STEEL FABRICATION PLANT SHOP INSPECTION

GENERAL

This Instructional Memorandum shall be used by the DOT Steel Plant Inspector to carry out various phases of structural steel inspection in fabricating shops. The essential sections in this memorandum include prefabrication meeting, storage and handling of materials, cutting of steel, straightening materials, assembly, machining, shop drawing, design drawing, design laydown inspection, secondary members, cleanup, blast cleaning and painting.

I. PREFABRICATION MEETING

When requesting a prefabrication meeting, the fabricator shall notify the Office of Materials in Ames four weeks in advance of the proposed meeting date. The final date shall be mutually agreed upon.

The DOT inspector shall initiate this meeting prior to commencement of any shop fabrication. The inspectors and supervisors of both the fabricating plant and the DOT shall attend this meeting.

The following items should be discussed during the meeting:

A. Work Schedule: The work starting date and the anticipated work schedule should be covered to allow the DOT to plan for and schedule its inspection. It is also expected that when planned work schedules are changed or are firmed up, the fabricating plant will notify the proper DOT representative in advance (at least 30 days in advance).

B. Specifications - Design Drawings - Shop Drawings:

   The letting date of the DOT contract determines what specifications govern. The applicable specifications shall be reviewed to clarify the revisions and deletions, which are pertinent to the work, which is to be done.

   Both the fabricator and the DOT representatives should have reviewed the design drawing previously. Any questions shall be clarified, and if an immediate answer is not available, the question will be noted and an answer will be made available to all concerned as soon as possible.

   The shop drawings for any work in the fabricating plant shall be submitted to the proper department or individual for checking and approval. It is understood that any work done in the fabricating plant without approved drawings is at the fabricating company's risk and no final inspection for acceptance shall be made on any material by the DOT inspector without an approved shop drawing(s) for the material in question. Shop inspection without approved or revised drawings does not constitute approval.

C. Purchase Orders - Material Acceptance: All parties should understand the method of material testing and/or acceptance by certification. This is covered under IM 562, Materials Inspection.

D. Material Storage and Handling: Care must be taken in the manner in which material is blocked while stacked so that there will be no detrimental bending or kinking of the material. The fabricating plant shall be required to use adequate equipment in moving material, either before or after assembly, so damage to the material does not occur.

E. Welding Requirements: The requirements in the specifications concerning qualifications of welders, welding operators, tackers, welding materials, and procedures shall be covered. This information may be found in IM 561. The implications of the limited use of tack welds shall be covered, along with the requirements of preheating of tack welds. Welding equipment shall be in proper working condition. Gauges, which indicate amperage, voltage and/or travel speed, shall be calibrated routinely to verify their accuracy.

F. Shop Errors: The fabricator must report any fabrication errors or materials discrepancies to the DOT Inspector. The fabricator shall submit the suggested repair method. Final approval of the repair method shall be by the Structural Materials Engineer.

G. Acceptance of Materials:

1. All steel materials shall be melted and manufactured in the USA. The fabricator shall certify that these materials are of domestic origin.

2. Defects in pieces or members

    a. Laminations shall be corrected in accordance with AWS D1.5 Bridge Welding Code, Section 3.2.3 unless otherwise specified by specification for the specific bridge. Unless specifically authorized by the Structural Materials Engineer, no welding repair of laminated pieces shall be made.

    b. All other discrepancies in pieces or members such as kinks, excessive camber or sweep, scabs or other internal or external defects shall be brought to the attention of the engineer for disposition along with the corrective methods suggested by the fabricating plant to correct them.

3. Material Identification - The method of material identification and documentation used by the fabricating plant shall be discussed. The method used shall be such that the identity as to heat and grade for any piece or any member is maintained throughout the fabrication plant.

    a. Transfer of heat numbers and grade numbers of steel:

        1) When pieces are cut from larger pieces, the heat and grade shall be transferred to all the pieces before they are moved from the cutting bed or area.

2) Heat and grade numbers may be steel stamped or painted on all webs, flanges and cover plates on the near side at the X end of the piece (or sub-section of webs or flanges) and visible after assembly, and out of the areas covered by splice plates.

H. Heat Correcting of Material: Heat correcting of material or fabricated members may be needed from time to time during the fabrication process. Any heating to be done shall be with the approval of the engineer. The engineer or his representative shall be notified when any approved heating is to be done so that inspection by the DOT representative may be made during the heating. It is also stressed that the technique used in heating is very important and in no case shall the steel be heated to over 1200°F (650°C). It is also very important that the steel that has been heated shall not be cooled by any means other than normal air-cooling.

