Work Type Definition and Submittal Requirements
3.1 Bridge and Structure Design

Work Type Definition

Pages 1-3 detail the work type definition. In order to become *pre-qualified* for this work type, please see the "Work Type Submittal Requirements" on pages 4-6.

I. Description

Bridge Preliminary Design involves design, production, and/or review of professionally engineered preliminary bridge plans upon which final design can be based. Bridge preliminary design may include surveys, boring information from foundation report, horizontal and vertical controls, structure type, and aesthetic features.

Bridge Final Design involves design, production, and/or review of professionally engineered bridge plans which conform to acceptable design standards and which meet the specific requirements of MnDOT, the American Association of State Highway and Transportation Officials (AASHTO), the American Railway Engineering and Maintenance-of-Way Association (AREMA), and/or the Federal Highway Administration (FHWA).

Bridge Studies involve report preparation of specific bridge related issues.

Bridge Design projects are categorized by level and include the following Project Types:

A. Level 1 – Major or Specialty Structure Design:
Refer to Section 1.3.3 of the MnDOT LRFD Bridge Design Manual for the definition of major or specialty bridges. These structure types may include, but are not limited to, the following:

1. Segmental post tensioned concrete box girder bridges;
2. Steel box girder bridges;
3. Steel truss or steel arch bridges;
4. Cast-in-place concrete arch bridges;
5. Cable stayed bridges.

The following design activities may be required for any major or specialty structure type:

1. Designs for both new construction and bridge renovation;
2. Development of construction specifications;
3. Bridge preliminary and final design services;
4. Development of contractor-style new bridge or repair cost estimates;
5. Bridge ratings and rating manuals for Level 1 structures, some field investigation, and other related work.

B. Level 2 – Complex Structure Design:

1. Curved structural steel girder bridges;
2. Straight, skewed structural steel girder bridges designed using system analysis;
3. Prestressed concrete beam bridges with a curved deck;
4. Post tensioned concrete box girders supported on falsework during construction;
5. Rigid frames;
6. Bridges with complex geometry;
7. Railroad bridges;
8. Drilled shaft or other challenging foundation component design.

The following activities may be required for any complex structure type:

1. Designs for both new construction and bridge renovation;
2. Significant construction staging;
3. Development of special provisions;
4. Bridge preliminary and final design services;
5. Ratings for Level 2 structures, some field investigation, and other related work.

C. Level 3 – Average Structure Design

1. Multiple span bridges;
2. Structural steel girder bridges designed using line-girder analysis;
3. Prestressed concrete beam bridges;
4. Substructures supported on typical foundations (pile or spread footings).
5. Continuous concrete slab bridges

The following activities may be required for any average structure type:

1. Designs for both new construction and bridge renovation;
2. Moderate construction staging;
3. Bridge preliminary and final design services;
4. Ratings for Level 3 structures, some field investigation, and other related work.

NOTE: MnDOT does not maintain a pre-qualification list for 'simple' structures, (i.e. less complex than Level 3). Examples would include box culverts and single span crossings.

D. Level 4 – Bridge and Structure Studies

1. This work involves evaluation of new or in-place structures (includes bridges, retaining walls, earthen or MSE walls, culverts, and other miscellaneous structures) and the preparation of studies and reports relating to the structures' design, construction, and/or maintenance issues.
2. Studies include but are not necessarily limited to:
   a. Field investigations;
   b. Structural, mechanical, and/or electrical analysis;
   c. Development of contractor-style new bridge or repair cost estimates;
   d. Structure life expectancy estimates;
   e. Development of design and construction specifications for non-standard projects;
   f. Historical considerations.

NOTE: Pre-qualification in Level 2 includes pre-qualification for Levels 3 and 4.
Pre-qualification in Level 1 includes pre-qualification for Level 4.

II. Standards and Specifications

Standards and specifications required for a project under this work type may include, but are not limited to, the following:

A. MnDOT LRFD Bridge Design Manual;
B. AASHTO LRFD Bridge Design Specifications;
C. MnDOT Road Design Manual;
D. AASHTO A Policy on Geometric Design of Highways and Streets;

E. Bridge Details Manual Parts I and II;
F. AASHTO Manual for Bridge Evaluation;
G. AREMA Manual for Railway Engineering.

III. Provided by MnDOT

Information to be supplied by MnDOT for a project may include, but is not limited to, the following:

A. Approved bridge preliminary plan;
B. Foundation geotechnical report;
C. Bridge survey;
D. Geometric layouts;
E. Road plans;
F. MnDOT design manuals and standards;
G. Hydraulic reports.

IV. Provided by Consultant

Deliverables to be supplied by the consultant for a project may include, but are not limited to, the following:

A. Bridge construction plans and documents; may include ratings or related work products. Deliverables may include, but are not limited to, some or all of the following:
   1. Certified final bridge construction plans, including non-standard special provisions, 100% complete and ready for construction contract bidding, and meeting all project specific requirements;
   2. Final reports, which may require certification, and meeting all project specific requirements;
   3. Bridge preliminary plans, 100% complete, as the basis for final bridge plan design and preparation;
   4. Computations and electronic design files in a format compatible with MnDOT's Microstation (latest version);
   5. Quantity calculations;
   6. Cost estimates and construction documents, including special provisions.

