mention in any of the reports of static pile load tests. Since pile capacity evaluations for H- and pipe piles tend to be more difficult (due to their different behavior when plugged or unplugged) when using dynamic methods, the performance of supplemental static load test(s) should be considered.	JM	12/5/08	Static load tests are discussed in Section 5.59 of the Report.	URS	1/5/09
Section 2	The site description in this section is difficult to comprehend because even though figures are attached, they have not been referenced within the text. Please reference the figures that match the various descriptions in the text.	JM	12/5/08	Appendix A figure numbers have been added to the text of this section.	RK&K	12/11/08
Section 2.3.8 and 5.4.8	If foundations already exist and new foundations are not required for S8 - SR-1 over Eagle Run, why is the structure being discussed at all in a foundation report?	JM	12/5/08	This structure was included in the report for completeness of the description of the project.	RK&K	12/11/08
Section 4.2	Stratum I, last paragraph: Provide reference/source of the Meyerhof equation.	JM	12/5/08	Will comply.	RK&K	12/11/08
Section 4.2	Stratum IIa, 5 th paragraph: Provide reference/source of the undrained shear strength equation.	JM	12/5/08	Will comply.	RK&K	12/11/08
Table 4.1	Provide basis for assuming that both the fine-grained and coarse-grained soils have the same total unit weight of 125pcf. Fine-grained soils usually have a lower unit weight.	JM	12/5/08	The fine-grained material encountered within the project site are overconsolidated and after have a high specific gravity. Based on the extensive amount of laboratory testing which was conducted for this project, a unit weight of 125pcf is not unreasonable. The range of measured unit weights was typically 120 to 130-pce with a few outliers at both tails. The calculations are not sensitive to the unit weight within this range.	RK&K	12/11/08
Section 4.3	2 nd paragraph: Reference the relevant calculations that show the derivation of these parameters.	JM	12/5/08	The calculations are provided in Appendix F.	RK&K	12/11/08



SR1/I-95 Interchange

Preliminary Foundation Report - Bridges and Associated Wing Walls

CONTRACT NO. 28-090-03

REVIEWER: Justice Maswoswe

REVIEW COMMENTS

Sheet No.	Comment	Made By	Date	Action	By	Date
Section 4.4.6	Stratum IIb, 3 rd sentence: Explain why S6 is the only structure that requires the development of site specific soil parameters.	JM	12/5/08	Location specific soil parameters were developed based on laboratory testing in the vicinity of a specific structure. The generalized soil parameters provided in Table 4.1 are conservative and generalized for the entire project site. In many cases the site specific soil parameters are greater than the conservative general soil parameters in the FFR. Additionally, structures have site specific soil parameters.	RK&K	12/11/08
Table 4.8	Explain why the unit weight for stratum IIA and the angle of friction for stratum I are higher than those provided in Table 4.1.	JM	12/5/08	Location specific soil parameters were developed based on laboratory testing in the vicinity of a specific structure. The generalize soil parameters provided in Table 4.1 are conservative and are generalized for the entire project site. In many cases the site specific soil parameters are greater than the conservative general soil parameters.	RK&K	12/11/08
Section 4.5	1 st paragraph, 2 nd sentence: There appears to be no data/basis for suggesting the possibility of an artesian condition at this site.	JM	12/5/08	The possibility of an artesian condition is general to the project geology. We agree there is no specific evidence that an artesian condition exists within the limits of the project. The intent of this statement was to bring it to the readers attention that an artesian condition maybe present in the region, but none was encountered in our borings.	RK&K	12/11/08
Section 5.1.2	paragraph, 2 nd sentence: Provide basis/reference for statement regarding anticipated lateral deflections from the installation of monotubes.	JM	12/5/08	Will clarify	URS	1/5/09
Section 5.1.4	3 rd paragraph: Add the fact that due to their different behavior when plugged or unplugged, pile capacity evaluations for H-piles tend to be more difficult when using dynamic methods.	JM	12/5/08	A sentence has been added to the FFR regarding this topic.	RK&K	12/11/08
Section 5.1.5	3 rd paragraph: Reference the relevant calculations that show the lateral capacity of the pipe piles would be inadequate.	JM	12/5/08	Will comply.	JPK	1/5/09
Section 5.1.6	last paragraph: Reference the relevant calculations that show that spread footings would be inappropriate for Ramp R1 pier.	JM	12/5/08	The calculations are provided in Appendix F.	RK&K	12/11/08
Section 5.2.2	2 nd paragraph: Design of MSE walls will be the Contractor's responsibility but this report must provide a separate section with recommended design criteria for the contract specifications for MSE walls.	JM	12/5/08	This comment is addressed in the FFR, Section 5.6. Section 5.2.2 of the report was developed for comparison of wall types only.	RK&K	12/11/08
Section 5.2.3	last sentence: Explain why an MSE wall would not work or why a CIP wall is better.	JM	12/5/08	This section of the report was further developed for the FFR. The wingwalls for S7 are in a cut and adjacent to an existing SWM pond.	RK&K	12/11/08
Section 5.3	2 nd paragraph: Provide calculations that support this comparison.	JM	12/5/08	Supporting calculations per structure are provided in Appendix F of the FFR.	RK&K	12/29/08
Section 5.4.6	6 th paragraph, 1 st sentence: Reference the calculations that show how the downdrag force was estimated.	JM	12/5/08	The calculations since the PFR have been significantly revised. Downdrag was not included during the final design as a sequence of construction was developed to include a 30 day quarantine period before the abutment piles can be driven. The anticipated settlement of the MSE's has been revised to correlate to the settlement results obtained from the construction of the Ramp A, B, C, and G1 embankment.	RK&K	12/11/08



