SECTION 11.1
Volume II

FABRICATION AND MANUFACTURING OF STRUCTURAL METAL, METAL COMPONENTS AND PROTECTIVE COATINGS QUALITY CONTROL PROGRAM

11.1.1 PURPOSE

This procedure provides guidance as a step-by-step process for the quality control of all new and currently accepted facilities that produce structural metal, metal components, and use protective coatings for the Florida Department of Transportation (Department).

11.1.2 AUTHORITY

Sections 20.23(3) (a) and 334.048(3), Florida Statues (F.S.)

11.1.3 REFERENCES

American Association of State Highway Transportation Officials (AASHTO) Load Resistance and Factor Design (LFRD) Bridge Construction Specifications

American Institute of Steel Constructors (AISC) Quality Certification Program for Structural Fabricators

American Institute of Steel Constructors (AISC) Quality Certification Program for Structural Fabricators, Sophisticated Paint Endorsement (SPE)

American Society for Nondestructive Testing (ASNT) SNT-TC-1A, Performance Criteria for Personnel Performing Nondestructive Testing

American Welding Society (AWS), Specification for AWS Accreditation of Certified Welding Fabricators

American Welding Society QC1:2007 Standard for AWS (AWS) Certification of Welding Inspectors (CWI) Program

ISO 9001, Quality Management System (QMS)

American Welding Society (AWS) AASHTO/AWS D1.5, Bridge Welding Code

American Welding Society (AWS) D1.1 Structural Welding Code - Steel

Florida Department of Transportation (FDOT) Construction Project Administration Manual (CPAM)

Florida Department of Transportation (FDOT) Florida Sampling and Testing Methods

Florida Department of Transportation (FDOT) Standard Specification for Road and Bridge Construction

Materials Manual Volume I – Chapter 11.1 Fabrication and Manufacturing of Structural Metal, Metal Components, and Protective Coatings Quality Assurance Program

NACE International (NACE) Coatings Inspector Program (CIP)

NACE International (NACE) NIICAP Auditing Standard: AS-1 Program for Accreditation of Field and Shop Coatings Contractor

Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High-Strength Bolts.

Society of Protective Coatings (SSPC) Bridge Coatings Inspector (BCI) and Protective Coatings Inspector (PCI)

Society of Protective Coatings (SSPC) Quality Control Program No. 3 Shop Painting Certification Program (QP3)

Structures Design Guidelines, Florida Department of Transportation - Structures Design Office, Procedure No. 625-020-150

11.1.4 SCOPE

This section establishes the scope of this materials manual chapter. For the remainder of this document, all facilities who fabricate, manufacture, weld, paint or produce machined components will be identified as a Production Facility. Each of the material types listed in Table 1 and all overhead metal structures within the Department right of way (except elements listed under ***FDOT Specification sections 646, 649, 650, 653, 654, 659, 700, and 715***) shall be produced by an accepted facility, listed on the Department ***Production Facility Listing***. Each Production Facility will need to be on the list prior to producing for an FDOT project. Qualification must be maintained by each Production Facility throughout the duration of a project. The qualification of the Production Facility is necessary to substantiate that materials and components are in conformity with the Contract Documents and this section of the Materials Manual. The components covered by the State Materials Office (SMO) and subject to the provisions of this Chapter are listed in ***Table 1***.

Table 1 - Materials Included in Chapter 11.1
Steel Bridge Pedestrian Truss Category 1
Steel Bridge Advanced
Bridge Machinery
Bridge Forgings
Bridge Castings
Bridge Bearings (Rocker, Roller, Pot, Disc, Spherical, Sliding, Guide)
Modular Joints (Expansion and Finger)
Overhead Gantries
Overhead Spans / Trusses
Overhead Cantilevers
Overhead Monotubes
Guardrail (Thrie-Beam, W-Beam)
Shop Painting
Shop Metalizing

11.1.5 GENERAL INFORMATION

Production Facilities that would like to work for the Department must have an acceptable Quality Control (QC) Plan, meet the criteria listed in this section, and pass an audit by the Department. Production Facilities require the certification identified in ***Table 2*****.** Production Facility personnel need to meet the criteria listed in ***Table 3*****.** The accreditation and certification requirements included in ***Table 2*** and ***Table 3*** must be achieved prior to acceptance and maintained throughout the duration of all Department projects.

Each Production Facility will be assigned an FDOT Production Facility Number reflecting the scope of initial authorization for each individual Production Facility. The Department will have sole discretion on defining the scope of material types that can be produced at each Production Facility.

