ORIGINATION FORM

THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR

☒ Modify Specification _____962_____.
Section/File number

☐ New Section _____.
Section number

Subject: Steel and Other Ferrous Metals and Metal Items

Origination date: November 8, 2005

Originator: Robert Robertson
Office/Phone: Ass't State Structures Design Engineer/(850) 414-4267 SC 994-4267
Email address/ Robert.robertson2@dot.state.fl.us

Userid:

Problem statement: The existing spec is outdated and needs updating.

Information source: The new spec was developed by a committee of the SDO, SMO, SCO and John Yadloski of HDR and is a complete rewrite to bring the spec up to date.

Background data:
Recommended Usage Note: All Jobs

Desired implementation date: Beginning with the January 2007 letting.

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

DENVER J. STUTLER, JR.
SECRETARY

M E M O R A N D U M

DATE: July 30, 2006

TO: Specification Review Distribution List

FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: Proposed Specifications Change: 9620000.D02 – Steel and Miscellaneous Metal Items (Other Than Aluminum)

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change to Steel and Miscellaneous Metal Items (Other Than Aluminum).

This change was proposed by Robert Robertson of the State Structures Office, complete rewrite of Section 962.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after August 27, 2006 may not be considered. Your input is encouraged.

DFB/dr

Attachment

COMMENTS: _____

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_____

Submitted by: _____ Phone #: _____

STRUCTURAL STEEL AND MISCELLANEOUS METAL ITEMS (OTHER THAN ALUMINUM).

(REV ~~10-14-05~~ _~~26-06~~_ _7-28-06_)

PAGE 857. The following new Section is added after Section 955.

SECTION 962
STRUCTURAL STEEL AND MISCELLANEOUS METAL ITEMS (OTHER THAN ALUMINUM)

~~**962-1 Certifications and Verification.**~~

~~**962-1.1 General:** Supply Certified Mill Tests Reports (MTR) to the Engineer for all metal materials to be used in fabrication, including but not limited to plates, bars, shapes, and fasteners in accordance with their respective ASTM or AASHTO specification. Materials not requiring an MTR are as noted in the Contract Documents. Furnish six copies of the MTR. On each copy of the MTR show or attach the full and complete designation of the project for which the materials are intended for use and specifically cross-identify each furnished piece to the order material.~~

~~Material meeting equivalent AASHTO and ASTM specifications may be supplied under either specification. Provide materials in accordance with the latest edition of the specifications shown below, as approved by the Engineer.~~

~~**962-1.2 Conformance:** The MTR will indicate that the material is in conformance with the applicable material specification and will include actual values from required tests. Check the MTRs against the appropriate specification to ensure that materials conform to Contract Documents.~~

~~**962-1.3 Source of MTR:** MTRs must originate from the producer of the material and not from a supplier. Material from stock may only be accepted if it can be positively identified and the appropriate documentation is provided.~~

~~**962-1.4 Verification Samples:** Provide verification samples in accordance with Section 6.~~

962-~~2~~_1_ Structural Steel.

962-~~2~~_1_.1 Structural Steel Materials: Unless otherwise specified in the Contract Documents, provide structural steel for bolted or welded construction in accordance with Structural Steel for Bridges, ASTM A 709~~ [ASTM A 709M]~~. If the grade is not shown in elsewhere in the Contract Documents, provide the grade as directed by the Engineer. All grades, as specified in the Contract Documents, are to conform to A 709~~ [A 709M]~~, as shown in Table 962-2.1 below:

Table 962-2.1 – Structural Steel Materials

ASTM A 709 ~~[A 709M]~~ Grade	Product Form*	Yield Strength (ksi) ~~[MPa]~~	Tensile Strength (ksi) ~~[MPa]~~
36 ~~[250]~~	P, S, B	36 min ~~[250]~~	58-80 ~~[400-550]~~
50 ~~[345]~~	P, S, B	50 min ~~[345]~~	65 min ~~[450]~~
50W ~~[345W]~~	P, S, B	50 min ~~[345]~~	70 min ~~[485]~~
50S ~~[345S]~~	S	50-65 ~~[345—450]~~	65 min ~~[450]~~