B. Consultant must check/verify bridge plans for conformance to MnDOT LRFD Bridge Design Manual and the consultant's documented Quality Management Plan (QMP). In some cases, this requires a complete, independent analysis. Consultant's QMP must address their methods of verifying their work, including review submittals, comments from previous submittals, and final deliverables. The project specific QMP must be developed in accordance with State's current QMP Manual, located at: http://www.dot.state.mn.us/design/qmp/index.html.

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Work Type Submittal Requirements

A consultant firm becomes pre-qualified based on the qualifications of the personnel that are employed by the firm and by meeting the demonstrated CADD requirements.

Key Personnel Requirements	
Minimum Number of Staff:	• At least two professionals for all work type levels. One of the professionals is required to perform independent checks of data, calculations and reports of the other. • Other support personnel (including CADD technicians).
Professional Certification/Licensure:	Professionals must be Minnesota Board Licensed professional civil or structural engineers.
Work Type Submittal Requirements*	
I. Resume and Relevant Project Experience Form (Form PQ1) ***Submit in Word format***	A. **Complete Parts 1, 1A, 2 and 3 of Form PQ1** **Part 1**: Fill out general information and names of personnel, including other professional and technical support personnel. Specify clearly what level pre-qualification is sought. **Part 1A**: Fill out one "1A" for each person listed in Part 1. • Level 1 Must demonstrate satisfactory experience on at least two certified bridge or structure plans designed according to LRFD design specifications of Level 1 complexity in the last ten years. • Level 2 Must demonstrate satisfactory experience on at least two certified bridge or structure plans designed according to LRFD design specifications of at least Level 2 complexity in the last ten years. For *Railroad Bridge Design*, consultant must also be on the approved list for that specific Railroad. • Level 3 Must demonstrate satisfactory experience on at least two Level 3 certified bridge or structure plans designed according to LRFD design specifications in the last ten years. • Level 4 Must demonstrate satisfactory experience on at least two Level 4 projects in the last ten years. Identify which Bridge Projects utilized *AASHTO's LRFD Design Specifications.*

	The qualified engineering personnel must have engineering training, experience, knowledge, and expertise in the appropriate areas necessary to do the project in accordance with AASHTO, FHWA, MnDOT, and all other applicable design policies, procedures, practices and standards. **Part 2:** Project Examples listed must correlate to those described below in "Project Example Requirements." **Part 3:** Bridge Design Software • Provide information on the design software the Firm utilizes for bridge or structure design. Examples include, but are not limited to, software packages used for prestressed beam design, straight steel girder design, curved steel girder design, segmental box girder design, pier design, and frame analysis. • Indicate which programs were used for each of the examples submitted. Quality Management Plan (QMP): • Submit a copy of *pertinent* sections of the Firm's Quality Management Plan (QMP) that address project and/or work types for which pre-qualification approval is desired. *Do not submit the entire QMP*. The QMP submittal must include the following: ❖ Methodology for checking and verifying the accuracy of work, including designs, plans, and information and data contained in special reports; ❖ Methodology for review of designs completed using vendor-supplied structural analysis and design software packages; ❖ Identification and a brief statement on the qualifications of the person responsible for each element of the quality control (QC) and quality assurance (QA) process, including software verification; ❖ Procedure for handling design development/changes in construction documents. • MnDOT reserves the right to request additional QMP information.
II. Project Example Requirements ***Submit in PDF format***	A. Submit relevant work examples as specified below (clearly mark/label each example as Level 1, 2, 3, or 4): • Levels 1, 2, and 3: Title sheet, General Plan and Elevation sheets, and no more than five additional representative sheets, that meet the qualifications for each level. • Level 4: Relevant work examples - each example should consist of no more than 20 sheets. To qualify as relevant work examples of key personnel, personnel must have been either the registered engineer who certified the plan as the Engineer of Record or a registered engineer with significant participation in

	plan preparation (i.e. plan sheets initialed for design and/or checking). It must be clear in the submitted examples what role each person had in each example. If a plan is not signed by the person put forth for pre-qualification, a certified statement must be included which details the role(s) and description of duties. Participation must be described clearly.
III. Proof of Professional Certification/Licensure ***Submit in PDF format***	A. Provide current copies of applicable Professional Certification/Licensure.
IV. CADD Requirements ***Submit in PDF format***	A. Complete, sign and notarize the following form, indicating the firm is capable of using MnDOT's Level 2 CADD Standards: http://www.dot.state.mn.us/consult/prequal/overview.html Once at website, click link for Affidavit for MnDOT's Level 2 CADD Standards

***Work Type Submittal Instructions**:

Create a CD or flash drive that includes the following individual files or folders in this order:

I. Resume and Relevant Project Experience Form (Form PQ1)
II. Project Example Requirements (this should be a folder that includes individual files clearly named according to Part 2 of the PQ1)
III. Proof of Professional Certification/Licensure
IV. CADD Requirements

Each file should be saved in the format identified above.
Submit 5 copies of the CD or flash drive.