

737 – CONTROLLED DEMOLITION

SECTION 737

FIELD ERECTION

737.1 DESCRIPTION

Evaluate project characteristics and develop unique Field Erection Plans for each qualifying structure within the Contract Documents according to this specification.

For the purposes of this specification, erection is the process of transporting, handling and assembling the bridge components to result in a bridge structure that meets all the geometric and structural requirements of the Contract Documents.

737.2 ERECTION SUPERVISOR

The Erection Supervisor is the person responsible for all rigging and handling of bridge primary members. The Erection Supervisor shall be present at the erection site during the erection of all primary members of Category B & C Structures.

All Erection Supervisors must be pre-qualified. To become pre-qualified, provide proof of experience that the Erection Supervisor has a minimum of 5 years experience and at least 10 projects similar in scope, type and complexity.

KDOT will maintain a list of approved Erection Supervisors on a Pre-Qualified List.

At the pre-construction meeting, submit to the KDOT Field Engineer proof of pre-qualification for the scope, type and complexity of the structure to be constructed.

737.3 ERECTION PLANS

a. General. The Contract Documents will indicate the field erection category for each structure. Submit shop drawings according to **SECTION 105**.

KDOT will review the Erection Plan for all Categories, and either decline, or recommend for approval. The Engineer must approve the Erection Plan before work may begin. The level of review and the requirements for submittals by the Contractor to the Engineer are categorized by risk and complexity. **FIGURE 737-1** defines the 3 categories for field erection.

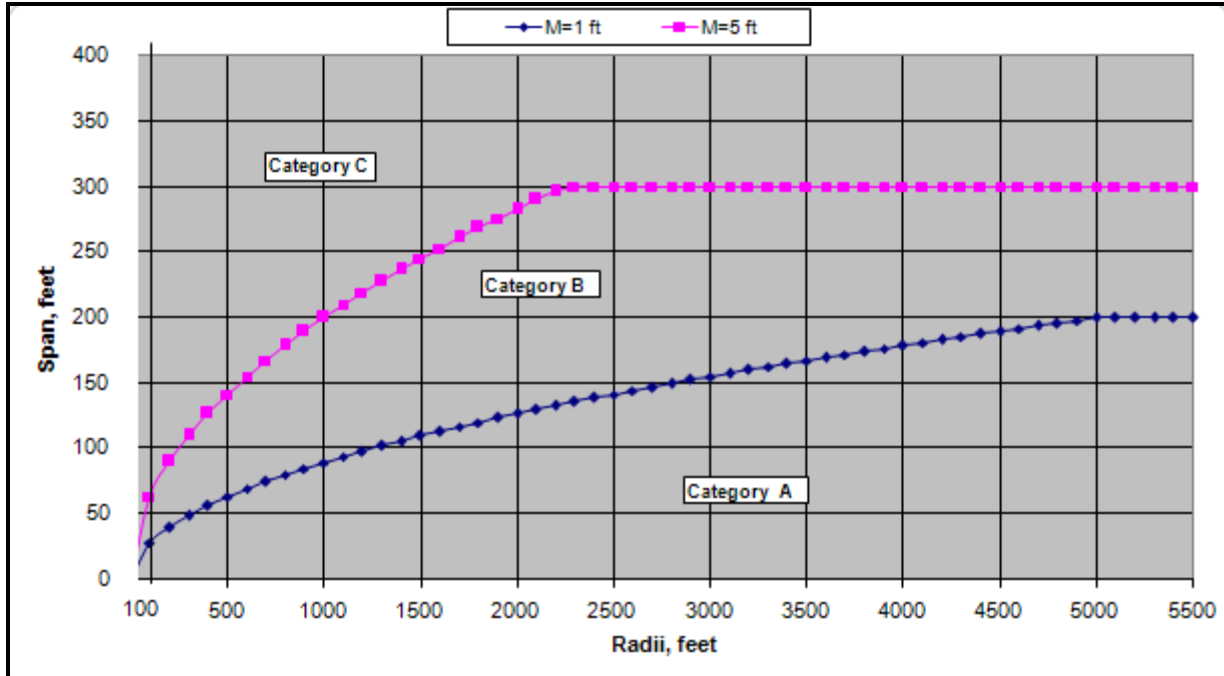


FIGURE 737-1

Special Requirements for Bridge Designers to Designate Erection Plan Categories

The initial Category is based on the chart which considers the length of the longest span, the curvature of the bridge and the skew angle.

