

Specifications & Details Outside Right-of-Way Working Group

June 29, 2011 Meeting (1:30 pm to 3:00 pm)

at

Arizona Rock Product Association

9th Avenue and Adams Street

Phoenix, AZ

Meeting Agenda

INTRODUCTION

- Welcome participants – Introductions

DISCUSSION ITEMS

- Review draft revisions to MAG (see attached summary)
 - Section 350 – Removal of Existing Improvements
 - Section 340 – Detectable Warnings
 - Section 415/Details 135-1 thru 4 – Guardrails
 - Section 520 – Handrails
 - Section 772 – Chain Link Fence
 - Detail 202 – Alley Details
 - Detail 210 – Speed Humps
- Discuss other potential cases
 - Section 515 – Steel Structures
 - Detail 131 – Street Sign Base
 - Others?
- Next meeting date

Cases for Removal from MAG Specifications and Details

Section	Title	Recommended Action by Outside ROW Working Group	Status
313	Bituminous Treated Base Course	Delete this section as this procedure is no longer used.	case submitted
410	Precast Safety Curbs	Delete this section as this is for outside of ROW locations.	
501	Driving Piles	Delete this section as it is outdated, rarely used and partly a design document.	
780	Timber Piles	Delete this section as it is outdated, rarely used and provides little guidance.	
781	Steel Piles	Delete this section as it is outdated, rarely used and provides little guidance.	
782	Concrete Piles	Delete this section as it is outdated, rarely used and provides little guidance.	
785	Steel Castings	Delete this detail as these materials are no longer used.	
786	Bronze Casting	Delete this detail as these materials are no longer used.	
Detail	Title	Recommended Action by Outside ROW Working Group	Status
150	Precast Safety Curb	Delete from ROW standard as these are used outside ROW.	case submitted
170	Typical Runway or Taxiway Edge Lighting Detail	Delete from ROW standard. Detail is for work outside of the ROW and may not be current.	
402	Encased Pipe for Canal Crossing	Delete this detail since irrigation agency standards supercede MAG on canals.	
425	24" Aluminum Manhole Frame and Cover	Delete this detail as it is rarely (if ever) used.	

Cases for Removal from MAG Specifications and Details - Minor Changes Needed in Other Standards/Details

Section	Title	Recommended Action by Outside ROW Working Group	Status
225	Watering	Delete this section since it provides minimal technical guidance - mostly general conditions. Modify earthwork and dust control specifications if needed and include general conditions in Section 104.	case submitted
787	Gray Iron Castings	Delete this section; place essential information from 787.3 in existing details referencing gray iron castings.	
Detail	Title	Recommended Action by Outside ROW Working Group	Status
190	Rock Correction Procedure for Maximum Density Determination	Delete from ROW construction standard. This is a QC testing requirement that can be specified in Section 301 using ASTM D4718.	case submitted

Cases for Review by Various Members & Agency Staff (green shading denotes minor revisions)

Section	Title	Recommended Action by Outside ROW Working Group	Status
350	Removal of Existing Improvements	Modify to include utility abandonment/removal requirements.	drafted
340	Sidewalks, Curbs, Gutters, (etc)	Update detectable warnings section	drafted
360	Telecommunications Installations	Revise to meet current agency practices and requirements.	
401	Traffic Control	Revise to meet current agency practices and requirements.	
415	Flexible Metal Guardrail	Revise to meet current agency practices and requirements.	drafted
430	Landscaping and Planting	Revise to include current practices and innovations (hydroseeding)	
440	Sprinkler Irrigation System Installation	Revise to include current practices and innovations (drip systems)	
515	Steel Structures	Revise section to delete references to major structures that fall under building code regulations; section should be for minor steel structures only.	???
520	Steel and Aluminum Handrails	Revise to match existing details and current codes/standards.	drafted
530	Painting	Section is outdated and needs to be revised to meet current industry standards.	
757	Sprinkler Irrigation Systems	Suggest changing title to "Landscape Irrigation" and update for current materials (drip systems).	
770	Structural And Rivet Steel, Rivets, Bolts, Pins, And Anchor Bolts	Antiquated specification. Update for current materials.	
772	Chain Link Fence	Review and change ASTM standards that are out of date.	drafted
779	Wood Preservatives	Section is outdated and needs to be revised to meet current industry standards.	
790	Paint	Section is outdated and needs to be revised to meet current industry standards.	
795	Landscaping Material	Revise to include current materials used by agencies.	
Detail	Title	Recommended Action by Outside ROW Working Group	Status
131	Street Sign Base	Update to include materials currently used by agencies for street sign supports.	???
135	Steel Guard Rail	Include end attenuation details.	drafted
145	Safety Rail	Modify to accommodate OSHA onsite needs	
160	Chain Link Fence and Gate	Include options for higher fencing as allowed in Section 420.	
202	Alley Details	Modify inverted crown alley for access road use; delete unpaved surface or include aggregate or RAP surfacing	drafted
204	Equipment Crossing	Review to determine if this is still needed. When would it be used?	
210	Residential Speed Hump	Include option for speed table (Tempe design); include a note on drainage impacts.	COC