11.1.6 PRODUCTION FACILITY QUALIFICATION PROCESS

11.1.6.1 General

Each Production Facility will be responsible to meet the requirements of this section prior to Department acceptance. Once a facility has provided an acceptable QC plan, participated in a successful audit, successfully logged into the Department database, and been assigned a Production Facility number, the Production Facility will be authorized to produce materials for use on Department projects. Each Production Facility will be responsible to maintain the qualifications listed in this section throughout the duration of all work for FDOT projects.

Bridge Bearing Production Facilities will need to maintain a valid long-term deterioration pre-qualification test to remain in the Department Production Facility Listing. See ***Section 11.1.17*** for details on long-term deterioration pre-qualification test.

11.1.6.2 Production Facility Qualification

Production Facilities are required to meet ***Table 2*** of this section. Alternate qualifications may be considered on a case-by-case basis**.**

Table 2 - Required Production Facility Accreditation	
Structural Category	**Accepted Accreditation Program**
Steel Bridge Pedestrian Truss Category 1	AISC Simple Bridge
Steel Bridge Advanced	AISC Advanced Bridge with Fracture Control Endorsement
Bridge Machinery, Bridge Bearings, Modular Joints, Overhead Gantries, Overhead Spans/Trusses, Overhead Cantilevers, Overhead Monotubes	AISC Component Manufacturer or AWS Welding Fabricator
Bridge Forgings, Bridge Castings, Guardrail	ISO 9001 (2015)
Shop Painting	AISC Complex Coatings Endorsement or AMPP QP3
Shop Metalizing	AMPP QP6

11.1.6.3 Personnel Qualifications

Minimum qualifications are required for Production Facilities to be on the Department's ***Production Facility Listing*****.** In addition to the facility requirements in Table 2, each Production Facility will be responsible to have and maintain staff meeting the qualifications listed in ***Table 3***.

Table 3 - Minimum Direct Experience Required for QC Management	
Material Types	**QC Management**
Steel Bridge Pedestrian Truss Category 1, Steel Bridge Advanced	5 yrs. experience, and an active AWS CWI, and Pre-installation Verification Certificate
Bridge Bearings, Bridge Machinery, Modular Joints	5 yrs. experience, and an active AWS CWI
Bridge Forgings, Bridge Castings	5 yrs. experience
Overhead Gantries, Overhead Spans/Trusses, Overhead Cantilevers, Overhead Monotubes	3 yrs. experience, and an active AWS CWI, and Pre-Installation Verification Certificate

Table 3 - Minimum Direct Experience Required for QC Management	
Material Types	**QC Management**
Guardrail	3 yrs. experience, and an active AWS CWI, or active AWS CAWI, or AWS D1.1 Endorsement, or AWS D1.6 Endorsement, or Annual Audit by FDOT approved QA Firm
Shop Painting	3 yrs. experience, and an active AMPP Certified Coating Inspector
Shop Metalizing	3 yrs. Experience, and an active AMPP Certified Coating Inspector

Production facilities listed in ***Table 5*** have defined Personnel Qualifications responsibilities related to Quality Control.

If the QC Manager elects to use QC inspectors to act on their behalf, in accepting material that will later be painted over, covered, hidden, or shipped, the QC inspectors performing these tasks shall meet the qualifications listed in ***Table 3*** for that specific function. When resolution is required, the QC manager shall make efforts to be present and resolve an inquiry.

11.1.6.4 Submittal of the Proposed QC Plan

Each Production Facility is responsible to submit a QC Plan and the following information to the SMO for review, Submit these requirements to SM-StructuresCI@dot.state.fl.us.

(1) Production Facility Name and Address
(2) List of ***Table 1*** components being made at the Production Facility
(3) Include Facility Accreditation meeting the requirements of ***Table 2***
(4) Contact Information, Qualifications of the QC Staff meeting the requirements of ***Table 3***
(5) The completed QC plan Checklist found in ***Appendix 1***

All information should be accurate, up to date and in good standing. The QC plan should reflect the fabrication processes and business operations of the Production Facility.

11.1.6.5 Review of the Proposed QC Plan

This section of the Materials Manual provides guidelines for the qualification process for the Production Facilities and describes the related functions and responsibilities of the personnel that are involved in the implementation of the QC plan. A review of the QC plan will be done in accordance with ***Materials Manual Section 5.6***.

QC plans may be returned to the Production Facility with a list of deficiencies and / or recommendations for improvement. Several rounds of review for a QC plan may be necessary prior to acceptance. Please review the QC plan checklist for guidance.

