SECTION 10240 – SOUND BARRIER WALL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Ground mounted Sound Barrier wall enclosure including support framing, sound barrier panels enclosing the Mechanical Yard. The system shall include swing gates and gate hardware.
2. Requirements for Delegated structural analysis and calculations.
3. The system shall be delivered in accordance with contract plans in ready for install condition including all necessary holes in columns, retention plates, base plates, nuts, bolts, washers, plus other which may be included within the scope of supply of the barrier wall system manufacturer.

B. Related Sections include the following:

1. Section 03300 – CAST-IN-PLACE CONCRETE
2. Section 05120 – STRUCTURAL STEEL
3. Section 05500 - METAL FABRICATIONS

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware’
4. ASTM A449 – Standard Specification for Quenched and Tempered Steel Bolts and Studs.
5. ASTM A 563 – Standard Specification for Carbon and Alloy Steel Nuts.
6. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM A992 – Standard Specification for Structural Steel Shapes.
8. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
9. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
10. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

11. ASTM D790 – Standard test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
12. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM D6944 – Standard Practice for Determining the Resistance of Cured Coatings to Thermal Cycling.
14. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
15. ASTM F 463 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
16. ASTM F959 – Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series.
17. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
18. ASTMF3125 - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
19. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
20. ASTM G154 – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials.

1.03 SUBMITTALS

A. Product Data: For each type of product, component and accessories.

B. Shop Drawings: Plans, elevations, sections, full size and fully drawn details showing layout, dimensions, spacing of components, and anchorage and installation details. The shop drawings shall reflect and incorporate information from the structural calculations.

1. Include fastener layout drawings.
2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
3. Indicate type, size, and length of bolts.

C. Welding certificates.

D. Qualification Data: For Installer and fabricator.

E. Samples:

1. Provide 12 long samples of sound barrier panel showing design and selected color coating.
2. Submit 12-inch square sample of sound absorptive wall panel .

F. Coordinated Calculation Submittal:

1. Provide structural calculations, sealed by a licensed professional structural engineer in the State of Hawaii prepared in compliance with referenced documents and these specifications.
2. Where specifications and code differ, the more severe requirements shall govern. Test reports are not an acceptable substitute for calculations. Calculations shall include the following information:
    a. Analysis for all applicable loads on framing members and panels.
    b. Anchor requirements specific to conditions of the project
    c. Analysis for all applicable loads on anchors, including anchors embedded in concrete.
    d. Section property computations for framing members.
    e. Certification of conformance with structural test pressures and design pressures indicated. Include evidence of compliance by submission of product test reports with notations as required by professional structural engineer

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials for system from a single manufacturer, or materials certified by the system manufacturer as compatible with other system components.

B. Installer Qualifications: A qualified installer specializing in performing the work of this section with minimum five years documented experience.

C. Fabricator Qualifications: A qualified fabricator specializing in performing the work of this section with minimum five years documented experience.

D. Delegated Design Engineer Qualifications: Professional structural engineer legally authorized to practice in the State of Hawaii and experienced in providing structural engineering services of kind indicated that have resulted in work similar to this Project, and, who has a record of successful in-service performance.

E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

F. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

G. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original, unopened packages and containers with manufacturer’s labels identifying products legible and intact.

B. Store materials to permit easy access for inspection and identification and under cover; keep them dry and protected from the weather, direct sunlight,

surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
2. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.06 DELEGATED DESIGN REQUIREMENTS

A. Delegated Engineering Requirements:

1. Delegated Engineering Responsibility: Require sound barrier wall system manufacturer to employ a delegated engineering professional to provide engineering for work of this Section to comply with concept expressed in Contract Documents.
2. Engineer system to withstand structural design loads within limits and under conditions indicated, specified, or required, without material failure or permanent deformation of structural frame or work specified.
3. Prepare engineering calculations, shop drawings, and other submittals and affix professional seal according to respective jurisdictional licensing regulations.