SECTION 350

REMOVAL OF EXISTING IMPROVEMENTS

350.1 DESCRIPTION:

This work shall consist of removal and disposal of various existing improvements, such as pavements, structures, pipes, conduits, curbs and gutters, and other items necessary for the accomplishment of the improvement.

350.2 CONSTRUCTION METHODS:

The removal of existing improvements shall be conducted in such a manner as not to injure active utilities or any portion of the improvement that is to remain in place. See Section 107.

Utilities to be removed shall be disconnected and taken out in accordance with the requirements of the utility owner to the limits shown on the plans. Utilities shall not be abandoned in place. Utility removal shall not be performed until a release has been obtained from the utility stating that their respective service connection and appurtenant equipment have been disconnected, removed or sealed and plugged in a safe manner.

Sidewalks shall be removed to a distance required to maintain a maximum slope for the replaced portion of sidewalk, for one inch per foot and all driveways shall be removed to a distance as required by standard details.

Existing concrete driveway curbs and gutters shall be removed to the right-of-way line and the new end of curb faced.

Portland cement concrete pavements, curbs and gutters and sidewalks designated on the plans for removal shall be saw-cut at match lines, in accordance with Section 601 and removed.

Asphalt concrete pavements designated on the plans for removal shall be cut in accordance with Section 336.

Removal of trees, stumps, roots, rubbish, and other objectionable materials in the right-of-way shall be done in accordance with Section 201.

Backfill of all excavated areas below structures shall be in accordance with Section 206.4. Backfill and compaction of all other excavated areas shall be compacted to the densities as prescribed in Section 601 (trenches) or Section 211 (holes, pits or other depressions).

All surplus materials shall be immediately hauled from the jobsite and disposed of in accordance with Section 205.

350.3 MISCELLANEOUS REMOVAL AND OTHER WORK:

This work shall include, but not be limited to the following, where called for on the plans:

(A) Relocate existing fence and gate.

(B) Remove and reset mail boxes.

- (C) Remove signs and bases in right-of-way.
- (D) Remove planter boxes, block walls, concrete walls, footings, headwalls, irrigation structures, and storm water inlets.
- (E) Install plugs for pipes and remove existing plugs as necessary for new construction.
- (F) Remove wooden and concrete bridges.
- (G) Remove median island slabs.
- (H) Remove pavements and aggregate base where called for outside the roadway prism.

350.4 PAYMENT:

Payment for removals will be made at the unit ~~bid-proposal~~ prices ~~bid in the applicable proposal pay for~~ each removal items, which price shall be full compensation for the item complete, as described herein or on the plans.

Revisions to MAG Section 340:

Concrete Curb, Gutter, Sidewalk, Sidewalk Ramps, Driveway and Alley Entrance”

340.2.1 Detectable Warnings

Truncated dome dimensions and spacing for Detectable Warnings are defined by the Americans with Disabilities Act Accessibilities Guidelines (ADAAG) for optimal detect-ability and public safety. Four essential detectable warning design factors, Color & Contrast, Material, Strength & Performance, and Attachment System, are defined in the following subsections to suit local performance requirements.

Detectable warnings shall consist of raised truncated domes aligned in a square grid pattern in conformity to the ADAAG Americans with Disabilities Accessibility Guidelines. Truncated domes shall have the following nominal dimensions: base diameter of nominal 1.0 inches (0.9 inches minimum) top diameter of 50 percent of the base diameter minimum to 65 percent of the base diameter maximum, and height of nominal 0.2 inches. Dome center-to-center spacing of 2.35 inches, measured between the most adjacent domes on the square grid. Dome center-to-center spacing for radial installations shall be 1.6 inches minimum and 2.4 inches maximum with a base-to-base spacing of 0.65 inches minimum. Detectable warning edges shall be sized and installed so that dome spacing is maintained across adjoining edges.

