

SECTION 32 31 19**PART 1 - GENERAL****1.01 WORK INCLUDED**

The contractor shall provide all labor, materials and appurtenances necessary for installation of the industrial ornamental steel fence system defined herein at (Loch Raven Campus).

1.02 RELATED WORK

Section ____ - Earthwork

Section ____ - Concrete

1.03 SYSTEM DESCRIPTION

The manufacturer shall supply a total industrial ornamental steel fence system of the Ameristar® Aegis II® **or Equal** (specify Classic™, Majestic™, Genesis™ or Invincible™) design. They system shall include all components (i.e., pickets, rails, posts, gates and hardware) required.

1.04 QUALITY ASSURANCE

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.05 REFERENCES

ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.

ASTM D523 - Test Method for Specular Gloss.

ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

ASTM F2408 - Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.06 SUBMITTAL

The manufacturer's submittal package shall be provided prior to installation.

1.07 PRODUCT HANDLING AND STORAGE

Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.08 PRODUCT WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 10 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer's warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 - MATERIALS

2.01 MANUFACTURER

The fence system shall conform to Ameristar Aegis II, (specify Classic, Majestic, Genesis, or Invincible) design, or Equal 3-Rail style

2.02 MATERIAL

A. Steel material for fence framework (i.e. tubular pickets, rails and posts), shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90.

B. Material for pickets shall be 1" square x 14 Ga. tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner™ double wall design with outside cross-section dimensions of 1.75" square and a minimum thickness of 14 Ga. Picket holes in the ForeRunner rail shall be spaced 4.715" o.c., except for Invincible style 6' long, which shall be, spaced 4.98" o.c. Picket retaining rods shall be 0.125" diameter galvanized steel. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections. Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.03 FABRICATION

A. Pickets, rails and posts shall be precut to specified lengths. ForeRunner rails shall be prepunched to accept pickets. Pickets shall be predrilled to accept retaining rods.

B. Grommets shall be inserted into the prepunched holes in the rails and pickets shall be inserted through the grommets so that predrilled picket holes align with the internal upper raceway of the ForeRunner rails (Note: This can best be accomplished by making an alignment jig). Retaining rods shall be inserted into each ForeRunner rail so that they pass through the predrilled holes in each picket.

C. The manufactured galvanized framework shall be subjected to the PermaCoat® thermal stratification coating process (high-temperature, in-line, multi-stage, multi-layer) including, as a minimum, a six-stage pretreatment/wash

(with zinc phosphate), an electrostatic spray application of an epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils (0.0508mm). The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be (specify Black, Bronze, White, or Desert Sand). The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

D. Completed sections (i.e., panels) shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation. Panels shall be biasable to a 25% change in grade.

E. Swing gates shall be fabricated using 1.75" x 14ga Forerunner double channel rail, 2" sq. x 11ga. gate ends, and 1" sq. x 14ga. pickets. Gates that exceed 6' in width will have a 1.75" sq. x 14ga. intermediate upright. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 - EXECUTION

3.01 PREPARATION

All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

Fence post shall be spaced according to Table 3, plus or minus 1/2". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.03 FENCE INSTALLATION MAINTENANCE

When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION: NA

3.05 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

Table 1 - Minimum Sizes for Aegis II Posts

<u>Fence Posts</u>	<u>Panel Height</u>			
2-1/2" x 12 Ga.	Up to & Including 6' Height			
3" x 12 Ga.	Over 6' Up to & Including 10' Height			
4" x 11 Ga.	Over 10' Height			
<u>Gate Leaf</u>	<u>Gate Height</u>			
	<u>Up to & Including 6'</u>	<u>Over 6' Up to & Including 8'</u>	<u>Over 8' Up to & Including 10'</u>	<u>Over 12'</u>
Up to 4'	3" x 12Ga.	3" x 12 Ga.	4" x 11 Ga.	4" x 11 Ga.
4'1" to 6'	3" x 12Ga.	3" x 12 Ga.	4" x 11 Ga.	4" x 11 Ga.
6'1" to 8'	4" x 11 Ga.	6" x 3/16"	6" x 3/16"	6" x 3/16"
8'1" to 10'	4" x 11 Ga.	6" x 3/16"	6" x 3/16"	6" x 3/16"
10'1" to 12'	6" x 3/16"	6" x 3/16"	6" x 3/16"	8" x 1/4"
12'1" to 16'	6" x 3/16"	6" x 3/16"	8" x 1/4"	8" x 1/4"

Table 2 - Coating Performance Requirements

<u>Quality Characteristics</u>	<u>ASTM Test Method</u>	<u>Performance Requirements</u>
Adhesion	D3359 - Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 3,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

Table 3 - Aegis II - Post Spacing By Bracket Type

<u>Span</u>	<u>For INVINCIBLE®</u>	<u>For CLASSIC, GENESIS, & MAJESTIC</u>
	8' Nominal (91.25" Rail)	8' Nominal (92.625" Rail)

Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304) *	
Post Settings ± ½" O.C.	94-1/2"	95"	96"	96.5"	96"	96-1/2"	*97-1/2"	*98"
Span	For INVINCIBLE® 6' Nominal (67.75" Rail)		For CLASSIC, GENESIS, & MAJESTIC 6' Nominal (71.375" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304) *	
Post Settings ± ½" O.C.	75"	75.5"	71.5"	72"	71.5"	72"	*73"	*73.5"
*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.								

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