When heat curving or cambering is required, the fabricator shall submit a procedure to be approved by the Structural Materials Engineer.

I. Material Cutting: The methods of cutting structural steel in the fabricating plant are limited by the specifications. Any questions concerning material cutting should be clarified during this meeting. It should be stressed that oxygen cutting be done only with mechanically guided equipment and that freehand cutting be done only with the approval of the Structural Materials Engineer.

Grinding is considered an integral part of every cutting operation. Workmanship and finish shall be first class in all respect.
Note: All edges shall be smooth, uniform, and properly trimmed.

J. Shop Drawings & Welding Procedures: Welding procedures are considered an integral part of the shop drawings and they shall be distributed as part of the shop drawings. No welding may be started without the welding procedures being approved for each individual contract or job.

The sets of shop drawings that are sent for approval shall contain one set for the DOT inspector. This set shall be distributed to the responsible DOT representative at the same time that the initial check set is returned to the fabricating plant's drafting department for either printing or correction and resubmitting for approval. The DOT Office of Bridge Design will also furnish the shop inspector a final approved drawing at the time of normal distribution of the shop drawings.

K. AWS Requirements for NDT Testing: Only qualified personnel may perform NDT testing. This is clarified in the AWS D1.5 Specifications, Section 6.1.3.4.

L. Charpy Test Requirements: The structural steel of main members shall meet the charpy impact test requirements. The main members are usually defined as follows:

1. Flange and web plates of welded plate girders; rolled section main beams stringers and welded cover plates.

2. Flange and web splice plates.

3. Rolled or welded floor beams, abutment diaphragms, stiffener bars, and cross frames carrying direct live loads.

4. Lateral bracing and connecting gusset plates in horizontally curved bridges.

5. The project plans may also designate other members as main members.

Charpy tests made at the mill and included in the Mill Test Reports are preferred but tests run on material not tested at the mill, but run by recognized testing laboratories will be acceptable.

M. Cleaning and Painting: The cleaning and painting requirements of the structural steel shall be reviewed.

N. Prerequisites for Laydown Inspections: The following items are considered necessary prerequisites for a DOT inspector to make a design detail laydown inspection:

1. All stiffeners shall be in place and welded to the webs.

2. All connecting holes, except the field splice holes shall have been made.

3. The locations of the field bolt splice holes in the splice plates shall have been punch marked or shall have been subpunched, subdrilled or predrilled full size.

4. The proper blocking for horizontal and vertical placement of the members in the laydown shall have been made.

O. Final Inspection of Structural Steel. All main girders and beams will be given a final inspection after painting by the DOT inspector and if the member is found to be satisfactory it will be stamped near the piece identification mark with an appropriate stamp. No girder or beam shall be shipped to the job site without this inspection stamp.

P. Documentation of the Prefabrication Meeting: Minutes of the meetings shall be recorded and they shall include any questions and answers and points that have been agreed upon by those present. Copies shall be distributed to all in attendance.

II. SHOP STORAGE & HANDLING OF MATERIALS

Care shall be taken in the storage of structural steel material both before and after fabrication. Blocks shall be placed directly over any blocks lower in a stack. Material and/or members shall be handled with proper equipment and in such a manner to prevent distortion or bending. Care shall be taken to minimize handling marks, especially chain marks on flange edge corners. Guard devices may be required to prevent or minimize these flange chain notches.

III. CUTTING OF STEEL

A. Oxygen Cutting: Oxygen cutting shall be done only when steel in the area of the cut is above 40°F (4.4°C) and in a surface-dry condition. However, different projects may have specific preheating requirements for oxygen cutting. The AWS Specifications, Section 3.2, gives the tolerances for roughness and corrections require for notches and gouges caused by oxygen cutting. There will be no corrections of oxygen cutting defects by welding without the approval of the engineer. Any weld repairing of oxygen cutting defects shall be done in compliance with the specifications, particularly the preheat requirements. Plates shall be cut so that the direction of stress in main members is in the direction of rolling, except web splice plates and bearing stiffeners, which are required to be bent. Bent plates shall be cut so that the bend is at right angles to the direction of rolling. Before bending, the corners of the plate shall be rounded to a radius of 1/16 in. (1.6 mm) throughout the portion of the plate at which bending is to occur. When pieces are cut from larger pieces, the heat and grade numbers shall be transferred to all the pieces before they are moved from the cutting bed or area. All corners of oxygen-cut edges of main stress-carrying members, except bearing stiffeners and girder webs, shall have a 1/16-in. (1.6-mm) radius or equivalent flat surface at a suitable angle. All other corners of oxygen-cut or sheared edges shall be dulled by grinding. Oxygen-cut edges shall be free of burning slag and scale.