If skew is greater than 30° , move up one Category (A to B or B to C).

If a structure crosses traffic or a railroad, require Category B as a minimum.

If the Contractor uses falsework bents or strong-backs for the field erection, Category C Erection Plans are required.

The designer may elevate a structure to the necessary Category based upon engineering judgment and unique circumstances.

b. Definitions and Submittals.

(1) Category A Erection Plan Requirements. Submit 1 copy of the detailed Field Erection Plans to the Field Engineer. At a minimum, include the following:

- Shop details, camber diagrams, list of field bolts, and shipping statements showing a list of parts and their respective weights
- Proposed methods of erection
 - A list of all equipment that will be used
 - Crane pick locations and loads
 - Falsework plans
 - Temporary bracing requirements
- Blocking diagrams
- Specific details for structural erection shall be clearly defined
 - Spliced pieces
 - Multiple girders
 - Pick descriptions
 - Bolting locations
 - Number of fully tightened bolts at each splice
 - Cross-frames or diaphragms
 - Anchor bolts
 - Temporary bracing

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(2) Category B Erection Plan Requirements. Meet the Category A Field Erection Plan Requirements in **subsection 737.3b.(1)** above. In addition, submit the detailed Field Erection Plans according to **SECTION 105** to the State Bridge Office (or Bureau of Local Projects) at least 4 weeks before beginning the erection process.

List on the Field Erection Plans the Erection Supervisor that shall be present at the site during the erection of all primary members.

Field Erection Plan development, authority, and responsibility fall under 3 separate Field Operations:

- **Traffic Control (Field Operation One):**

This is site and structure specific control of traffic movements relative to the structural erection operations.

- This portion of the operation is developed by the Contractor's personnel and will be reviewed and approved by KDOT's Field Engineer.
- Field changes are under the authority of the Field Engineer.

- **Pick and Place (Field Operation Two):**

This includes crane movements, rigging operations, storage, assembling, loading and unloading operations of primary, secondary and falsework members. This includes placing the assemblies into the structure.

- This portion of the operation requires procedures, calculations and drawings and is developed by the Erection Supervisor.
- All field operations and field changes are under the authority, and the responsibility, of the Contractor's Erection Supervisor.

- **Part of Permanent Structure (Field Operation Three):**

Defined as the point in time when the primary member becomes part of the structure. When the primary member is released from the rigging or when it rests solely on the bridge bent, bearing device or falsework bent as a part of the uncompleted structure, the primary member is considered to be part of the Permanent Structure.

- This requires calculations, procedures and drawings to be developed and sealed by the Contractor's Professional Engineer.
- Field changes must be approved and resealed by the Engineer who originally developed the plans before work begins. This work is under the authority of the Contractor's Professional Engineer.

(3) Category C Erection Plan Requirements. Meet the Category B Field Erection Plan Requirements in **subsection 737.3b.(2)** above. Additionally, there will be a pre-erection meeting before erection operations begin. The Erection Supervisor shall attend this pre-erection meeting to discuss any field concerns related to the erection procedures and to increase familiarity with each structure site.

c. Calculations.