340.2.1.1 Color & Contrast Detectable warnings shall contrast visually with adjoining surfaces, either light-on-dark, or dark-on-light. Use white where adjacent walking surfaces are dark (e.g. asphalt), and a dark brick red color where adjacent walking surfaces are light (e.g. standard gray concrete). Other colors shall be approved by the jurisdictional agency prior to installation. Visual contrast shall be obtained by color, use safety yellow or other approved color. The color shall be an integral to the detectable warning part of the material surface. The material is to be durable with a non-slip surface not subject to spalling, chipping, delamination, or separation.

340.2.1.2 Material Detectable warnings shall be constructed of high-strength concrete material only. The material is to be durable with a non-slip surface not subject to spalling, -chipping, delamination, -or separation. Detectable warning tiles shall have a design service life of 30 years and carry a warranty against manufacturer defect of at least 10 years.

340.2.1.3 Strength & Performance High-strength concrete detectable warnings shall meet the following minimum ASTM standards for strength and performance:

<u>Strength/Performance Test</u>	<u>Minimum Requirement</u>	<u>ASTM Method</u>
<u>Compressive strength</u>	<u>>12,000 psi</u>	<u>ASTM C 39-04</u>
<u>Tensile strength</u>	<u>>2,500 psi</u>	<u>ASTM C 496</u>
<u>Flexural yield strength</u>	<u>>2,500 psi</u>	<u>ASTM C 947-03</u>
<u>Slip Resistance</u>	<u>>FA=0.85</u>	<u>ASTM C 947-03</u>
<u>Abrasion Resistance</u>	<u><0.03 cm³/cm²</u>	<u>ASTM 418</u>
<u>Water Absorption</u>	<u><0.50%</u>	<u>ASTM C 140</u>
<u>Freeze/Thaw</u>	<u>0.00%</u>	<u>ASTM C 1262</u>

Manufacturer conformance with the above minimum requirements shall be demonstrated by furnishing the jurisdictional agency with results of independent laboratory tests. The jurisdictional agency may request detectable warning samples for additional supplier-paid quality assurance testing at an agency-selected laboratory. All detectable warnings shall be approved by the local jurisdictional agency prior to installation.

340.2.1.4 Anchoring System Detectable warnings shall be installed directly into freshly poured concrete (i.e. wet-set) with a proven wet-set anchoring mechanism that assures constant contact of the detectable warning bottom surface with the concrete slurry as it cures, thus rendering the ramp a single monolithic structure.

340.3.1 Detectable Warnings The detectable warning surface shall be located so that the edge nearest the curb line is 6 inches minimum and 8 inches maximum back from the face of curb. Detectable warning surfaces for railroads shall be located so that the edge nearest the rail crossing is 6 inches minimum and 8 inches maximum from the vehicle dynamic envelope.

Detectable warnings shall be installed perpendicular to the direction of pedestrian/wheelchair travel and have a minimum width of 24 inches measured perpendicular to the edge of the roadway or rail crossing. The base surface of detectable warnings shall be installed flush with the adjacent walkway surface; the truncated domes shall extend above the walkway surface. The boundary between detectable warnings and the adjacent walkway shall provide a flush uniform surface that will not cause ponding of water nor present a tripping hazard. Partial domes at the edge of the detectable warning shall be made flush to match the base surface of the detectable warning. Detectable warnings installed on curb ramps shall extend the full width of the ramp depression.

Detectable warnings installed on sidewalk ramps shall modify the sidewalk concrete thickness at the detectable warning to provide a minimum thickness of four-inches (4"). When detectable warnings are modules inset into the sidewalk ramp, the bottom surface of the sidewalk shall be lowered a distance equal to or greater than the module thickness to maintain the minimum sidewalk thickness. The sidewalk bottom surface shall have a minimum transition taper length of 12" between the thickened and normal/depth sections of sidewalk.

Detectable warnings shall be installed as shown in Details 235.1 through 235.5.

SECTION 415

FLEXIBLE METAL GUARDRAIL

415.1 DESCRIPTION:

~~This~~ The work under this section shall consist of furnishing all materials, constructing metal beam ~~new~~ guard-railing, and delineating guardrail sections at the locations and in accordance with the details shown on the plans, and as specified in the special provisions per the requirements of this section.

