

# SECIFICATION FOR INQUIK MODULAR BRIDGE SYSTEM

## 1.0 GENERAL

### 1.1 Scope

These specifications are for prefabricated, self-supporting components with pre-placed reinforcement and permanent formwork for cast-in-place reinforced integral concrete bridges, where the superstructure slabs and beams are combined to form a single structure. The components may include deck panels, abutments, wing walls and pier caps. These shall be regarded as minimum standards for design and fabrication. The work included under this item shall consist of design, fabricating, and transporting the prefabricated bridge modules. These specifications are based on system designed and manufactured by InQuik Inc.

### 1.2 Definitions

- *Owner*: Entity who will own the bridge.
- *Site Engineer*: Engineering Entity or Firm who will be representing the Owner.
- *Contractor*: Entity who will be installing the bridge.
- *Foundation Engineer*: Engineering Entity or Firm who will be designing and detailing the foundation system.
- *Geotechnical Engineer*: Engineering Entity or Firm who will be responsible for providing the Geotechnical information necessary to design the foundation system.
- *Bridge Manufacturer*: Firm who will be designing and supplying the bridge in accordance with this specification.

### 1.3 Qualified Bridge Manufacturer

Each Contractor is required to identify their intended supplier as part of the bid submittal. Qualified Bridge Manufacturers must have at least 3 years of experience supplying these types of structures.

Pre-Approved Bridge Supplier:

Commercial Metals Company (CMC)  
1-866-249-9661  
E-mail: [bridgesystems@cmc.com](mailto:bridgesystems@cmc.com)

Bridge Manufacturers, other than those listed above, may be used provided the Engineer receives a written request at least 10 days prior to the bid. The written request shall accompany the following information:

- Bridge Manufacturer's Product Literature,
- Name and resume of Bridge Manufacturer's design professional who will be signing and sealing the engineering submittals,
- Representative copies of detailed drawings, field procedures, calculations, quality control manual, welder's certifications
- Listing of projects including owner, location, size, year of fabrication, contact person

- Certification by the Bridge Manufacturer's Design Professional that the bridge proposed will be in accordance with all project development done up to the date of these specifications

The above will be evaluated by the Engineer for accuracy and ability to provide the bridge in accordance with these specifications. Bridge Manufacturers other than those listed above may only be used if the Engineer provides written approval via addendum 5 days prior to the bid. The Engineer's ruling shall be final.

#### 1.4 Bridge Manufacturer's Design Professional and Submittals

The Bridge Manufacturer shall employ or retain an engineer who is experienced in bridge design to be responsible for all engineering related tasks and design. The engineer shall have a minimum of 5 years of experience in bridge design and be a currently licensed civil or structural Professional Engineer in the State of New York and shall be the Professional Engineer who will seal and sign the structural plans.

Engineering drawings shall be prepared by the Bridge Manufacturer and submitted for review after receipt of the order and deposit. Submittal drawings shall be unique drawings, prepared to illustrate the specific sections of the bridge being fabricated. All relative design information such as component size, ASTM/AASHTO material specification, dimensions necessary to fabricate and required welding shall be clearly shown on the drawings. Drawings shall have cross referenced details and sheet numbers. All drawings shall be stamped, signed and dated by the Bridge Manufacturer's Design Professional.

Structural calculations for the design of the bridge superstructure shall be prepared by the Bridge Manufacturer and submitted for review after receipt of the order.

Drawings and Calculations shall be submitted within eight weeks after receipt of the order.

## 2.0 APPLICABLE CODES AND STANDARDS

### 2.1 Governing Specifications

Bridge shall be designed in compliance with the AASHTO LRFD Bridge Design Specifications, 9<sup>th</sup> Edition, 2020 (*AASHTO LRFD*). Calculations shall be in accordance with this document, and formulas shall reference the appropriate sections.

### 2.2 Other Reference Codes, Specifications and Standards

- AISC, Steel Construction Manual, 15<sup>th</sup> Edition, 2017 (*AISC*)
- American Welding Society, Structural Welding Code, D1.5, 2015 (*AWS D1.5*)

## 3.0 BRIDGE GEOMETRY

### 3.1 Width and Span Length

(Per project requirements)

### 3.2 Camber

Deck units shall have a vertical camber dimension at the mid-span equal to the anticipated full dead load deflection. Additional finished road surface camber shall be

determined by the site engineer

## **4.0 STRUCTURAL DESIGN LOADS**

### 4.1 Dead Load

Dead loads will be determined based on the site-specific structural and site design

### 4.2 Vehicle Load

Bridge shall be designed for highway traffic, supporting HL-93 design vehicle

### 4.3 Owner Specified Vehicle

Bridge may be designed for an Owner Specified Vehicle.

