

**SECTION 05 50 00
METAL FABRICATIONS**

SPEC WRITER NOTES:

- 1. Use this section only for NCA projects.
- 2. Delete between //____// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.
- 3. Use terminology as listed and coordinate drawings to use the same term.
- 4. This section includes custom fabricated items.
- 5. List additional items required by the project.
- 6. VA standard details numbers are identified in list in parenthesis following each item; delete numbers from project specification.

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified:
 - 1. Support for wall and ceiling mounted items.
 - 2. Loose Lintels.
 - 3. Shelf Angles.
 - 4. Handrails.

SPEC WRITER NOTES:

- 1. Add additional items included in project.

5. //_____.

1.2 RELATED WORK

- A. Railings attached to steel stairs: Section 05 51 00, METAL STAIRS.
- B. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Prime and finish painting: Section 09 91 00, PAINTING.
- D. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

1.3 SUSTAINABILITY REQUIREMENTS

- A. Materials in this section may contribute towards contract compliance with sustainability requirements. See Section 01 81 11, SUSTAINABLE

DESIGN REQUIREMENTS, for project // local/regional materials, // low-emitting materials, // recycled content, // _____// requirements.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS AND PRODUCT DATA.
- B. Shop Drawings:
 - 1. Indicate each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
 - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
 - 3. Provide templates and rough-in measurements as required.
- C. Manufacturer's Certificates:
 - 1. Anodized finish as specified.
 - 2. Live load designs as specified.
- D. Submit Design Calculations for specified live loads including dead loads prepared by professional engineer licensed in the location of their practice.
- E. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.5 QUALITY ASSURANCE

- A. Each manufactured product must meet or exceed the requirements specified and be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type to be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

SPEC WRITER NOTES:

1. Remove reference citations that do not remain in Part 2 or Part 3 of edited specification.
2. Verify and make dates indicated for remaining citations the most current at date of submittal; determine changes from date indicated on the TIL download of the section and modify requirements impacted by the changes.

B. American Society of Mechanical Engineers (ASME):

B18.6.1-81 (R2016) Wood Screws
 B18.2.2-2022 Nuts for General Applications

C. American Society for Testing and Materials (ASTM):

A36/A36M-19 Carbon Structural Steel
 A123/A123M-17 Zinc (Hot-Dip Galvanized) Coatings on Iron and
 Steel Products
 A307-21 Carbon Steel Bolts, Studs, and Threaded Rod
 60,000 PSI Tensile Strength
 A500/A500M-21a Cold-Formed Welded and Seamless Carbon Steel
 Structural Tubing in Rounds and Shapes
 A653/A653M-22 Steel Sheet, Zinc Coated (Galvanized) or Zinc-
 Iron Alloy Coated (Galvannealed) by the Hot-Dip
 Process
 C1107/C1107M-20 Packaged Dry, Hydraulic-Cement Grout
 (Nonshrink)
 E488/E488M-22 Strength of Anchors in Concrete Elements
 F436-11 Hardened Steel Washers

D. American Welding Society (AWS):

D1.1/D1.1M:2010 Structural Welding Code Steel
 D1.2/D1.2M:2008 Structural Welding Code Aluminum
 D1.3/D1.3M:2008 Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06-2006 Metal Finishes Manual

F. Structural Steel Painting Council (SSPC):

SSPC-SP 1 Solvent Cleaning
 SSPC-SP 2 Hand Tool Cleaning
 SSPC-SP 3 Power Tool Cleaning

PART 2 - PRODUCTS

SPEC WRITER NOTES:

1. Update materials requirements to agree with applicable requirements (types,

- grades, classes,) specified in the referenced Applicable Publications.
2. Coordinate with structural design criteria and specify live loads where forklift and other vehicles will subject plates, gratings and trap doors in floors or pavements to concentrated loads.

2.1 MATERIALS

- A. Structural Steel: ASTM A36.
- B. Structural Tubing: ASTM A500.
- C. Primer Paint: As specified in Section 09 91 00, PAINTING.
- D. Modular Channel Units:
 1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
 2. Form channel with in-turned pyramid shaped clamping ridges on each side.
 3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
 4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A653, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
- E. Grout: ASTM C1107, pourable type.

2.2 HARDWARE

- A. Rough Hardware:
 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
 2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal is used.
- B. Anchor Bolts: ASTM A307; same material, color, and finish as the metal to which applied when exposed.
- C. //Expansion Anchors // Sleeve Anchors // Adhesive Anchors //: Design values listed must be as tested according to ASTM E488.
- D. Lag Screws and Bolts: ASME B18.2.1, type and grade best suited for the purpose.

E. Toggle Bolts: ASME B18.2.1.

F. Bolts, Nuts, Studs and Rivets: ASME B18.2.2 or ASTM A307.

G. Washers: ASTM F436, type to suit material and anchorage.

2.3 FABRICATION

A. General:

1. Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, // support framing for ceiling-mounted toilet partitions, // miscellaneous mountings and frames.
2. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as required to support wall loads over openings. Provide with connections and // fasteners // welds //.
3. Construct to have at least 200 mm 8 inches bearing on masonry at each end.
4. Provide angles and plates, ASTM A36, for embedment as indicated.
5. Galvanize embedded items exposed to the elements according to ASTM A123, G90 unless noted otherwise.