After a successful review of the documentation in ***Section 11.1.6.4*** and notification to the facility, an initial Production Facility audit will be scheduled.

11.1.7 MATERIAL ACCEPTANCE AND CERTIFICATIONS DATABASE

A successful Production Facility audit will result in the generation of a Department Production Facility number. However, no such number can be generated until personnel at the Production Facility request access to the Materials Acceptance and Certification (MAC) system. The SMO will notify the facility such that access to MAC can be requested.

It's the responsibility of each Production Facility to comply with these requirements and to keep their Production Facility and Company contact information, and other relevant information up-to-date in MAC. The SMO should be notified of any changes.

11.1.8 PRODUCTION FACILITY NUMBERING

Each accepted Production Facility will be assigned a Department Production Facility number based on the category that applies to the fabrication being done at the Production Facility. Production facilities will be categorized based on ***Section 5.6 of the Quality Control Program***. Other material types may be added to the Production Facility assigned number.

The MAC report will categorize the Production Facilities by material type. Production Facilities will be further identified by name, physical address, and QC plan status.

11.1.9 CONTINUED ACCEPTANCE ON THE DEPARTMENT'S PRODUCTION FACILITY LISTING

Each Production Facility will need to meet the following criteria to remain on the Department's ***Production Facility Listing***:

(1) Provide fabricated material that consistently meets the contract documents
(2) Provide products from an accepted Production Facility or an accepted sub-contracted facility
(3) Maintain the required Production Facility accreditation and personnel certifications

(4) Have consecutive successful FDOT audits
(5) Continue to maintain up-to-date Production Facility and Company contact information and other data in MAC.
(6) Update and submit QC Plan in response to company changes, corrective actions or suspension
(7) Comply with material investigations and requests for documentation when needed
(8) Provide and maintain accurate documentation traceable to project-related materials
(9) Allow Department personnel, including Quality Assurance Inspectors (QAI), access to the Production Facility
(10) Allow Department personnel, including QAI, to photo document non-conformances related to FDOT projects
(11) Maintain a valid long-term deterioration pre-qualification test as a Bridge Bearing Production Facility.

If a Production Facility fails to comply with the items identified in this section or ***Section 105 of the FDOT Standard specifications***, they will be requested to submit a proposed corrective action plan for approval by the Department. Each Production Facility on the Department's ***Production Facility Listing*** will be held accountable, independent of other facilities owned by the same company or entity.

Production facilities shall submit to their certifying company, a complete list of all Department related nonconformances and corrective actions that violated their quality control plan, during each certification audit. The Department may review and coordinate with the certifying agency to confirm and review the reporting and responses to all nonconformances and corrective actions. The Department may elect to share any nonconformances and corrective actions responses made by a production facility, with the certifying agency.

11.1.10 USE OF SUB-CONTRACTORS

The majority of the Facilities on the Department's ***Production Facility Listing*** use sub-contractors to provide source material (base metals, forgings, castings), assist on the fabrication (bending or heat-treating) or complete production (coating, fabrication). The accepted Production Facilities are the sole responsible party for evaluating and examining material in their custody for material compliance. The accepted Production Facility is responsible to verify that all materials are compliant, and the information required is complete, accurate and meets the requirements of the contract documents prior to its incorporation into an FDOT project. This should include chain of custody, QC oversight, and all documentation for work done at any sub-contracted facility. This could be achieved through a combination of material-based documentation, independent audits, and the actual witnessing of work by a QC representative.

11.1.11 MATERIAL COMPLIANCE REPORTING AND INVESTIGATIONS

All Production Facilities are subject to material compliance investigations. This may be a formal request related to a specific project or validation of a Production Facility's qualification. This courtesy is extended to the Department's representatives and QAI who act on behalf of the Department. All Production Facilities should be able to maintain traceability of their source material, the applicable material properties, and their final products.

11.1.12 DEPARTMENT AUDITING

All Production Facilities will be audited on a schedule not to exceed two (2) calendar years. Audits may reveal deficiencies which may warrant corrective actions. Without corrections to those deficiencies, this could affect the scope of authorization for each Production Facility. Production Facilities that wish to make products beyond the scope of their authorization shall discuss and seek approval from the SMO. This may require an additional audit and demonstration of capabilities prior to acceptance.

11.1.13 COMMERCIAL INSPECTION

This section of the Materials Manual discusses the scope, application and scheduling of Commercial Inspection. The Contractor is responsible for sending the Production Facilities schedule to the Engineer at least 30-day prior to the beginning of fabrication. The components identified in ***Table 4*** and all overhead metal structures within the Department right of way (except elements listed under ***FDOT Specification Sections 646, 649, 650, 653, 654, 659, 700, and 715***) require commercial inspection.

