

Typical Scope of Services for Land Development/Private Bridges

1.0 Bridge Type Study

- 1.1 Obtain and review all available site related project information from the Civil Engineer of Record (CER) and the project Geotechnical Engineer of Record (GER); including project objectives. This includes a fully completed *Bridge Design Coordination Data Sheet* and the requested backup information.
- 1.2 Prepare a detailed list of design criteria for each bridge site.
- 1.3 Prepare conceptual designs and drawings (plan, elevation and sections) for all of the feasible alternatives for each site. Consideration will be given to steel, timber, precast and cast-in-place concrete components. Coordinate closely with the CER related to the bridge geometrics and the Landscape Architect (LA) related to the desired aesthetics for each bridge.
- 1.4 Prepare cost estimates for each of the feasible alternatives for each site. Obtain actual price quotes from bridge product vendors, as required.
- 1.5 Prepare a report that discusses the advantages and disadvantages of each feasible alternative for each site and provide a recommendation for the preferred alternative. Submit three (3) copies of the report for review and comment.
- 1.6 Attend a meeting to discuss the report and decide on the preferences and requirements for preliminary design.

2.0 Preliminary Bridge Design

- 2.1 Finalize the coordination with the CER related to bridge geometry for the selected alternatives including: wingwall lengths, vertical and horizontal alignments, hydraulic opening, staging, utilities, permitting, scour mitigation, and utilities.
- 2.2 Perform preliminary design calculations for the superstructure elements to determine the minimum construction depth.
- 2.3 Based on the recommendations of the Geotechnical Engineer, determine the bottom of footing elevations for the substructures. Perform preliminary design calculations for the abutments and wingwall elements including the foundation design.
- 2.4 Prepare a set of preliminary design drawings that include:
 - 1"=20' scale (or larger) plan and elevation views
 - Typical bridge section
 - Typical roadway approach section
 - Details for aesthetic treatments for railing, barriers, lighting, etc.
 - Details for location and method of attachment for utilities

- 2.5 Prepare a preliminary cost estimate based on estimated materials and labor costs.
- 2.6 If a fast track schedule is required, prepare design documents to allow for bidding and procurement of selected bridge components by the Developer (Owner).
- 2.7 Compile eight (8) copies of the preliminary design deliverables and submit two (2) copies to the CER, GER, and Developer (Owner) for review and comment. Attend one (1) meeting to discuss the comments and coordinate the details for final design.

3.0 Final Bridge Design

- 3.1 Prepare the final bridge design calculations for the superstructure elements, or prepare a final bridge design criteria for use by the Specialty Structural Engineer (SSE).
- 3.2 Prepare the final bridge design calculations for the substructure elements and foundations.
- 3.3 Prepare the detailed construction drawings for bridge superstructure and substructure elements.
- 3.4 Prepare the material specifications for the bridge items in the form of notes on the drawings. References will be made to AASHTO, ASTM and local state DOT specifications where appropriate.
- 3.5 Prepare a final cost estimate.
- 3.6 Compile four (4) sets of the final bridge design deliverables for review by the CER and Developer (Owner). Incorporate the comments and submit one (1) stamped set of reproducible drawings for use by the CER or Developer in bidding the project.

4.0 Construction Administration/Certification

- 4.1 Prepare a document that defines the requirements for the specialty threshold inspections.
- 4.2 Attend a pre-construction meeting to coordinate the specialty threshold inspections for the bridges with the project participants.
- 4.3 Coordinate with all project participants to facilitate communication and documentation of project issues and details.
- 4.4 If prefabricated bridge elements are utilized, review and approve the final bridge design calculations prepared by the SSE and the shop drawings prepared by the bridge vendor.
- 4.5 Perform quality control/quality assurance inspections at the manufacturing plant to confirm compliance with the construction drawings on projects for prefabricated projects where prefabricated products are incorporated.

- 4.6 Perform periodic on-site inspections at the site to confirm compliance with the construction drawings. Perform the specialty threshold inspections to be defined in task 4.1.
- 4.7 Review requests from the contractor related to changes to construction details. Submit documentation to the owner for final approval.
- 4.8 Review and approve interim and final pay requests submitted by the contractor.
- 4.9 Prepare the final “Record Drawings” that documents all field changes.
- 4.10 Perform a field inspection at the time of substantial completion of the bridge. Prepare a punch list of work items required by the contractor to reach final completion. Prepare a letter certifying the bridge was constructed in accordance with the design drawings. Submit one (1) set of final “Record Drawings” to the CER and the Developer.