   Laminations and other discontinuities discovered on cut plates shall be examined, and the acceptability or the correction of any unacceptable discrepancies shall be based upon the requirements of section 3.2.3 of the AWS Code.

   NOTE: Piping laminations or discontinuities which are discovered in the cut face of a joint to be welded and are located at approximately mid-thickness, and are less than one inch visible width, may be sealed prior to the welding of the joint. For further information, see IM 561, Welding.

B. Shearing: The maximum thickness for sheared bearing stiffeners is 5/8 in. (16 mm). Items, which may not be sheared, are webs, flanges, flange splice plates, main stress carrying stiffeners and gusset plates for lateral bracing in horizontally curved bridges. All sheared exposed edge corners shall be dulled by grinding.

C. Sawing & Machining: Cold sawing and machining may be used in place of oxygen cutting if the roughness tolerances are met. Planing done with a plate edge planer is not considered machining in this instance. This type of planing is considered equivalent to shearing. Edge corners of sawed or machined surfaces are to be dulled by grinding.

D. Grinding: On the surfaces of girders, which receive web to flange welds, all mill scale shall be removed. The cut edge of the web in a web to flange joint shall be left free of slag. This will normally require grinding. Transition weld surface finishes shall not exceed ANSI 250 (6.25 µm). Surfaces finished to values of 125 – 250 (3.125 - 6.25 µm) shall be finished parallel to the direction of primary stress. Surfaces finished to values of ANSI 125 (3.125 µm) or less may be finished in any direction subject to the following additional requirement: butt joints between parts subject to tensile stress, whether joining parts of equal or unequal width or thickness, shall be finished flush or to a smooth transition to a roughness not exceeding ANSI 125 (3.125 µm).

E. Holes - Drilling, Punching, & Reaming: Holes in main stress carrying members and their end connection plates shall not be punched full size. The main members are those as listed in Article 2408.04 of the Standard Specifications and as revised by Special Provision. For detailed specifications concerning bolt holes, see Standard Specifications, Articles 2408.17 and 2408.18. Misplaced holes may be considered as a basis for rejection and shall be repaired only with the approval of the engineer.

NOTE: Prior approval shall be required.

IV. STRAIGHTENING OF MATERIALS

A. Mechanical Straightening: Straightening of bent material is covered in DOT Standard Specifications, Article 2408.36. Distorted members shall be straightened by mechanical means or, if approved by the engineer, by the carefully planned and supervised application of a limited amount of localized heat. All material shall be straightened before assembly into a member. Specifically, webs, flanges or cover plates, which contain sharp bends, caused either by handling or butt welding, shall be straightened before assembly into a member.

B. Heat Straightening & Cambering: Heat correction of distortion of plates or members shall only be done with the approval of the engineer. Initial cambering of welded girders by heating is not allowed. Heat cambering of rolled beams shall be done according to the Standard Specifications, Article 2408.16.

In the heat cambering of the majority of rolled beams, because of their size, multiple torches are required to achieve compliance with the above specification.

The DOT inspector must be notified and the engineer's approval received before any heat straightening, cambering or correction of distortions is done.

C. Heat Curving: When heat curving is required, the fabricator shall submit a procedure to be approved by the engineer. The Iowa DOT inspector shall be notified before any heat curving is done.

V. ASSEMBLY

A. Welded Girders

1. Butt welding of flanges and webs: See IM 561.

2. Radiographs: Two sets of radiographs shall be taken for welds subject to radiographic testing. One radiograph of each test shall, upon completion of QC and QA interpretation, be forwarded to the Office of Materials, Ames, Iowa for final disposition. The contractor as part of onsite inspection records shall retain the second set of radiographs. Upon completion of the project, this second set will become the property of the contractor.

3. Alignment and fit up of web to flange: Specifications covering assembly in AWS shall apply. The pieces shall be brought into as close contact as possible.