### 4.4 Wind Load

The wind load that is applied horizontally shall be as specified in AASHTO LRFD BDS Table C3.8.1.2.1-1

### 4.5 Seismic

Seismic loads shall not be considered or included in the design.

### 4.6 Fatigue Load

The fatigue loading shall be as specified in *AASHTO LRFD* Article 6.6.

### 4.7 Combination of Loads

The load combinations and load factors to be used shall be as specified in *AASHTO LRFD* Table 3.4.1-1.

## **5.0 STRUCTURAL DESIGN CRITERIA**

### 5.1 Deflections

Per the *AASHTO LRFD* Article 2.5.2.6.2, vehicle load deflection limits are considered optional and are not being used. However, the Bridge Manufacturer will provide an anticipated vehicle load deflection of no more than  $\text{Span}/500$ .

### 5.2 Wheel Load Distribution

The structure shall be designed to support the maximum wheel load from the HL-93 design vehicle. For HL-93 design vehicle or owner specified vehicle, distributed over an area of 20x10 [in] as prescribed by AASHTO LRFD BDS

## **6.0 MATERIALS OF CONSTRUCTION**

### 6.1 Formwork Steel

All formwork steel shall meet Buy America requirements

Formwork shall be any one of the following based on Owner's preference:

- ASTM A588 Weathering Steel
- ASTM A1046 Zinc Alloy Coated Steel
- ASTM A240 Stainless Steel

## 6.2 Reinforcing steel

Reinforcing steel shall be ASTM A706 Grade 60, plain, stainless or hot-dip galvanized as required

## 6.3 Concrete

Concrete shall have compressive strength per the structural engineer's site-specific design

# 7.0 GUARDRAIL

## 7.1 Guardrail Type

(per site engineer's specification)

# 8.0 BEARINGS

## 8.1 Elastomeric Pads

The bearings were assumed to be 1in thick with 2 layers of 0.075in steel plates, 0.25in of cover, and an elastomeric layer thickness of 0.5in

# 9.0 FOUNDATIONS

Foundation system design by site engineer subject to conformance with bridge component structural design

# 10.0 FABRICATION

## 10.1 Welding

Welding procedures and weld qualification test procedures shall conform to the provisions of *AWS D1.5*. Filler metal shall be in accordance with the applicable *AWS Filler Metal Specification* and shall match the corrosion properties of the base metal.

## 10.2 Welders

Welders shall be qualified for each process and position used while fabricating the bridge. Qualification tests shall be in accordance with *AWS D1.1/D1.5*. All weld qualifications and records shall be kept in accordance with the Fabricator's Quality Assurance Manual.

## 10.3 Splices

The bridge will be fabricated in sections. Sections shall be field assembled using splice rebar connections as indicated on the drawings.

## **11.0 QUALITY CONTROL**

### 11.1 Certified Weld Inspector

The Bridge Manufacturer shall employ at least one Certified Weld Inspector (CWI), with endorsement by AWS QC1. At least one CWI shall be present during the fabrication of the bridge. The CWI shall provide written documentation that the bridge has been fabricated in accordance with these specifications and the approved design drawings.

### 11.2 Documentation

Material Certifications shall be available for review for all formwork and reinforcing steel to include traceability of heat numbers.

Documentation showing the performance of all critical quality checks shall also be made available for review by the Engineer or Owner.

### 11.3 Non-Destructive Testing

All welds within the structure, shall be visually inspected for conformance to size, under cut, profile and finish.

## **12.0 DELIVERY AND ERECTION**

### 12.1 Delivery

Delivery shall be made via truck to a location nearest the site which is accessible to normal over-the-road equipment. All trucks delivering bridge materials will need to be unloaded at the time of arrival. If the erection Contractor needs special delivery or delivery is restricted, he shall notify the Bridge Manufacturer prior to bid date. This includes site issues which may prevent over-the-road equipment from accessing the site. Steerable dollies are not used in the cost provided by the Bridge Manufacturer. Determining the length of bridge section which can be delivered is the responsibility of the Contractor and shall be communicated to the Bridge Manufacturer prior to the bid date.

### 12.2 Installation & Lifting Procedures

The Bridge Manufacturer will provide standard typical written procedures and limits for lifting and splicing the bridge. All actual methods, equipment and sequence of installation used are the responsibility of the Contractor. Each module shall be lifted from the lifting points identified. Attach rigging to lifting points with adequately sized rigging hardware. Rigging materials and methods are the responsibility of the Installer.

### 12.3 Loose Items

Guardrails (if provided) will be shipped loose for field installation as shown on plans.

Splice bars will be shipped loose for field installation as shown on plans.