HPS 50W ~~[HPS 345W]~~	P, S	50 min ~~[345]~~	70 min ~~[485]~~
HPS 70W ~~[HPS 485W]~~	P	70 min ~~[485]~~	85-110 ~~[590 – 780]~~
100 [690](to 2-1/2 in) ~~[to 65mm]~~ (over 2-1/2 in) ~~[over 65mm]~~	P	100 min ~~[690]~~ 90 min ~~[620]~~	130 min ~~[900]~~ 130 min ~~[900]~~
100W [690W](to 2-1/2 in) ~~[to 65mm]~~ (over 2-1/2 in) ~~[over 65mm]~~	P	100 min ~~[690]~~ 90 min ~~[620]~~	130 min ~~[900]~~ 130 min ~~[900]~~

* P = plates, S = structural shapes, B = bars

962-~~2~~*1*.2 Testing: For structural steel subjected to tensile stress used for main load-carrying members or components (as defined in Section 460), meet the ASTM A 709 ~~[ASTM A 709M]~~ supplementary notch toughness requirements S83 (Non-Fracture Critical members) or S84 (Fracture Critical members) as specified in the Contract Documents. Meet the requirements for Zone 1 (Minimum Service Temperature 0ºF ~~[-18ºC]~~).

If not specified elsewhere in the Contract Documents, provide S83 or S84 as directed by the Engineer.

962-*2*~~3~~ Steel Castings.

962-*2*~~3~~.1 Carbon Steel Castings: Provide carbon steel castings that conform to the requirements of ASTM A 27 ~~[ASTM A 27M]~~. Unless otherwise specified in the Contract Documents, all castings are to be Grade 65-35 ~~[450-240]~~ or Grade 70-36 ~~[485-250]~~.

962-*2*~~3~~.2 Corrosion Resistant Steel Castings: Provide corrosion resistant Iron-Chromium or Iron-Chromium-Nickel castings that conform to the requirements of ASTM A 743 ~~[ASTM A 743M]~~. Unless otherwise specified in the Contract Documents, all castings are to be Grade CA 15M.

962-*3*~~4~~ Steel Forgings.

Provide steel forgings from which pins, rollers, trunnions, shafts, gears, or other forged parts are fabricated that conform to ASTM A 668 ~~[ASTM A 668M]~~. Unless otherwise specified in the Contract Documents, all forgings are to be Class C, D, F, or G.

~~**962-5 Cold-Finished Steel Bars for Shafting.**~~

~~Provide cold-finished carbon steel bars for shafting to the requirements of ASTM A 108. Unless otherwise specified in the Contract Documents, furnish UNS Designations G10160 to G10300 inclusive.~~

962-6*4* Iron Castings.

962-6*4*.1 Gray Iron Castings: Provide gray iron castings that conform to the requirements of ASTM A 48 ~~[ASTM A 48M]~~. Unless otherwise specified in the Contract Documents, provide machinery parts to Class 30. For manholes constructed within the area of vehicular traffic, the frames and gratings shall be machine ground so the irregularity of contact will be minimized and the grates will be rattle-proof.

962-6*4*.2 Ductile Iron Castings: Provide ductile iron castings that conform to the requirements of ASTM A 536. Unless otherwise specified in the Contract Documents, provide castings to Grade 414-276-18. In addition to the specified test coupons, test specimens from parts integral with the castings, such as risers, are to be tested for castings with a mass more than 1,000 pounds ~~[450 kg]~~ to determine that the required quality is obtained in the castings in the finished condition.

962-*4*6.3 Malleable Iron Castings: Provide malleable iron castings that conform to the requirements of ASTM A 47~~ [ASTM A 47M]~~. Unless otherwise specified in the Contract Documents, provide castings to Grade 24118.

962-5 Bolts, Nuts and Washers Not Designated as High-Strength.

Provide bolts that conform to the requirements of ASTM A 307 or ASTM A 449. Provide nuts that conform to the requirements of ASTM A 563 and washers that conform to ASTM F 436, unless specified as ordinary rough or machine bolts as approved by the Engineer. Washers provided to ASTM F 844 and nuts to ASTM A 194 may be used with the Engineer's approval.