   The tolerances for the allowable amount of gap between pieces is considered to be applicable only in localized areas and are not intended as a general tolerance. A condition considered applicable would be a gap, which was caused from the grinding correction of a notch, or gouge in the oxygen cut web edge. All notches and gouges in oxygen cut web edges must be corrected before assembly to the flanges. The slope of the faired out edges shall not be greater than 1 to 10. See AWS 3.3.1 for increased weld size requirements when a gap exists. Defects in cut edges shall not be repaired by welding without the approval of the Structural Materials Engineer.

   The tolerance for the variation between the centerline of the flange and the centerline of the web is 1/4 in. (6 mm) maximum. Proper fit and assembly procedures shall be followed to assure that after web to flange welding; the combined warpage and tilt of the flanges shall not exceed the allowable tolerances.

4. Tack Welds: The tack welds used in the assembly of welded girders shall be kept to the minimum size needed to be effective. Tack welds shall be subject to all requirements of final welds with those exceptions listed in AWS. For the exemption from preheating requirements of tack welds which are "remelted and incorporated into continuous submerged arc welds," tests may be made to ascertain that the tack weld in question is actually remelted fully by the final welding procedure to be used.

   When broken tacks are discovered either before or during the final welding process, they shall be removed. Welding over broken or cracked tack welds is not allowed. Tack welds not incorporated in final welds are allowed only where and as shown on approved assembly procedure sketches or drawings which have been submitted and approved by the engineer (See IM 561). Tack welds on run-off tabs are prohibited at locations outside the weld area.

5. Member Material Identification and Measurement: At the time of assembly, if not before, and before any final web to flange welding is done, the girder identification number shall be placed on the member.

   a. The physical condition of the webs and flanges will be inspected for surface discontinuities such as scabs, fins, nicks, gouges, etc. The fit up of the members will be checked for compliance with specification tolerances.

   b. The DOT inspector shall make the cross sectional dimension measurements of the member.

      1) Flange width in inches to the nearest 1/16 in. (1.6 mm)

      2) Web depth in inches to the nearest 1/16 in. (1.6 mm)

      3) Flange and web thickness to the nearest .001 in. (25 µm)

   The heat numbers of all the member pieces shall be recorded in the DOT shop records.

6. Web to Flange Welding: Refer to IM 561.

7. Addition of Detail Material: Detail material which have cut edges, which require grinding and which would be difficult or impossible to grind after assembly shall be ground before assembly. The tack welds for attaching detail materials shall comply with the applicable preheat requirements.

   All stiffeners shall be inspected for compliance with the drawings in regard to degree of fit to the flanges. A "close" or "tight" fit is regarded as one having a maximum gap of 1/16 in. (1.6 mm). The fit of the stiffeners to flanges, the joints of which shall be welded, shall be inspected to assure that the desired welded joint will be achieved.

B. Rolled Beam Members

1. Member Material Identification and Measurements:

   The beam identification number shall be placed on the beam before any cover plates or detail material is attached to it. The beam shall be measured for flange width, average flange thickness, beam depth and web thickness. These readings and the heat number of the beam shall be recorded in the DOT shop records. When necessary, heat numbers of cover plates shall be transferred so that they will be on the outside surface after they are attached to the beam. The width and thickness of each cover plate shall be measured and recorded in the DOT shop records. The heat number of the cover plate will also be recorded.

2. Main beams in simple span bridges shall be precambered before the cover plate is added to it to minimize the amount of cambering or camber correction required after the cover plate has been added and final welding.

3. The cover plate ends shall be properly beveled, and when called for the corners shall be clipped (and ground) prior to addition to the beam.

4. When the cover plate(s) are fit up to the beam, they shall be clamped into as close contact as possible before tacking.

5. The edges of the cover plate or beam, on which welding is to be done, shall be examined and trimmed where necessary to produce satisfactory welding.

6. Welding of Cover plates to Beams: Welding shall be in a direction from a fixed position to that of a relatively free position. Cover plate end welds shall be made only after the longitudinal welds have been made. Drawings should be carefully checked to determine the termination location of longitudinal welds in relation to transverse cover plate welds. Care must be taken not to weld over the edge of a beam flange at the end of a cover plate. (See AWS 3.4 for more detailed specifications concerning the welding of assembled members).

7. Addition of Detail Material: Same as for welded girders listed previously.

8. Grinding of Cover plate End Welds: Grinding of the transition welds at the ends of cover plates shall be done according to the grinding specifications.

   Care shall be taken so over grinding does not result at the transition welds. The maximum thinning of the beam flange due to grinding is 1/32 in. (0.8 mm) or 5% of the flange thickness, whichever is smaller. The weld shall not be overground as to reduce its effective throat size below what is called for on the drawings.