B. Material:

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named, or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

C. Size:

1. Size and thickness of members as shown.

D. Connections:

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punch or drill; burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.

6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable member's machine screws or bolts.

E. Fasteners and Anchors:

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self-drilling and tapping screws or bolts.

F. Workmanship:

1. General:
 - a. Fabricate items to design shown.
 - b. Furnish members in longest lengths commercially available within the limits shown and specified.
 - c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
 - d. Provide holes, sinkages, and reinforcement shown and required for fasteners and anchorage items.
 - e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
 - f. Prepare members for the installation and fitting of hardware.
 - g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.

- h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
- 2. Welding:
 - a. Weld in accordance with AWS standards as listed in article Applicable Publications.
 - 3. Joining:
 - a. Miter or butt members at corners.
 - b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
 - 4. Anchors:
 - a. Provide as indicated.
 - 5. Cutting and Fitting:
 - a. Accurately cut, machine and fit joints, corners, copes, and miters.
 - b. Fit removable members to be easily removed.
 - c. Design and construct field connections in the most practical place for appearance and ease of installation.
 - d. Fit pieces together as required.
 - e. Fabricate connections for ease of assembly and disassembly without use of special tools.
 - f. Joints firm when assembled.
 - g. Conceal joining, fitting and welding on exposed work as far as practical.
 - h. Do not show rivets and screws prominently on the exposed face.
 - i. Fabricate fit of components and the alignment of holes to eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

SPEC WRITER NOTES:

- 1. If more than one finish is used on project, specify applicable finish under the item. Coordinate paragraphs to delete finishes not used.

G. Finish:

- 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.
- 2. Steel and Iron: NAAMM AMP 504.
 - a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
 - b. Surfaces exposed in the finished work:

- 1) Finish smooth rough surfaces and remove projections.
- 2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.

c. Shop Prime Painting:

- 1) Surfaces of Ferrous Metal:
 - a) Provide as defined in SSPC-SP2 and SP3.

H. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.4 SUPPORTS

A. General:

1. Fabricate ASTM A36 structural steel shapes as shown.
2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
3. Field connections may be welded or bolted.

B. For Ceiling Hung Toilet Stall:

1. Use a continuous steel channel above pilasters with hangers centered over pilasters.
2. Make provision for installation of stud bolts in lower flange of channel.
3. Provide a continuous steel angle at wall and channel braces spaced as shown.
4. Use threaded rod hangers.
5. Provide diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.

SPEC WRITER NOTES:

1. Coordinate with structural section and drawings for specifying sizes.

2.5 LOOSE LINTELS

- A. Furnish lintels of sizes shown.
- B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.

SPEC WRITER NOTES:

1. Coordinate with structural section for shelf angles part of steel framing this paragraph is for angles to concrete framing.

2.6 SHELF ANGLES

- A. Fabricate from steel angles of size shown.

B. Attach shelf angle as indicated.

SPEC WRITER NOTES:

1. Verify railings are detailed for compliance with NFPA 101 in public areas.

2.7 HANDRAILS

- A. Design Criteria: 900 N (200 pounds) in any direction at any point.
- B. Provide continuous welded joints, dressed smooth and flush.
- C. Standard flush fittings, designed to be welded, may be used.
- D. Exposed threads will not be approved.
- E. Form handrail brackets to size and design shown.
- F. Close free ends of rail with flush metal caps welded in place except where flanges for securing to walls with bolts are shown.
- G. Make provisions for attaching handrail brackets to wall, posts, and handrail as shown.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Items set into concrete or masonry.
 1. Provide temporary bracing for such items until concrete or masonry is set.
 2. Place in accordance with setting drawings and instructions.
 3. Build strap anchors, into masonry as work progresses.
- C. Field weld in accordance with AWS.
 1. Design and finish as specified for shop welding.
 2. Use continuous weld unless specified otherwise.
- D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed, or substrate damaged by their use.
- E. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

3.2 INSTALLATION OF SUPPORTS

- A. Anchorage to Structure:
 1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.

2. Secure supports to concrete inserts by bolting or continuous welding.
3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts unless shown otherwise.
4. Secure steel plate or hat channels to studs as detailed on shop drawings.

B. Ceiling Hung Toilet Stalls:

1. Securely anchor hangers of continuous steel channel above pilasters to structure above.
2. Bolt continuous steel angle at wall to masonry or weld to face of each metal stud.
3. Secure brace for steel channels over toilet stall pilasters to wall angle supports with bolts at each end spaced as shown.
4. Install diagonal angle brace where the suspended ceiling over toilet stalls does not extend to side wall of room.
5. Install stud bolts in lower flange of channel before installing furred down ceiling over toilet stalls.
6. Install support for ceiling hung pilasters at entrance screen to toilet room similar to toilet stall pilasters.

3.3 STEEL LINTELS

- A. Use lintel sizes and combinations shown or specified.
- B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.
- C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

3.4 SHELF ANGLES

- A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
- B. Provide expansion space at end of members.

3.5 STEEL COMPONENTS FOR MILLWORK ITEMS

- A. Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.6 CLEAN AND ADJUSTING

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame

and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

- B. Clean after installation exposed prefinished and plated items and items fabricated from aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

- - - E N D - - -