SR1/I-95 Interchange

Preliminary Foundation Report - Bridges and Associated Wing Walls

CONTRACT NO. 28-090-03

REVIEWER: Justice Maswoswe

REVIEW COMMENTS

Sheet No.	Comment	Made By	Date	Action	By	Date
Table 5.2	Reference the calculations that show how the maximum lateral deflections were derived.	JM	12/5/08	Lateral deflection calculations are included in Appendix F of this report.	RK&K	12/11/08
Section 5.4.6	last paragraph: Include the drivability results as part of this report.	JM	12/5/08	A drivability analysis has been included in the FFR.	RK&K	12/11/08
Table 5.5 and 5.6	A symbol for lateral load is included in the legend of the two tables but lateral loads have not been provided or discussed.	JM	12/5/08	Will comply.	RK&K	12/11/08
Section 5.5.2	4 th paragraph: Reference the calculations that support the estimated elastic/immediate and long-term settlements of 11 and 3.5 inches, respectively.	JM	12/5/08	The anticipated settlement calculations indicated in this section of the PFR have been revised for the FFR. The calculations are provided in Appendix F.	RK&K	12/11/08
Section 5.6	Provide/reference calculations supporting that MSE walls would be more economical than CIP walls.	JM	12/5/08	Will comply.	RK&K	12/11/08
Section 5.6	There is too much repetition of exactly the same recommendations for each structure. Shorten report by providing recommendations common to all structures in one subsection and then only describing the differences for each structure in other subsections.	JM	12/5/08	We agree there is some repetitiveness in Section 5.6. For completeness, recommendations for each structure was provided separately. This was also for the designer's use as we felt it would be easier to isolate the recommendations per structure then to have one very long section for similar recommendations and structure specific recommendations elsewhere. It is our opinion that by having one complete section of recommendations common to all structures would be difficult to read and would cause greater confusion for the designer than as presented in the PFR and FFR. By having the recommendations in separate section, it shortened review times.	RK&K	12/11/08
Section 5.6.1	Bearing Resistance, last paragraph, 4 th sentence & 5 th sentences: Define "unsuitable" and "tall walls".	JM	12/5/08	Will comply.	RK&K	12/11/08
Section 5.6.1	Retaining Wall Backfill, 3rd paragraph, 1 st sentence: Replace "Small" with "Light".	JM	12/5/08	Will comply.	RK&K	12/11/08
Table 5.5	For clarity, suggest revising title to "Acceptable Limits of".	JM	12/5/08	Will comply.	RK&K	12/11/08
Section 5.7	2 nd paragraph, 2 nd sentence: Rather than refer to "a relatively dry condition" be specific regarding how deep the groundwater should be below bottom of excavation to ensure a stable subgrade during construction.	JM	12/5/08	Dewatering during construction is the Contractor's responsibility. The depth where groundwater should be below the bottom of the excavation will depend on the season, the contractor's means and methods, construction equipment, and location within the project site.	RK&K	12/11/08

Abbreviations:

MSE	Mechanically Stabilized Earth
CIP	Cast In Place
PFR	Preliminary Foundation Report
FFR	Final Foundation Report