9. Holes in Beam Webs: For information on holes in beam webs, see Subsection E in Section 3, Cutting of Steel.

VI. MACHINING INSPECTION

A. Material Compliance to Specifications

1. Cold Rolled Bars: Cold rolled bars may be approved based on mill certifications provided that they include tensile requirements test results. Cold rolled bars may also be approved based on sampling and testing. Material which has been previously approved may be placed into stock and when actually used may be reported as "from approved stock."

2. Iron Castings: The casting numbers, pour numbers (when used) and pour dates, which are found on the castings, shall be verified with the numbers and dates noted on the DOT laboratory test reports.

   The test reports must be checked to make sure that the casting meets the grade requirements, which have been called for on the drawings. A visual inspection of the casting surfaces should be made before the machining operation is begun.

3. Steel Castings: When steel castings are called for on the drawings, the Ames Materials shall be consulted as to the manner in which the material acceptance will be handled.

4. Bronze Castings: When a steel fabricating plant orders bronze bearing plates, a copy of the purchase order shall be sent to the Ames Materials Office. The purchase order should include the grade of bronze and DOT Spec. Number, county, design number and project number. The Ames Materials Office will arrange for the producer to submit samples and test analysis of each pour. When the producer delivers the actual bearing plates to the steel fabricating plant (or other destination), they shall be sampled at the rate of one piece per each pouring lot. This sample is sent to the DOT Testing Laboratory in Ames, which inspects the casting for dimension graphite depth, and its hardness is checked for a verification check with the hardness test result on the representative producer's sample. The receiving inspector (in the shop or field) should have both test reports before the material may be considered acceptable.

5. Rolled Steel Plates: Hot rolled steel plates, which are to be machined, are accepted in the normal manner of acceptance of the mill certification along with visual inspection of the plates for visible defects.

6. Other Materials: The DOT Materials Office in Ames should be contacted when any other type of bearing material is encountered so that a satisfactory method of testing and/or acceptance may be arranged.

B. Machining

1. Flatness: Paragraph 3.5.1.9 of the AWS code spells out very specific tolerances for flatness on the outside flange surfaces of girders at bearing points. (There are times that these areas are required to be machined).

   In the Standard Specifications, Article 2408.21, Facing Bearing Surfaces, one sentence reads "Curved sole plates shall make full-line bearing with masonry plates, ----- member". Another sentence reads, "Bottom surfaces of masonry plates that are to be placed in contact with concrete shall be free from warps and other projections".

   These two sentences give an implied tolerance. The intent is to have as much full line bearing or full area bearing as possible rather than point loading bearing situations. Another sentence reads, "The tolerance for flatness for all bearing material in contact with other material except as otherwise indicated shall be 1/32 in. in 12 in. (1 mm in 400 mm) and 1/16 in. (2 mm) tolerance overall".

A masonry plate, which meets the 1/32 in. (0.8 mm) and 1/16 in. (2 mm) tolerance, listed above and which would deflect during loading and would then comply with the previous contract specifications, would be an example of an acceptable degree of flatness.

2. Degree of Finish: The tolerance for degree of surface finish is found in Standard Specifications Article 2408.21.

3. Direction of Finish: In Article 2408.21, the sliding bearing contact surfaces are to be finished to an ANSI 125 (3.125 µm) finish with the cut of the tool in the direction of movement. Sliding bearing contact surfaces with an ANSI 63 (1.5625 µm) finish need not have the direction of the cut of the tool in the direction of movement.

4. Dimensional Tolerances: The dimensions of machined pieces, such as width, depth and thickness shall comply with the drawings with tolerances determined by their fit with other members. Width dimensions of rockers, shoes or plates which fit inside parts of other pieces such as pin collars and keeper bars shall be machined or otherwise kept to a tolerance to allow fit without chance of binding. Radius tolerance for pins and pin seats is given in Article 2408.25.

5. Repairs of Casting or Machining Errors: Any casting defect or machining error that is questionable to the DOT inspector shall be referred to the engineer for disposition and/or correction.

VII. DESIGN LAYDOWN INSPECTION

See IM 564.

VIII. SECONDARY MEMBERS

The term "secondary members", as used in this section, is meant to mean all the members, which have not been inspected in the laydown inspection.

Inspection of secondary members shall include, but not be limited to the following items:

A. Cutting of Copes. Coping shall be done neatly and accurately. Machine guided flame cutting is required whenever possible.