Use double nuts, when ordinary rough or machine bolts are specified in the Contract Documents.

962-6 High-Strength Bolts, Nuts, Washers and Direct-Tension-Indicator (DTI) Devices.

962-6.1 General: *Use high strength bolts, nuts, washers and DTI devices meeting the following requirements:*

Bolts: ASTM A 325 or A 490, Heavy Hex. Only use ASTM A 490 high strength bolts with the approval of the Engineer.

Nuts: ASTM A 563, Heavy Hex. Select nuts in accordance with ASTM A 325 (Subsection 3.2). If grade C, D or C3 nuts are selected, provide with a minimum Rockwell hardness of 89 HRB or a minimum Brinell hardness of 180 HB. Use nuts meeting the requirements of ASTM A 194 only when approved by the Engineer.

Washers: ASTM F 436 and ASTM A 325 (Subsection 3.3). Use washers meeting the requirements of ASTM F 844 only when approved by the Engineer.

Identifying Marks: in accordance with ASTM A 325, A 490 and A 563.

DTI devices: meeting the requirements of ASTM F 959. Furnish plain DTI devices for use with plain bolts if the finish coat of paint is applied after installation and testing of the DTI device and will cover the remaining gap. Otherwise, coat the DTI device in accordance with the manufacturer's recommendations.

When the Contract Documents call for uncoated weathering steel in any component of the connected part, provide Type 3 bolts and washers, and nuts with weathering characteristics. If one side of the assembly is coated and the other exposed weathering steel, coat the fastener assembly on the coated side similarly (Such as the case for weathering steel tub girders coated on the inside only.).

Ensure that fastener assemblies are properly lubricated in accordance with ASTM A 563 Supplementary Requirements S1 and, S2.

962-6.2 Manufacturer's and/or Distributor's Testing:

962-6.2.1 General: *Provided that the integrity of the LOT audit system has been maintained, perform sampling and testing in accordance with the applicable ASTM Standards and the Contract Documents as supplemented herein.*

For the purpose of verifying properties of galvanizing, sample and test the fastener assembly components in accordance with ASTM B 602 Table 2 for nondestructive tests or Table 4 for destructive tests, unless indicated otherwise in the Contract Documents.

Perform proof load and wedge tests in accordance with ASTM F 606, Method 1 for all high-strength bolt assemblies in accordance with the following:

1. Provide the minimum frequency of testing in accordance with ASTM A 325 and A 563.

2. Wedge test galvanized bolts after galvanizing.

3. Perform proof load tests for the nuts.

4. Perform proof load tests for nuts to be used with galvanized bolts after galvanizing, overtapping and lubricating.

962-6.2.2 Rotational-Capacity (RC) Testing: *Perform RC testing on all fastener assembly LOTs prior to shipping. Should the Distributor revise and remix the fastener assembly components from the Manufacturers LOT designation(s) as described in 3 below, the Distributor must redo the L tests as stated herein. Splitting of an RC Lot by the Distributor and maintaining the Manufacturer's LOT designations (a fastener assembly quantity change only) will not require retesting as stated herein:*

1. Perform the tests in accordance with FM 5-581 or FM 5-582.

2. Test as an assembly all possible combinations of the bolt, nut and washer LOT shipped to the Distributor, Contractor, Fabricator or Erector. Where washers are not required by the Contract Documents, they do not need to be included in the LOT identification. Ship fastener assemblies in LOTs as tested. Washers are required for RC tests even though they may not be required for jobsite installation. The washer coating is to be the same as that for the bolt and nut.

3. Assign a LOT designation to each combination of bolt, nut and/or washer tested.

4. As a minimum test two assemblies per LOT designation. If any of the required tests fails, the Contractor is allowed to clean, relubricate and retest the LOT. If any of the retests fail, the entire LOT may be rejected by the Engineer.

5. Prior to testing, ensure proper assembly lubrication.

962-7 Anchor Rods and Bridge Bearing Materials.