415.2 MATERIALS ~~AND CONSTRUCTION:~~

~~Materials and construction for the railings shall conform to the following requirements:~~

The rail elements, ~~terminal sections~~, bolts, nuts and other fittings shall conform to the specifications of AASHTO M-180, except as modified in this specification. ~~The edges and center of the rail element shall contact each post or block. Rail element joints shall be lapped not less than 12 1/2 inches and bolted.~~ The rail metal shall be open hearth, electric furnace, or basic oxygen steel and, in addition to conforming to the requirements of AASHTO M-180, shall withstand a cold bend, without cracking of 180 degrees around a mandrel of a diameter equal to 2 1/2 times the thickness of the plate.

~~The ends of each length of railing shall be fitted with terminal sections.~~

Three certified copies of mill test reports of each heat from which the rail element is formed shall be furnished to the Engineer.

All material shall be new.

Railing Parts furnished under these specifications shall be interchangeable with similar parts regardless of source. All surfaces of guardrail elements that are exposed to traffic shall present a uniform, pleasing appearance and shall be free of scars, stains or corrosion.

Nails shall be 16 penny common galvanized. Nails for retainer strap shall be 10 penny common, galvanized.

Bolts shall have shoulders of such shape as will prevent the bolts from turning.

Unless otherwise specified the rail elements, terminal sections, bolts, nuts, and other fittings shall be galvanized in accordance with Section 771. Where galvanizing has been damaged, the coating shall be repaired in accordance with Section 771.

Prismatic guardrail reflector tabs shall have a minimum thickness of 3/16", and be either galvanized steel or ultraviolet-resistant plastic. Prismatic guardrail-mounted barrier markers shall have an ultraviolet-resistant reflective surface, be secured to the body in accordance with the manufacturer's recommendations, and have a trapezoidal-shaped body as shown in the Reflector Tab Detail of ADOT Roadway Standard Drawing C-10.01.

~~Posts, including blocks, shall be construction grade, Douglas Fir, free of heart center.~~

Timber for posts and blocks shall be rough sawn (unplanned) or S4S with the nominal dimensions indicated. Any species or group of woods graded in accordance with the requirements for Timber and Posts of the Western Wood Products Association may be used. Timber shall be No. 1 or better, and the stress grade shall be as follows:

<u>6" by 8" Post and Block</u>	<u>1200 psi</u>
<u>8" by 8" Post and Block</u>	<u>900 psi</u>
<u>10" by 10" Post and Block</u>	<u>900 psi</u>

When the plans show guardrail systems using 8" by 8" timber posts and blocks, the Contractor may use 8 1/4" nominal size posts and blocks with a stress grade of 825 pounds per square inch. Substitution of 8" by 8" posts for 6" by 8" post may be approved on a per project basis by the engineer.

At the time of installation, the dimensions of timber posts and blocks shall vary no more than plus or minus 1/2" from the nominal dimensions as specified on the project plans.

The size tolerance of rough sawn block in the direction of the bolt holes shall vary no more than plus or minus 3/8". Only one type of post and block shall be used for any one continuous length of guardrail.

~~The posts and blocks~~All timber shall be pressure treated have a preservative treatment after fabrication with oil borne pentachlorophenol, or coppernaphthenate, as provided in per the requirements of Section 779.

415.3 CONSTRUCTION REQUIREMENTS:

415.3.1 General: The construction of the various types of guardrail shall include the assembly and erection of all component parts complete at the locations shown on the project plans or as requested by the Engineer. All materials shall be new except as provided for under the project plans.

General guardrail construction shall be done in accordance with ADOT Roadway Standard Drawings C-10.01, C-10.02 and C-10.03. Departure end terminals shall be done in accordance with ADOT Roadway Standard Drawing C-10.8

Terminal sections shall be installed in accordance with the manufacturer's recommendations.

Workmanship shall be equivalent to good commercial practice and all edges, bolt holes and surfaces shall be free of torn metal, burrs, sharp edges and protrusions.

The various types of guardrail shall be constructed with wood posts and wood blocks, except where other post materials to be used are noted on the plans.

The bolted connection of the rail element to the post shall withstand a 5,000 pound pull at right angles to the line of the railing. ~~The All~~ metal work shall be fabricated in the shop, ~~and no~~ punching, cutting or welding ~~will be permitted~~ shall be done in the field, except as provided for by the project plans. All metal cut in the field shall be cleaned and the galvanizing repaired in accordance with Section 771.