Table 4 – Components Requiring Commercial Inspection
Required by Specification
Steel Bridge Pedestrian Truss Category 1
Steel Bridge Advanced
Bridge Machinery
Bridge Bearings (Rocker, Roller, Pot, Disc, Spherical, Sliding, Guide)
Modular Joints (Expansion and Finger)
Overhead Gantries
Overhead Spans / Trusses
Overhead Cantilevers
Overhead Monotubes
Shop Painting
Shop Metalizing
At the Request of the Engineer
Steel Cable (Suspension, Bridge Stay, Guardrail)
Field Bolting

Table 4 – Components Requiring Commercial Inspection
Field Welding
Field Coating
Buildings
Other Non-Standard Fabrication

QAI will have full access on the jobsite where the Department projects are being fabricated, coated, bolted or repaired. Questions of acceptability of stamped members that have not incurred shipping damage are to be resolved with proper input from the QAI at the shipping point prior to rejection at the job site.

11.1.14 SUBMITTING DRAWINGS TO THE DEPARTMENT

The Department has organized the material requirements for structural metals and coatings throughout the FDOT Specifications for Road and Bridge Construction. These material requirements may be superseded by the Standard Plans. When submitting Contract Drawings to the Department for approval, all deviations from the Contract Drawings shall be bubbled or marked in a clear manner to make it easily identifiable to the reviewer. When requested, the fabricators shall provide the latest approved and applicable shop drawings to the quality assurance inspectors.

11.1.15 WELDING

11.1.15.1 General

The Department uses the following Welding Code books when joining structural metals: ***AWS D1.1 Structural Welding Code - Steel, AWS D1.2 Aluminum Welding Code, AASHTO/AWS D1.5 Bridge Welding Code, and AWS D1.6 Structural Welding Code - Stainless Steel***. The applicable Florida Standard Specification for Road and Bridge Construction should be reviewed prior to a project.

The Fabricators shall use the Department provided digital forms for code-related ***Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR), and Fillet Weld Soundness Tests (FWST)***. These forms are available to the public and are located on the SMO Internet website.

All facilities are required (by the applicable code) to fill out and keep FDOT approved ***WPS, PQR, and FWST*** records internally and available for review. Facilities that req*uir*e commercial inspection (***Table 5***) are required to fill out these documents prior to fabrication and submit to the commercial inspection firm for review and compliance to the applicable welding code.

Only WPS's stamped by the Department are acceptable for use on commercially inspected projects.

Welding done without commercial inspection should generate a Non-Conformance Report (NCR) and is subject to rejection. NCR's are discussed in ***11.1.18.3***.

11.1.15.2 Welding Structural Steel

The Production Facility is responsible to weld structural steel in accordance with ***AWS D1.1 Structural Welding Code - Steel, AASHTO / AWS D1.5 Bridge Welding Code, or D1.6 Structural Welding Code-Stainless Steel*** as modified by ***FDOT Specification 460*****.**

All ***D1.1 Welding Procedure Specifications (WPSs)*** joining pipe together or making a joint to a pipe shall have a constraint on preheat and interpass temperatures. Carbon equivalencies following this formula shall be written on every Mill Test Report or component traveler. Carbon Equivalencies (CE) are industry and application specific and may not be appropriate for welding to AWS. Disregard the CE provided by the Mill.

Using the formula below, if the CE is > 0.400, increase the preheat to 200°F. If the CE is > 0.600, increase the preheat to 400°F. Mill certifications missing relevant information shall be resolved prior to introduction into an FDOT project.

$$CE = \%C + \frac{(\%Mn + \%Si)}{6} + \frac{(\%Cr + \%Mo + \%V)}{5} + \frac{(\%Ni + \%Cu)}{15}$$

11.1.16 BOLTING

11.1.16.1 Quality Control of Rotational Capacity Testing

Fabricators may order bolts with rotational capacity testing already completed, without performing additional testing. Damage to the bolts, poor storage conditions or change in lubrication will void any prior rotational capacity results. Field connections will still need to qualify through independent rotational capacity testing. Fabricators performing Rotational Capacity testing of bolted assemblies when required by specific components shall follow the requirements of the following test methods:

(1) ASTM F3125 Annex 2 – Method 1
(2) ASTM F3125 Annex 2 – Method 2

Components requiring such test are included in ***Table 5***. All Rotational Capacity testing shall be made available to the Department or Department representative, including QAI upon request.