The calculations, as a minimum, shall include the following information:

- Calculations to substantiate structural adequacy and stability for each stage of erection, accounting for the structures lack of completeness or complex structural geometry.
- Calculations to determine translations and rotations at intermediate erection conditions.
- Design calculations indicating and verifying the load capacity, the stability of all temporary supports, falsework bents, and bracing when used to allow traffic to travel under the incomplete structure.
- Calculations indicating structural redundancy of the incomplete structure shall be required at specific stages of erection. These calculations shall be required to account for unforeseen obstacles to the erection process that necessitate halting erection at an undesignated stopping point.

737.4 ERECTION INFORMATION

Submit a detailed Erection Procedure to the Owner for each bridge structural unit. In the Procedure, address all requirements for erection of the structure into the final designed configuration and satisfy all written Owner comments prior to the start of erection. As a minimum, include the following in the Erection Procedure:

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a. The Contractor's Engineers shall provide the following information:

- Plan of the work area showing permanent support structures (piers and abutments), roads, railroad tracks, waterways (including navigational channel), overhead and underground utilities and other information pertinent to erection.
- Erection sequence for all members noting any temporary support conditions, such as holding crane positions, temporary supports, falsework, etc. Member reference marks, when reflected on the erection plan, should be the same as used on shop detail drawings.
- In the Field Erection Plans, describe the number, location and bolting requirements for the permanent cross-frames or diaphragms for each stage of construction.
- In the Field Erection Plans, address the expected condition of each bearing device for each stage of construction. State the minimum number of positive bearing connections or supplemental connections to each bent cap which will resist all potential destabilizing forces.
- In the Field Erection Plans, address traffic control and railroad issues.
- If falsework bents or strong-backs are used, the Field Erection Plans shall meet falsework requirements as defined in **SECTION 708**.

b. The Contractor's Erection Supervisor shall provide the following information:

- Location of each crane for primary picks showing all necessary information.
- Capacity chart for each crane configuration.
- Center of gravity, lift weight (including rigging) for all primary member picks.
- Primary member site delivery location and storage orientation.
- Details of any temporary lifting devices to be bolted/welded to or cast in to permanent members, including method and time (shop or field) of attachment, capacity and method, time and responsibility for removal.
- Temporary support details for bridge bearings.

c. The Owner's Inspector shall require the following:

- Requirements for bracing. At the end of the workday, remove the members not properly braced in compliance with the Field Erection Plan from the bridge substructure elements.
- All rigging must have capacity stamps, tags or be otherwise permanently marked on the device (per OSHA Standards)

737.5 CONSTRUCTION REQUIREMENTS

No erection work may begin without an approved Field Erection Plan. The Contractor is responsible for the erection, even though the Field Erection Plans have been approved by the Engineer. See **SECTION 105**. Keep the approved Field Erection Plans available on site at all times.

Before erection begins, resolve any questions that any party may have.

Prepare a Contingency Plan if the number of stable girder lines to be erected does not meet the Field Erection Plan number for a sequence proposed. (i.e. the plan says 6 girder lines and because of problems, 5 girder lines where erected before traffic delay penalties accrued).

It is required that all traffic must be stopped while overhead erection work involving the placement of primary members into the permanent structure is being performed. No members shall be suspended over highway traffic at any time during loading, unloading, moving, rigging or placing. In no case will KDOT allow highway/railroad traffic to travel under uncompleted structures without compliance of Field Operation Three above.

Erect the fabricated structure and perform all work required to complete the structure as specified in the Contract Documents. Provide all falsework, tools, machinery and appliances required to complete the work. After the structure is erected, remove all falsework, appliances and other obstructions or debris resulting from erection.

Provide the Engineer with safe means (such as scaffolding, safety lines, snoopers or hoist buckets) to inspect any portion of the structure during the erection operations. The Engineer will refuse permission to proceed with erection work if the erection process is determined to be unsafe or substantially different than approved Field Erection Plans.

737.6 MEASUREMENT AND PAYMENT

Erection is considered complete when all field connections are completed to the final design condition and falsework is removed. The Engineer will not measure Field Erection and Field Erection Plans for separate payment.