Where field cutting or boring of wood posts and blocks is permitted, the affected areas shall be thoroughly swabbed with at least two passes of the same type of wood preservative as initially used.

Where Wood posts with rectangular sections are used, the posts shall be set so that the longest dimension is perpendicular to the rail.

All bolts shall extend beyond the nuts a minimum of two threads, except that all bolts adjacent to pedestrian traffic shall be cut off flush to the nut.

Bolts extending more than 2" beyond the nut shall be cut off to less than 1/2" beyond the nut.

Unless otherwise shown on the plans, bolts shall be torqued as follows:

<u>Diameter of Bolt</u>	<u>Torque, Foot/Pounds</u>
<u>5/8"</u>	<u>45-50</u>
<u>3/4"</u>	<u>70-75</u>
<u>7/8" and larger</u>	<u>120-125</u>

All bolts, other than those specified to be torqued, shall be securely tightened.

When guardrail is being constructed under traffic, the work shall be conducted so as to constitute the least hazard to the public. Guardrail work shall be performed in the direction of traffic flow when feasible.

Any section of guardrail that is removed for modification shall be replaced within five calendar days of the date the guardrail is removed, unless otherwise directed by the Engineer. At the end of each day, incomplete guardrail sections having an ~~Rail elements shall be lapped so that the~~ exposed ends ~~toward oncoming will not face approaching traffic.~~ shall have a buffer end section (MAG Standard Detail 135-4, Detail No. 5 Buffer End Section) bolted securely in place together with approved overnight traffic control devices in place.

415.3.2 Delineation: The maximum spacing between reflector tabs shall not exceed six posts. The slotted part of the tab shall be installed under the mounting bolt head so that the ReflectORIZED surface of the tab faces oncoming traffic. The exposed ends of the slotted part of the tab shall be bent up against and then over the top of the bolt head. The color of the reflective portion of the barrier markers shall conform to the color of the adjacent edge line. Silver-faced reflector tabs shall be installed on the right hand side of all roadways, and yellow-faced tabs shall be installed on the left-hand side of one-way, or median divided roadways.

All guardrail delineation shall be installed in accordance with the manufacturer's recommendations and as specified herein.

415.3.3 Roadway Guardrail: Wood posts shall either be driven, or placed in manually or mechanically dug holes; however, driven posts will not be permitted at locations where damage to the curb, gutter, sidewalk, buried items, shoulders or pavement might occur. The Engineer will be the sole judge as to whether driving of posts will be allowed. Driving of posts shall be accomplished in a manner that will prevent battering, burring, or distortion of the post. Any post which is damaged to the extent it is unfit for use in the finished work, as determined by the Engineer, shall be removed and replaced at no additional cost to the Agency.

The posts shall be firmly placed in the ground. The space around posts shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted to the density of the surrounding material.

Where pavement is disturbed in the construction of guardrail, the damaged surfacing shall be repaired as approved by the Engineer. Where a culvert or other obstacle is at an elevation, which would interfere with full depth post placement, guardrail installation shall comply with requirements of Section 415.3.4 Bolted Guardrail Anchors or Section 415.3.5 Nested Guardrail.

Wood blocks shall be toe nailed to the wood post with one 16 penny galvanized nail on each side of the top of the block. Wood blocks shall be set so that the top of the block is no more than 1/2" above or below the top of the post, unless otherwise shown on the project plans.

Rail elements shall be spliced at 25 foot intervals or less. Rail elements shall be spliced at posts unless otherwise shown on the project plans. The rail element shall have full bearing at joints. When the radius of curvature is 150 feet or less, the rail elements shall be ~~shaped in the shop~~ curved.

Posts shall be placed at equal intervals, as shown on the plans, except that the end posts may be spaced closer to adjacent posts if directed by the Engineer.

The Contractor shall dispose of ~~S~~urplus excavated material remaining after the guard railing has been constructed shall be disposed of.

Railing parts furnished under these specifications shall be interchangeable with similar parts regardless of source.

415.3.4 Bolted Guardrail Anchors: Where the elevation of the top surface of a box culvert or other similar installation prevents the placement of a post of the specified length, the posts shall be shortened and anchored in accordance with ADOT Roadway Standard Drawing C-10.07 at the locations shown on the plans.