Table 5 – Components Requiring Rotational Capacity and Pre-Installation Verification Testing by Specification
Steel Bridge Pedestrian Truss Category 1
Steel Bridge Advanced
Overhead Gantries
Overhead Spans / Trusses
Overhead Cantilevers
Overhead Monotubes

11.1.16.2 Quality Control of Pre-Installation Verification Testing

Fabricators performing pre-installation bolt tensioning of bolted assemblies when required on specific components per ***FDOT Specification 460*** should develop quality control processes to ensure accuracy of the data collected. Components requiring such test are included in ***Table 5***. All Rotational Capacity testing shall be made available to the Department or Department representative, including QAI upon request.

11.1.17 PRE-QUALIFICATION OF BRIDGE BEARINGS

Fabricators of Bridge Bearings shall be pre-qualified by a long-term deterioration test. Perform the long-term deterioration test on one expansion type bearing with a rated capacity of 300 kips or higher. Load the bearing to the rated capacity and then subject it to a plus and minus 0.02 radians rotational displacement amplitude for 5,000 cycles. The bearing must also be displaced through at least 1,000 cycles with a plus and minus amplitude equal to 1 inch (2 inches peak to peak). Use a maximum sliding speed of 10 inches per minute for this test.

Include the following in the test package for long-term deterioration prequalification:

a. Material specifications
b. Photographs of the complete bearing assembly and each primary component, both before and after testing.
c. Video of the last 2 minutes of each of the two tests described above.
d. Certified copies of any test reports on the physical properties of the applicable component materials for the tested bearing (elastomer, PTFE, stainless steel sheet, and polyether urethane disc).
e. Verification statement by a third-party witness to the testing.

Submit the test package for long-term deterioration prequalification to the Department. Damage observed upon disassembling the bearing, such as cracks or splits in the material, or a coefficient of friction exceeding the

allowable value for the material used, is grounds for rejecting the test. An accepted test will result in prequalification valid for up to 5 years. It is the responsibility of the bearing fabricator to monitor the expiration date of their bearing system prequalification and to resubmit for prequalification at least 3 months prior to the expiration date. The Department reserves the right to remove any bearing system based on project performance. It is the responsibility of the bearing fabricator to inform the Department of any changes in design information, component information, material specifications, contact information, etc.

Fabricators shall develop quality control processes to cover as a minimum the following information:

(1) Design Criteria Summary: The design summary shall include the following:
   a. Service Design Load (kips)
   b. Service Design Stress (ksi)
   c. Service Design Rotation (radians)
   d. Disc Size (in.) outside diameter, inside diameter, thickness
   e. Shape Factor

(2) Test Results Summary: The test summary shall include the following:
   a. Service Test Load (kips)
   b. Service Test Stress (ksi)
   c. Service Test Rotation (radians)
   d. Disc Size (in.) outside diameter, inside diameter, thickness
   e. Shape Factor

(3) Drawings: The test summary should include the following:
   a. Shop drawing of the proposed bearing

11.1.18 REPAIR PROCEDURES

11.1.18.1 Pre-Approved Repair Procedures

The ***Materials Manual Volume II Sections 11.5 Pre-approved Repair Procedures for Structural Steel*** and ***Section 11.6 Pre-approved Repair Procedures for Shop Applied Coatings*** have several pre-approved repair procedures for structural metals and shop-applied coatings that allow the Production Facility to make repairs without Engineer approval. Notify the QAI if used.

11.1.18.2 Submitting Repair Procedures

The Department has prepared several template repair procedures that may be used by any Production Facility on all FDOT projects. They are listed in ***Appendices 2 and 3*** of this document. These repair procedures are not pre-approved and still require approval by the Engineer, however, they provide a comprehensive repair procedure that meets the standards set by the Department and applicable Codes.

11.1.18.3 Nonconforming Material

Fabricators should develop quality control processes to cover an NCR or a Fracture Critical Non-Conformance Report (FCR) identifies something related to the project that does not meet the contract requirements. This may include misaligned bolts, a surface gouge, dropped material, material not fitting-up, and damage to the faying surface or work done without commercial inspection. The applicable document (e.g. ASTM, AWS D1 Code, and FDOT Specification) will determine the scope of an NCR.