Provide anchor rods, washers, masonry plates, bearings and other miscellaneous metal components that conform to the following requirements:

Provide anchor rods that conform to the requirements of ASTM554 unless the Engineer approves the use of anchor rods meeting the requirements of ASTM A 307, with nuts that meet the requirements of ASTM A 563, Hex Nuts, Heavy and with a finish consistent with the rod. Nuts meeting the requirements of ASTM A 194 may be used only with the Engineer's approval.

Use washers meeting the requirements of ASTM F436, with a finish consistent with the rod. Washers meeting the requirements of ASTM A 844 may be used only with the Engineer's approval.

962-*8*~~7~~ ~~Steel Materials for Specific Items~~*Miscellaneous Metal Items*.

Unless otherwise specified in the Contract Documents, provide the following specific materials.

962-*8*~~7~~.1 Pipe Railings: Provide steel pipe conforming to the requirements of ASTM A 53~~ [ASTM A 53M]~~ for Standard Weight Pipe.

962-*8*~~7~~.2 Steel Sheet Piling: Provide steel sheet piles conforming to the requirements of ASTM A 328~~ [ASTM A 328M]~~ or ASTM A 709~~ [ASTM A 709M]~~, Grade 50~~ [345]~~. Provide ASTM A 572 with the approval of the Engineer.

962-*8*~~7~~.3 Steel Sign Supports and Accessories: Provide steel members for sign supports that meet the material requirements specified in the Contract Documents.

962-*8*~~7~~.4 Structural Tubing:

962-*8*~~7~~.4.1 Materials: Provide steel structural tubing as one of the following:

Cold-formed, welded or seamless conforming to the requirements of ASTM A 500, Grade B, coated in accordance with the Contract Documents;

Hot-formed, welded or seamless tubing conforming to the requirements of ASTM A 501, coated in accordance with the Contract Documents;

ASTM A 847 when weathering characteristics are required; or

As indicated elsewhere in he Contract Documents.

962-*8*~~7~~.4.2 Testing: Meet the requirements of 962-2.2.

~~**962-7.5 Bolts, Anchor Rods, Nuts, and Washers:** Provide steel bolts, nuts, washers and lockwashers in accordance with Section 460.~~

962-*8.5*~~7.6~~ Steel for Concrete Reinforcement: Requirements for concrete reinforcement are contained in Section 931.

962-*8.6*~~7.7~~ Steel Guardrail: Requirements for steel guardrail are contained in Section 967.

962-*8.7*~~7.8~~ Field Splice Filler Materials: Provide field splice filler materials in accordance with the Contract Documents. If unspecified and less that 3/16 inch~~ [5 mm]~~ thick provide ASTM A 606 or ASTM A 1011.

962-*9*~~8~~ Galvanizing.

962-*9*~~8~~.1 Plates, Structural Shapes, Bars, and Strip: When galvanizing is specified in the Contract Documents for ferrous metal products, other than fasteners and hardware items, provide galvanizing in accordance with the requirements of ASTM A 123~~ [ASTM A 123M]~~, Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

962-*9*~~8~~.2 Fasteners and Hardware: When zinc coating is required in the Contract Documents, fasteners and hardware items shall be galvanized in accordance with the requirements of ASTM A 153~~ [ASTM A 153M]~~, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, except for high strength fasteners as noted below:

1. Do not galvanize ASTM A 490~~ [ASTM A 490M]~~ bolts.

2. Mechanically galvanize ASTM A 325~~ [ASTM A 325M]~~ Type 1 bolts in accordance with ASTM B 695, Class 50.

3. For all anchor rods and hardware treat the coated rods, nuts and washers with chromate after coating in a water solution containing 0.2% sodium dichromate 3 ounces/10 gallons~~ [2.2g/L]~~. Coat the bolt, nut and washer used in the fastener assembly by the same zinc process, and provide a test report on the zinc coating thickness.

4. For anchor rods fabricated from material having a yield strength greater than 80,000 psi~~ [550 MPa]~~ apply an electroplated zinc coating SC 3, Type II in accordance with ASTM B 633.