415.3.5 Nested Guardrail: This work shall consist of furnishing and constructing nested guardrail, Type 1, 2, or 3, as shown in *ADOT Roadway Standard Drawing C-10.06* including all materials, in accordance with the requirements of the project plans.

Nested guardrail consists of additional steel W-beam sections attached as an appurtenance to guardrail.

415.3.6 Guardrail to Structure Transitions: Guardrail transitions shall be constructed in accordance with the details shown on the project plans, at the locations shown on the plans. *Thrie beam to concrete half barrier guardrail transitions shall be in accordance with ADOT Roadway Standard Drawing C-10.30.*

415.4 MEASUREMENT:

The limits of measurement for roadway guardrail shall be as detailed in *Maricopa County Department of Transportation Standard Detail 3016* and as shown on the project plans. Guardrail, of the type shown on the project plans, will be measured by the linear foot along the face of the rail element from center to center of end posts, exclusive of guardrail terminals, guardrail end terminal assemblies, and guardrail transitions and anchor assemblies.

Delineation is considered a part of installation of guardrail and hence will not be measured as a separate item.

The accepted quantities of bolted guardrail anchors, will be measured by the unit each, complete in place, including steel brackets, hardware, excavation, backfill, removing and replacing surfacing, cutting and fitting steel beam posts or timber posts, drilling anchor bolt holes in steel posts, timber posts, and box culverts, and disposal of surplus materials.

Nested guardrail, Type 1, 2, or 3, installed as an appurtenance to new guardrail, shall be measured by the linear foot of additional steel W-beam, installed using guardrail hardware, complete in place and accepted, as shown on the plans.

Guardrail transitions will be measured by the unit each, complete and accepted as shown on the project plans.

415.5 PAYMENT:

Payment for accepted quantities of each type of guardrail will be made at the contract unit price. Payment shall be full compensation for furnishing materials and installing guardrails, complete in place including excavation, backfill, and disposal of surplus material.

Payment for Bolted Guardrail Anchors will be at the contract unit price, and shall be full compensation for the work, complete in place, including steel brackets, hardware, excavation, backfill, removing and replacing surfacing, cutting and fitting steel beam posts or timber posts, drilling anchor bolt holes in steel posts, timber posts, and box culverts, and disposal of surplus materials.

Payment for Additional Steel W-beam will be at the contract unit price.

Payment for guardrail transitions will be at the contract unit price.

415.3 PAINTING:

~~All metal surfaces of the guard rails shall have a zinc chromate prime coat and two coats of white enamel. The exposed portions of the wood posts shall have a wood primer and two coats of finish paint. Materials and application shall be as specified in Sections 790 and 530. Colors shall be as directed by the Engineer.~~



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Case 11-____

DATE: June 27, 2011
TO: MAG Specifications and Details Committee Members
FROM: Peter Kandarlis, SRP Representative
RE: **Section 520: Steel and Aluminum Handrails**

Purpose: The existing section allows aluminum handrails, but provides no requirements for use of aluminum (steel only). Also, Detail 145, "Safety Rail" requires the use of steel railing. The welding standard is nearly 25 years out of date.

Revisions: Option A

- a) Retitle the section "Metal Handrails"
- b) Delete reference to aluminum handrails in 520.1 and the third paragraph in 520.2

Option B:

- a) Provide material requirements for aluminum handrails. Add material requirements to 520.2.
- b) Change the title on Detail 145 to "Steel Safety Rail" to be consistent with the specification.

For both options, update the welding reference to current standards (AASHTO/AWS Standard D1.5, Bridge Welding Code).

SECTION 520**STEEL AND ALUMINUM HANDRAILS****520.1 DESCRIPTION:**

Metal handrail shall consist of furnishing all materials and constructing handrail of steel or aluminum, including railing, posts, fittings and anchorages. Metal handrail shall be fabricated, installed and painted, when required, in accordance with the details shown on the plans and these specifications.

520.2 FABRICATION:

Prior to beginning any work on the fabrication of the railing, the Contractor shall submit shop drawings for approval, showing complete railing details.

Materials furnished for metal handrail shall conform to the requirements specified on the plans.

The Engineer shall be furnished complete, copies in triplicate of all mill reports on steel and aluminum materials furnished.