When submitting an NCR or FCR, the Production Facility should respond with a nonconformance report that includes the scope of information listed below. The Production Facility should include:

(1) Scope of the problem
(2) Affected heat numbers or component(s)
(3) Applicable drawing(s), highlight or bubble the area in question
(4) Identify areas in compression, tension, subject to reversal of stress
(5) Project-specific repair procedure or Request
(6) Include any welding procedures (WPS) to be used in the repair
(7) Root cause / Method of Prevention
(8) Any quality control documents / traveler that may support the issue

At any point, QAI is authorized to notify the Engineer of concerns related to a non-conforming material. Examples of these NCR's are listed in ***Appendices 2 and 3***.

11.1.19 PHASED ARRAY ULTRASONIC TESTING (PAUT)

Accepted Production Facilities can use PAUT in lieu of Radiography for the purposes of weld inspection, as modified by ***Materials Manual Section 11.3***.

11.1.20 PLASMA ETCHING / SCRIBING STEEL BASE METALS

Accepted Production Facilities can use plasma scribing methods for marking the surface of all steel base metals, including fracture critical applications. The parameters for safe marking of steel are defined in ***FDOT Specification 460***.

11.1.21 GUARDRAIL COMPONENTS

Accepted Production Facilities should submit any certificates of compliance for use on the roadway to the Contractor and to the SMO, as SM-StructuresCI@dot.state.fl.us. State Materials will review and upload these documents into the Department's database and mark the stamp number as accepted or rejected. An acceptable certificate should identify the following:

(1.) Facility Name and Address
(2.) Description of Components and Quantity

(3.) Heat and/or Lot Numbers for each Guardrail Component
(4.) Clear and complete Guardrail Heat numbers
(5.) All reported information as required by ***AASHTO M180***
(6.) All reported information as required by ***Specification 967***
(7.) Compliance with the ***Buy America Act***

11.1.22 LOWERED SALT TESTING

Accepted Production Facilities may provide 36 months of historical, sequential salt/conductivity levels below the levels specified in ***FDOT Specification 560-7.5***, soluble salts/conductivity testing frequency may be reduced to one per day, per project. Those documents should be submitted to the SMO, at SM-StructuresCI@dot.state.fl.us for review. The MAC database will reflect the approval for each facility to operate with a lowered salt testing frequency.

11.1.23 QUALITY BASED TRAVELER SYSTEM

When a QAI or Department representative is assigned to witness and oversee fabrication, each fabricator is responsible to present a thorough traveler on the shop floor, for all components once the pieces of material have been incorporated into the project. The quality based travelers will follow the progress of the component throughout fabrication, sub-contracting, treatment, repair, fit-up, bolting, painting, and shipping as appropriate. The Department may request the traveler for a specific project when an NCR/FCR is submitted.

The quality based travelers need to address QC hold points and be sufficient and legible enough to trace material and work done back to a heat number, welding procedure, repair location, date and identify the involved personnel. Approved producers are expected to make continued improvement to these travelers as needed in response to an internal review, a corrective action, or valid Department request. Copies of traveler systems should be available to the QAI upon request.

11.1.24 RECORD RETENTION

All production facilities are responsible to keep all project records, including the quality-based travelers. These documents shall be maintained for a period of minimum three years after the delivery of the components to the project site.

11.1.25 FORMS

The following forms may be obtained from the Department forms library at the Department forms and procedure website.

FDOT Welding Forms (Refer to ***Material Manual Volume II Section 11.2***)

Form No. 675-070-07 Request for Commercial Inspection and Testing of Structural Metals and Coatings

Form 675-070-17 QC Checklist

Form No. 325-060-05, FDOT Computer Security Access Request

APPENDIX 1 - Department QC Plan Checklist

A. Shop Qualification	**Page/Section**
A1. Production Facility Experience (QC Manager, Staff)	
A2. National Accreditation / Audit Program Participation	
A3. Training (Internal and External)	
A4. Ordering of Materials, Identifying Material Deviations	
A5. Submitting Drawings for Department Acceptance	
A6. How does the Production Facility Evaluates Subcontractors?	
A7. Description of Cutting, Measuring, and Production Capabilities	
A8. Description of Instrument Calibration Frequency / Practice	
A9. Subscription to or Purchase of Industry Standards	
A10. Agree to Department Access	
A11. Agree to Material Compliance Investigations	
A12. Quality Assurance Access and Resources	
A13. Long-Term Deterioration Testing (Bridge Bearings Only)	
B. Pre-Fabrication	**Page/Section**
B1. Initial Material Inspection, Frequency (e.g., Documentation)	
B2. Maintaining Traceability	
B3. QA Notification and Access to Witness	
B4. Addressing Nonconformances	
B5. Repairing and Rejecting New Material, Acceptance Criteria	
B6. Material Storage	
B7. Identify Authority for Material Acceptance	
Facilities Intending to Weld (Additional Requirements)	**Page/Section**
B8. Handling WPS's, Qualifications and Materials (Documents)	
B9. Define the Scope and Use of an RFI/RFM	
Facilities Intending to Execute Load-Carrying Bolted Connections	**Page/Section**
B10. Identifying main or primary-load carrying members	
B11. Identify the responsible party for rotational capacity testing	
B12. Address Florida Methods for Rotational Capacity and DTI Testing	
C. Fabrication	**Page/Section**
C1. Traceability / Transferring Information / Chain of Custody	
C2. Description of In-Process Controls (e.g., Documentation)	
C3. Quality Control Hold Points	
C4. Addressing Fabrication Nonconformances	
C5. Isolation of Nonconforming Material (e.g., Documentation)	
C6. Compliance to Contract Documents and Specifications	
C7. Document Control	
C8. Material Storage	
Bridge, Bridge Components and Sign Structures (Additional Requirements)	**Page/Section**
C9. Distortion Control Plan	
C10. Implementation of Applicable Welding Codes	