5.0 Bridge Management Services

5.1 Review of Record Documents

- 5.1.1 Obtain and review copies of all available record documents for the bridge which may include construction drawings, as-built plans, specifications, design computations, shop drawings, field reports, previous inspection reports, photographs, load rating computations, scour documentation, traffic counts, maintenance records, etc.
- 5.1.2 Compile the record documents in an organized file folder that includes paper and electronic copies of all the record data.

5.2 Safety Inspection

- 5.2.1 Perform a cursory visual inspection of all the exposed bridge elements that is possible by walking on and around the bridge structure and by using binoculars to view distant bridge elements.
- 5.2.2 Document the condition of each bridge element in a field report using a numbering system similar to the rating system required by Federal Bridge Inspection procedures.
- 5.2.3 Document the general conditions and specific problems using field notes and digital photographs.
- 5.2.4 Provide recommendations for further investigations in the field report.

5.3 In-Depth Inspection

- 5.3.1 Perform a detailed “hands-on” inspection of all visible bridge elements including the use of specialized equipment to gain access to each bridge element for a close-up visual inspection. Obtain measurements and document the dimensions of each bridge superstructure element for comparison to any record documents.

- 5.3.2 Prepare field sketches to document the bridge geometry and member sizes including connections.
 - 5.3.3 Document the condition of each bridge element in a field report using a numbering system similar to the rating system required by Federal Bridge Inspection procedures.
 - 5.3.4 Determine the soundness of the exposed concrete surfaces of the substructure units using sounding techniques.
 - 5.3.5 Document the inspection findings including all significant defects including cracks, spalls, corrosion, impact damage, etc. using field notes and digital photographs. Provide recommendations for further investigations in the field report.
- 5.4 Bridge Deck Evaluation
- 5.4.1 Determine the soundness of the top and bottom surfaces of the concrete deck using sounding techniques. Document the findings of the inspection using field notes and digital photographs - document all significant cracks and spalls.
 - 5.4.2 Extract at least three (3) concrete cores from the concrete deck and perform a close-up visual inspection of the concrete aggregates and reinforcing steel. Depending on the condition of the cores, recommend a laboratory testing program that may include: compression tests, petro-graphic analysis, chloride content concentration test, cement content, water/cement ratio, etc.
 - 5.4.3 Prepare a report that summarizes the findings of the bridge deck evaluation and provide repair recommendations.
- 5.5 Scour Documentation
- 5.5.1 Establish a datum on the bridge superstructure to allow measurements of the channel bottom along each fascia of the bridge and along the face of each pier founded in the channel.
 - 5.5.2 Document these measurements in a field report that can be repeated every two years during future biennial bridge inspections to allow the monitoring of the channel bottom scour.
 - 5.5.3 If scour is evident at the footing of a substructure unit, probe under the footings of the substructure to determine the limits of the undermining.
- 5.6 Load Posting Recommendations
- 5.6.1 Perform analytical computations to determine the live load carrying capacity of all the superstructure elements including the connections based on the information in the record documents and the results of an in-depth inspection.
 - 5.6.2 Provide as-built and as-inspected load ratings in accordance with the "AASHTO Manual for the Maintenance and Inspection of Bridges."

- 5.6.3 Prepare a report that summarizes the load ratings for each bridge element and provides a recommended load posting for the bridge based on the controlling bridge element.
- 5.7 Bridge Management Study Report
 - 5.7.1 Perform a study that considers the existing conditions and probable future maintenance requirements including the probable life expectancy of the bridge structure.
 - 5.7.2 Prepare a report that provides a summary of the inspection findings and recommendations for future maintenance and repairs.
 - 5.7.3 Provide a breakdown of the recommended repairs in categories that include immediate, short term and long term repairs. If alternative repair methods are available, provide a description of each alternative.
 - 5.7.4 Provide an opinion of the probable cost for each of the repairs (including alternatives) and summarize these costs in the report. Include a copy all corresponding field inspection and load posting reports in the Appendix of the study report.

For Additional Information Contact:

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