Railings shall be fabricated from welded or seamless members of the size and thickness shown on the plans. Steel members shall conform to the requirements of ASTM A-53. Grade B structural steel conforming to ASTM A-36, or tubular sections of hot rolled mild steel, as shown. Aluminum handrails shall conform to the requirements of either ASTM B-429 for round extruded tube or ASTM B-221 for semi-hollow extruded tube with rounded corners.

Welding shall be performed by the electric arc process and shall be done in conformance with AASHTO/AWS D1.5. Bridge Welding Code~~Specifications for Welded Highway and Railway Bridges of the AWS~~. All butt welds on exposed surfaces shall be ground flush with adjacent surfaces.

Railing panels shall be straight and true to dimensions.

For structures on curves, either horizontal or vertical, the railing shall conform closely to the curvature of the structure.

The completed steel railing units shall be galvanized in accordance with the requirements of Section 771 unless otherwise specified.

Provide Series 300 stainless steel fasteners for aluminum alloy handrails.

520.3 ERECTION:

The railing shall be carefully erected, true to line and grade. Posts and balusters shall be vertical and parallel with the deviation from the vertical for the full height of the panel not exceeding 5/8 inch. After erecting the railing, any abrasions or exposed steel shall be repaired in accordance with Section 771 or Section 530.

520.4 MEASUREMENT:

The various types of railing will be measured by the linear foot from end to end along the face of the railing including terminal sections.

520.5 PAYMENT:

The price paid per linear foot for handrailing shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work involved in constructing the railing complete in place as shown on the plans and specified herein.



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Case 11-11(b)

DATE: June 27, 2011
TO: MAG Specifications and Details Committee Members
FROM: Peter Kandarlis, SRP Representative
RE: **Superseded ASTM Specification: Chain Link Fence**

Purpose: Review ASTM standards referenced in MAG Section 772. Find outdated standards and recommend replacement standards.

Revisions: Below is a table of the ASTM standards referenced in Section 772. Replace withdrawn standard ASTM A569 with ASTM A1011. All other standards are current.

MAG Section 772 – Chain Link Fence
Referenced ASTM Standards:

ASTM F-1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM A-569	Withdrawn – replaced with ASTM A1011-10 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM A-500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM F-1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM A-653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A-924	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A-789	Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service
ASTM A-392	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A-491	Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A-824	Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use With Chain Link Fence
ASTM F-626	Standard Specification for Fence Fittings
ASTM A-121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

SECTION 520**~~STEEL AND ALUMINUM~~ METAL HANDRAILS****520.1 DESCRIPTION:**

Metal handrail shall consist of furnishing all materials and constructing steel handrail ~~of steel or aluminum~~, including railing, posts, fittings and anchorages. Metal handrail shall be fabricated, installed and painted, when required, in accordance with the details shown on the plans and these specifications.

520.2 FABRICATION:

Prior to beginning any work on the fabrication of the railing, the Contractor shall submit shop drawings for approval, showing complete railing details.

Materials furnished for metal handrail shall conform to the requirements specified on the plans.

The Engineer shall be furnished complete, copies in triplicate of all mill reports on steel ~~and aluminum~~ materials furnished.

Railings shall be fabricated from welded or seamless members of the size and thickness shown on the plans. Steel members shall conform to the requirements of ASTM A-53. Grade B structural steel conforming to ASTM A-36, or tubular sections of hot rolled mild steel, as shown.

Welding shall be performed by the electric arc process and shall be done in conformance with AASHTO/AWS D1.5, Bridge Welding Code ~~Specifications for Welded Highway and Railway Bridges of the AWS~~. All butt welds on exposed surfaces shall be ground flush with adjacent surfaces.

Railing panels shall be straight and true to dimensions.

For structures on curves, either horizontal or vertical, the railing shall conform closely to the curvature of the structure.

The completed steel railing units shall be galvanized in accordance with the requirements of Section 771 unless otherwise specified.

520.3 ERECTION:

The railing shall be carefully erected, true to line and grade. Posts and balusters shall be vertical and parallel with the deviation from the vertical for the full height of the panel not exceeding 5/8 inch. After erecting the railing, any abrasions or exposed steel shall be repaired in accordance with Section 771 or Section 530.

520.4 MEASUREMENT:

The various types of railing will be measured by the linear foot from end to end along the face of the railing including terminal sections.

520.5 PAYMENT:

The price paid per linear foot for handrailing shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all work involved in constructing the railing complete in place as shown on the plans and specified herein.