C11. Establishing Camber and Sweep	
C12. Faying Surfaces	
C13. Fit-Up Procedure	
C14. Bolting Procedure (e.g., Documentation)	
C15. Quality Based Traveler System	
C16. Fracture Control Plan (Bridge Only)	
D. Inspection	**Page/Section**
D1. Quality Control Hold Points and Visual Inspection	
D2. Description of In-Process Inspection and NDT	
D3. Identification of Nonconforming Material	
D4. Communicating Nonconformances	
D5. Repair Procedures (e.g., Documentation)	
D6. Define the Scope and Use of Subcontractors for Inspection	
D7. Identify Acceptance Criteria	
D8. Rejecting Material (e.g. Documentation)	
D9. Document Control	
Facilities Intending to Apply Coatings (Additional Requirements)	**Page/Section**
D11. Qualifications of the Coatings Supervisor and Inspector(s)	
D12. Compliance with Project-Related Specifications	
D13. Include a Production Facility Coatings Plan	
D14. Quality Based Traveler System	
Facilities Intending to Weld (Additional Requirements)	**Page/Section**
D14. Define the Scope and Use of an NCR	
D15. Identify the frequency and use of a CWI	
D16. Define the Scope of a Critical Weld Repair (Bridge Only)	
E. Material Acceptance	**Page/Section**
E1. Identify compliance with Owner Specifications	
E2. Identify compliance with Contract Drawings	
E3. Identify the Authority for QC Acceptance	
E4. Address Scope of Engineer Approval	
E5. Storage Prior to Shipping	
E6. Final Document Control	
Bridge, Bridge Components and Sign Structures (Additional Requirements)	**Page/Section**
E7. Notification QA of Accepted Material	
E8. Define Scope of Bolting Acceptance (e.g., Documentation)	
E9. Define Scope of Acceptance for Faying Surfaces	
F. Shipping Components	**Page/Section**
F1. Summary Package of Quality Control Documentation	
F2. Lifting, Loading and Securing Material	
F3. Touch-Up and Visual Examination	

APPENDIX 2 - Repair Procedure Template #0001
Field Welding of Misaligned Base Plates on a Sign Structure: Base Flange Removal, Relocation, and Reattachment (Fillet Welds Only)

Scope

This repair is applicable to fillet welds only. This repair procedure does not apply to Partial Joint Penetration (PJP) weldments, Complete Joint Penetration (CJP) weldments or weldments that include a backing bar. The existing base plate will be cut away and a new base plate and stiffeners will be fabricated, hot dipped galvanized and reattached. This repair is limited to as-rolled steel. This repair is not applicable to steel subject to additional treatment such as heat treatment or quenching.

Qualifications

A. All field welding shall be done in accordance with the ***AWS D1.1 Structural Welding Code***. This requirement includes the use of ***Certified Welding Inspectors (CWI), qualified welding procedures (Clause 6.3)***, and ***qualified inspection personnel (Clause 6.1.4, Clause 6.14.6).*** Welding shall be performed utilizing a welding procedure (WPS) that has been reviewed by a CWI, reviewed by Commercial Inspection and accepted by the SMO prior to fabrication.

   The appropriate welding forms required by FDOT and are located on the SMO Internet website.

B. Magnetic Particle testing shall be done in accordance to the acceptance criteria listed in ***AWS D1.1 Structural Welding Code***. This includes the ***qualification of qualified personnel (Clause 6.14.6)***.