962-*9*~~8~~.3 Qualifications of Galvanizer: Use Galvanizer's listed on the Department's Qualified Providers List. Listing must occur prior to commencing the work.

~~**962-9 Non-Ferrous Metal Materials and Items (Other Than Aluminum).**~~

~~**962-9.1 Bronze Castings and Rolled Bronze:** Provide Bronze castings in accordance with the requirements of ASTM B 22. Unless otherwise specified in the Contract Documents furnish Alloy 911.~~

~~Provide bronze bearing and expansion plates conforming to the requirements of ASTM B 100, Alloy No. 510 (for rolled plate) or ASTM B 22, Alloy No. C91100 (for castings).~~

~~**962-9.2 Bronze Castings, Rolled Bronze and Self-Lubricating Bearing Plates:** Except as otherwise specified in the Contract Documents, provide self-lubrication bearing plates to the following requirements:~~

~~1. Bronze to 962-9.1.~~

~~2. Recesses, not grooves, filled with lubricating compound.~~

~~3. A solid type lubricant consisting of graphite-metallic substances having lubricating properties and a lubricating binder. The lubricating materials are to be of a type capable of withstanding atmospheric elements and that do not promote chemical or electrolytic reactions. Internally mold the lubricant and press it into the recesses by hydraulic pressure of at least 6,000 psi [40 MPa] to form a dense, nonplastic lubricant.~~

~~4. Recesses arranged in a geometric pattern such that successive rows overlap in the direction (directions) of motion. Provide these lubricant-filled recesses over the entire bearing area subject to motion, with a coverage of between 25 to 35 percent of the bearing area.~~

~~5. Furnish bearing plates to the dimensions shown in the Contract Documents. All tool marks in the direction of motion.~~

~~6. Machine-finished surfaces with a surface roughness of 125 micro-inches [3 um] or less, when measured in accordance with ANSI (ASA) Standards.~~

~~7. Provide flat surfaces to within 0.005 inch per inch [0.005 mm per mm] in both length and width.~~

~~8. For mating surfaces: the concave surface with a positive tolerance not exceeding 0.01 inch [0.25 mm]; the convex surface with a negative tolerance not exceeding 0.01 inch [0.25 mm].~~

~~9. A coefficient of friction between self-lubricating plates and steel surfaces not exceeding 0.10 under a unit loading of 1,200 psi [8.3 MPa].~~

~~10. Prior to erection, apply a coating of graphite lubricant, in either stick or paste form, to the self-lubricating and steel surfaces in contact.~~

962-10 Certifications and Verification.

962-10.1 General: *Supply Certified Mill Tests Reports (MTR) to the Engineer for all metal materials to be used in fabrication, including but not limited to plates, bars, shapes, and fasteners in accordance with their respective ASTM or AASHTO specification. Materials not requiring an MTR are as noted in the Contract Documents. Furnish six copies of the MTR. On each copy of the MTR show or attach the full and complete designation of the project for which the materials are intended for use and specifically cross-identify each furnished piece to the order material.*

Material meeting equivalent AASHTO and ASTM specifications may be supplied under either specification. Provide materials in accordance with the latest edition of the specifications shown below, as approved by the Engineer.

962-10.2 Conformance: *The MTR will indicate that the material is in conformance with the applicable material specification and will include actual values from required tests. Check the MTRs against the appropriate specification to ensure that materials conform to Contract Documents.*

962-10.3 Source of MTR: *MTRs must originate from the producer of the material and not from a supplier. Material from stock may only be accepted if it can be positively identified and the appropriate documentation is provided.*

962-10.4 Verification Samples: *Provide verification samples in accordance with Section 6.*

~~**962-10 Babbitt Metal.**~~

~~Provide Babbitt metal in accordance with the requirements of ASTM B 23. Use Alloy Grade No. 3, unless otherwise shown in the Contract Documents.~~

~~**962-11 Copper Water Stops.**~~

~~Unless otherwise shown in the Contract Documents, provide copper water stops meeting the requirements of ASTM B 370.~~

962-12 Heat Treatments.

Provide procedures and perform heat treatments in accordance with Section 460.