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Date: June 2nd, 2015

Subject: Calais BHF 037-2(10) – Bridge No. 74 IAB – Addendum Revised Spacing

1.0 INTRODUCTION

Per your request, we have re-run the original integral abutment analysis given the new pile cap geometry sent in an email dated May 4th, 2015 for the Calais BHF 037-2(10) project. This is an additional addendum report to the revised loads integral abutment report dated March 30th, 2015. Contained herein are the revised FB-Pier output parameters based on the updated pile cap spacing. All other information contained in the report dated March 30th, 2015, except for what is updated below, should still remain pertinent.

2.0 MODELING

The same loads and soil information were used as provided in the report dated March 30th, 2015. The only change to the analysis was the pile cap spacing, which was provided in an email from Adam Stockin of Parsons Brinkerhoff on May 4th, 2015. The abutments were modeled as having a 7.89 foot high and 3.5 foot thick pile cap with 4 HP 12x84 piles spaced at 9.052 feet on center. The pile cap was modeled as 40'-0" long, revised from a previous length of 35'-4". This resulted in a new overhang length of 6.422 feet (versus 4.089 feet as previously modeled). All piles are assumed to be driven plumb and oriented for weak axis bending. Figure 2.1 below shows the pile layout for both abutments.

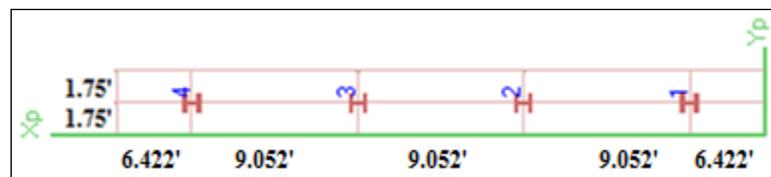


Figure 2.1: Revised Abutment Pile Layout

3.0 RESULTS

3.1 Pile Stresses: Four HP 12x84 piles were modeled for both the non-scour and scour condition. The piles were checked for combined axial compression and flexure under both non-scour and scour conditions using the requirements of the 2014 AASHTO LRFD Section 6.9.2.2. Revised FB-Pier outputs as well as calculated

values are displayed below in Table 3.1 for an assumed 110 foot pile seated on bedrock.

Table 3.1: FB-Pier Output for AASHTO Strength Case I

Soil Condition	Max. Applied Moment (kip-ft)	Plastic Moment** (kip-ft)	2nd Pile Segment Interaction	Factored Lateral Load (kips)	Unbraced Length (feet)	Fixity* (feet)
Non-Scour	179.3	155.4	0.58	31.7	6.8	34.2
Scour	97.2	136.8	0.89	9.2	11.3	43.8

** Moment resulting in plastic hinge development. This moment becomes constant at pile head after pile begins to plastically deform.

* Measured from top of pile head

As shown in Table 3.1, in the scour condition, the maximum applied moment is less than the plastic moment calculated; therefore a plastic hinge does not develop in the top segment of the pile during scour condition. The factored lateral load in this table is the load applied to the top of the pile to achieve the required deflection times a load factor of 1.2.

4.0 RECOMMENDATIONS

The 4 HP 12x84 piles organized in a single row spaced at 9.052 feet center to center, with the revised overhang spacing, will still satisfy the requirements for design. The piles are anticipated to be driven to bedrock given the loose overburden soils, at an estimated length of 110 feet. The minimum required embedment for the piles shall be 35 feet below bottom of footing for both abutments. The nominal axial pile resistance, or resistance the piles should be driven to is 480 kips.

5.0 CONCLUSION

If any further analysis is needed or you would like to discuss this report, please contact us at (802) 828-2561. FB-Pier input file are located in the M:\Projects\12b144\MaterialsResearch\FB-Pier folder:

Non-scour_revised spacing.in

Scour_revised spacing.in

c: Electronic Read File/DJH
Project File/CEE
MLM