C. Commercial inspection shall be given an opportunity to oversee the removal, rotation, fitting, welding, and coatings repair operations on all repairs made to [Cantilevers, Monotubes, Sign spans, Trusses and Gantries] prior to acceptance. They will have access to all documentation and reports to confirm individual qualifications and confirm that all welds meet the ***AWS D1.1 Structural Welding Code*** as modified by FDOT ***Specification 460***.

D. The repair and subsequent galvanizing will be performed by an accepted producer listed on the Department's ***Production Facility Listing***.

Procedure

A. Remove galvanizing for a minimum of 1.0" on each side of the original weld, prior to cutting off the flange, stiffener or gusset. Remove the stiffener by oxyacetylene / fuel torch, cutting to 1/8" above the fillet welds. The stiffeners shall be not re-used. Remove the base plate from the upright by oxyacetylene / fuel torch cutting no more than 5/16" above where the base plate meets the upright.

B. The components shall be ground smooth and flush per ***AWS D1.1***. The entire repair area (100%) shall be examined by Visual Testing (VT) and Magnetic Particle Testing (MT) to verify there is no surface or near-surface cracking.

C. The base flange shall be fit to the existing upright after being rotated into position to provide correct orientation. The orientation will be verified by QC with the revised drawing.

D. A welding inspector shall witness the welding process. The welding process will reflect an approved Welding Procedure (WPS) [Insert WPS] stamped by the SMO. The weld inspector and commercial inspection will have access to all documentation (including MTR's, the WPS, PQR, Fillet Weld Soundness Test (FWST), and Personnel Qualifications) and reports (VT, MT Reports) to conform they meet ***AWS D1.1 Structural Welding Code.***

E. The entire weld (100%) shall be examined by VT and MT to verify there is no surface or near-surface cracking. The weld shall be acceptable if it meets ***Table 9.16 of the AWS D1.1 Structural Welding Code***. All non-destructive evaluations shall be completed after the repair of the welded area(s), and prior to galvanizing repair.

F. If the structure is galvanized, repair the upright and base flange connection with materials selected from the Approved Products List and meet ***FDOT Specification 975-2.4.1***. See attached ***Product Data Sheet (PDS).***

G. If the structure is painted, repair the upright and base flange connection per the manufacturer's recommended repair procedure.

APPENDIX 3 - Repair Procedure Template # 0002
Repair Welding in the Shop, Base Metal Steel Bridge: Gouge > 7/16" Deep or > 1-1/2" Length (Due to Operator Error)

Scope

This repair is applicable to gouges that occurred while cutting the base metal and are related to operator error. This repair procedure does not apply to material defects or damage from handling. The affected Heat Number(s) are #____.

Qualifications

A. All shop welding shall be done in accordance with the ***AWS D1.5 Bridge Welding Code***. This requirement includes the use of ***CWI, qualified welding procedures (Clause 1.9, Clause 5.0)***, and ***qualified inspection personnel (Clause 6.1.3.4)***. Welding shall be performed utilizing a WPS that has been reviewed by a CWI, reviewed by Commercial Inspection and accepted by the SMO prior to fabrication.

   The appropriate welding forms required by FDOT and are located on the SMO Internet website.

B. The welding inspector shall notify QAI prior to the beginning of welding. The welding process will reflect an approved WPS [Insert WPS #] stamped by the SMO. The weld inspector and commercial inspection will have access to all documentation (including Mill Test Reports (MTR) the WPS, PQR, FWST, Personnel Qualifications) and reports (VT, MT, and Ultrasonic Testing (UT) as applicable to confirm they meet ***Table XX of the AWS D1.5 Bridge Welding Code***.

C. The weld shall be examined in accordance with the ***AWS D1.5 Bridge Welding Code***.

Procedure

A. QAI will be presented with the report outlining all depth and length measurements of defects ≤1.0" distance from the intended weld area (see map of defect locations included). The welding inspector shall notify QAI on the day of the repair, and not less than 30 min. prior to the beginning of welding.

B. Grind the gouge to bright metal with a bottom radius of 1/4-inch minimum and a 20-degree minimum bevel on each side of the gouge.

C. Run-off tabs will be tack welded to either end of the repair area.

D. The area must be pre-heated per the applicable WPS, and interpass temperature maintained.

E. Remove all run-off tabs and grind the surfaces smooth and flush. Final grinding shall be parallel to the direction of stress.

F. The entire weld (100%) + 2.0” on either side shall be examined by VT and MT to verify there is no surface or near-surface cracking. The weld shall be acceptable if it meets 6.26 of the ***AWS D1.5 Bridge Welding Code***.