MSA Professional Services, Inc.

Quality Assurance/Quality Control Plan for WisDOT Structure Plan Development August 12, 2010

**Bridge Manual:**

Only one shared hard copy of the Bridge Manual and Bridge Standard Drawings is available for reference in each MSA office designing bridge projects. The number of copies is controlled to ensure updating to be complete and accurate. One person is responsible for getting WisDOT Bridge Manual updates to each office. Currently that person is Dan Wagner. Updates that are known to affect future projects are noted. Changes are reviewed at monthly in-house MSA TORQ (Transportation Organization to Retain Quality) meetings.

**Preliminary Plans:**

Preliminary structure plans are developed based on review of field data, hydraulic design, structure sizing, underpass clearances, and compatibility with the road approach improvements. The Project Manager/Project Engineer shares this information with an experienced structural draftsperson. The draftsperson is responsible for producing the preliminary bridge plans based on Bridge Manual Standards and job specific information. The Project Manager/Project Engineer is responsible for review of the preliminary structure plans based on a checklist for the primary sheets. Example checklist items include consistency checks of profile information versus the plan and profile sheet, hydraulic information versus the Hydraulic Report, structure geometry versus initial sizing documents including design class criteria, Operational Planning Meeting decisions, and interim design memos, structure reference line stations same as the road approach plans, and elevations are correct on the plans. The preliminary abutment berm and bottom of abutment elevations are calculated and checked. The subsurface investigation report is reviewed to ensure appropriateness of the proposed foundation design and that the boring data has been transferred accurately to the plans. Foundation design parameters including piling type, loads, and length are developed and reviewed by the structural designer and project manager. The structure survey report and necessary attachments are brought together for a final review by the Project Manager or Project Engineer prior to submittal. On unique structures, a constructability review is performed at this stage.

**Structural Calculations:**

Experienced personnel perform structural calculations using established computer programs and spread sheets based on the approved preliminary bridge plans. All structural calculations are checked by an engineer. The design checker checks program input/results and any hand calculations. Computer programs are used to analyze and design for HL-93 loads where the LRFD methods are required by WisDOT. Summary calculations and sketches are reviewed and checked. Although the designer may use alternate methods to verify initial computations or design, the design checker is a separate person performing review of the designer’s work. Minimum Standard Permit vehicle loads for new structures are 190K or more depending upon roadway type. The structural calculations include the permit load and HL-93 load ratings. Final piling loadings and lengths or spread footing load capacities are also calculated and checked.

**Final Structure Plans:**

The experienced structural draftsperson will use the checked structural calculations to prepare the final structure plans. The person that designed or checked the structure calculations usually checks the final structure plans. An experienced MSA construction engineer reviews the plan for constructability (if unique structure or detailing). The Project Manager or the Bridge Team Leader provides an overall quality review of the final structure plans. Changes are completed by the same draftsperson that created the drawing. The plan checker makes sure all changes were made and initials the plans as checker.

**Quantities:**

Quantities are calculated separately by two people, either the designer, design checker, or draftsperson. Then these two sets of quantity calculations are cross-checked by both people, discrepancies identified if any, and corrected into one set of checked, verified final quantities. The transfer of final quantities from the calculations to the plans sheets is also checked by the responsible plan checker.

**Specifications:**

The bridge designer, Project Manager, and Bridge Team Leader review the need for project specific or standardized special provisions relative to the structure. These are finalized at final plan stage and are reviewed as part of the QA/QC and constructability reviews of the final plans.

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Quality Assurance/Quality Control

Verification Summary Sheet for WisDOT Structures:

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| --- | --- | --- | --- | --- | --- | --- |
| Structure Number: |  | | | WisDOT P.S.&E. Submittal Date: | |  |
| Const. Project ID: |  | | | Target Final Plan Submittal Date: | |  |
| Title: | | | | | | |
| Subtitle: | | | | | | |
| Road: | |  | | | | |
| County: | |  | | | | |
| Project Manager: | |  | | | | |
|  | | | | | | |
| Preliminary Plans: | | | Reviewed by | | Date | |
| Sizing/Hydraulic Report: | | |  | |  | |
| Layout & Design: | | |  | |  | |
| Subsurface Investigation Report: | | |  | |  | |
| Plan: | | |  | |  | |
| E-Submitted: | | |  | |  | |
|  | | | | | | |
| Final Structural Calculations: | | | Performed by | | Date | |
| Designed: | | |  | |  | |
| Checked: | | |  | |  | |
|  | | | | | | |
| Final Plans: | | | Performed by | | Date | |
| Constructability Review: | | |  | |  | |
| Plan Check: | | |  | |  | |
| QA/QC Review: | | |  | |  | |
| P.E. Stamped: | | |  | |  | |
| Final Plan Submittal Date (electronic): | | |  | |  | |