B. Re-entrant Radius. Coped corners shall have the proper radius shall be neatly and smoothly finished.

C. Flame Cut Edges. All flame cut edges shall be within tolerance for smoothness. They will be ground to remove burning slag and the corners rounded or dulled, depending on whether they are main stress carrying pieces or non-main stress carrying members.

D. Hole Size & Placement. Holes in secondary members shall be inspected so as to ascertain that they are of the proper size and placement. This does not imply that every member be checked, but that thorough random inspection along with ongoing visual inspection the accuracy of hole size and placement is satisfactory and consistent when multiple pieces are being fabricated.

E. Holes – Drilled or Punched. Holes in secondary members may be punched full size except where specifically prohibited.

F. Welding. Welding on secondary members shall meet all the requirements required for main members.

G. Shear Studs. Some secondary members require shear studs. When shear studs are required, they shall be welded in accordance with AWS.

H. Dimension Inspection. Full dimensional checks shall be made on random pieces when multiples of that piece are fabricated. When jigs are used in the assembly, close inspection shall be made on the first members assembled and fully welded to verify final dimensions.

I. Grinding. Grinding will be required to maintain a high standard of workmanship.

J. Misplaced Holes. All misplaced holes shall be referred to the shop inspector by the fabricator. The engineer through the DOT shop inspector shall make the disposition and correction of misplaced holes.

K. Hole Edge Distances. Holes in secondary members, which have less than the minimum edge distances shall be handled as a misplaced hole.

L. Heat Numbers. Heat numbers on secondary members need not be transferred. Color-coding of secondary members during fabrication up to the time of blast cleaning shall be required. **NOTE:** Even though heat numbers need not be transferred on secondary members, the fabrication plant shall maintain a satisfactory system of identification so that all the heats and grades of steel used will be recorded. Mill reports for all the material shall be furnished to the DOT shop inspector.

The fabricator shall furnish an affidavit in the form of a cutting list, listing heat numbers and grade of steel and a statement certifying that throughout the fabrication operation, he has maintained the identification of steel in accordance with this specification.

M. Charpy Requirements. All main stress carrying members shall have test reports showing charpy test results, which comply with the specifications unless specifically exempted by the specifications. It should be noted that some plates will be tested on a (H) heat lot basis, whereas others may require (P) plate testing or even (PP) double testing per plate.

When checking Charpy V-Notch Test results of A 709 Grade 50T and 50WT steel (for compliance with Standard Specifications, Article 4152.02, as modified by Current Supplemental Specification), be aware of the 2nd footnote B, under Table A.

IX. CLEAN-UP BLAST CLEANING & PAINTING

A. Cleaning. Prior to painting, structural steel shall be cleaned in accordance with applicable Supplemental Specification

B. Touch Up Clean Up. Final touch up and clean up, where needed and not previously done shall be done before shop painting. Items to be checked and made satisfactory are:

1. Weld repair

2. Grinding

    a. Oxygen cut and sheared edges & corners

    b. Welds

    c. Handling marks

    d. Scabs and fins

    e. Holes when necessary

C. Painting. All painting and inspection thereof shall be in accordance with the applicable Standard Specifications and the Supplemental Specifications.

Machined surfaces and similar items, which receive grease or other protective coverings, as listed in Article 2408.30 of the Standard Specifications shall not be painted.

D. Painting shall be performed by certified painters. Painter's certification shall be renewed on an annual basis.

E. Final Inspection. All main girders and beams will be given a final inspection after painting and will be stamped with an appropriate inspection stamp.

No main girders or beams shall be shipped unless they have been stamped with the above mentioned stamped. All other members shall be given a final inspection but will not need to be stamped before they are shipped.

X. INSPECTION

- Quality Control (QC) is the responsibility of the fabricator. As a minimum, the fabricator shall provide inspection and testing prior to cutting, during cutting, prior to assembly, during assembly, during welding and after welding as required by the specifications and the AWS code to assure that material and workmanship conform to the requirements of the contract documents.

- Quality Assurance (QA) is the prerogative of the contracting authorities. The QA

inspector shall perform verification testing and monitor inspection as deemed necessary to verify that an acceptable material and workmanship are acceptable and as specified in the contract documents.

- All inspectors responsible for QC and QA inspection shall be an Certified Welding Inspectors (CWI) qualified and certified in accordance with the provisions of AWS / QCI standard for qualification and certification of welding inspectors.