1.07 PERFORMANCE REQUIREMENTS

A. Thermal Movement: Fabricate exterior components which have been designed to provide for expansion and contraction resulting from ambient temperature range of 120 degrees F and metal surface temperature extreme of 185 degrees.

B. Structural Performance: Provide sound barrier enclosure capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Structural supports and wall panels shall be designed with adequate strength and stiffness to withstand the loads as determined by IBC 2018 and ASCE 7 using the following criteria:
   a. Wind Design Criteria: As indicated on the Structural Drawings.
   b. Seismic Criteria: As indicated on the Structural Drawings.
2. Under the calculated loading conditions, the assembled acoustic structure shall not exhibit any panel joint deflection in excess of L/360, where L is the unsupported span length of any panel section in the erected structure.

C. Acoustic Performance:

1. The manufacturer shall provide certified independent test data indicating sound absorption and transmission loss characteristics of the panel

assembly. Test data must be obtained through independent tests conducted in a NVLAP accredited laboratory in accordance with ASTM E90, Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and ISO 354 or ASTM C423, Standard Method of Test for Sound Absorption of Acoustic Materials in Reverberant Rooms.

2. Sound Barrier Panels shall exhibit a minimum STC 35 and NRC 0.85.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. All components and accessories for Sound Barrier Wall Systems are products of RMP Global, Inc.

1. Sound Barrier Panels: Modular, molded plastic sound absorptive wall panels; Adelaide Panel with a running bond pattern embossed on one side and vertical slat pattern embossed on the other side. Vertical slat pattern shall be visible from the exterior of the enclosure

2.02 MATERIALS

A. Structural Steel Shapes: ASTM A 992 Grade 50.

B. Channels, Angles: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Steel Sheet: Galvanized steel, ASTM A 653, commercial steel, Type B with G90 coating.

E. Welding Electrodes: Comply with AWS requirements.

F. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-Dip Zinc Coating, ASTM A153.

2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type.

a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

G. Anchor Rods: ASTM F1554, Grade 36 or ASTM A449

1. Nuts: ASTM A563 heavy-hex carbon steel

2. Plate Washers: ASTM A36 carbon steel.

3. Washers: ASTM F436, Type1, hardened carbon steel

4. Finish: Hot-dip zinc coating, ASTM A153, Class C.

2.03 FABRICATION

A. Structural Steel:

1. Structural members shall be designed as a field bolt-together system. All holes in column webs, backer angles and base plates shall be factory drilled. All nuts, bolts and washers to be supplied by barrier wall system manufacturer. Field welding of structural components is not permitted.
2. Columns and base plates shall be supplied as factory-welded assemblies by the barrier wall system manufacturer.
3. Provide welded steel plate caps at the open end tops of tube columns sealing the tube from water infiltration. Grind welds smooth.

B. Barrier Panels: Barrier panels and their components shall be factory fabricated, sectional. and modular designed for easy and accurate field assembly. The panels and components shall not be susceptible to damage due to extended exposure to vibration, UV exposure, salt air, rain, air temperature or humidity with the passage of time.

1. All panels shall be 6-inches thick, with a mass of 4-5 lbs per square foot. The modular panel system shall be connected together by means of a interlocking connection.
    a. All panels internal reinforcing members shall be horizontal tube steel elements running horizontally at the top and bottom of each panel. Such steel reinforcing shall galvanize steel, Type G90 and hidden within the panel design.
2. Panels should have a density of at least 3lbs/ft2 of face area.
3. Panel Performance Requirements:
    a. Sound Transmission: ASTM E90; STC 35
    b. Acoustic Absorption: ASTM C423; NRC 0.85
    c. Thermal Cycling: ASTM D6944; Pass
    d. Fire Resistance: AS 1530; Pass
    e. UV Resistance: ASTM G154; Pass
    f. Flexural Strength: ASTM D790; ≥ 15 MPa
    g. Impact Resistance: ASTM D256; ≥ 90 J
    h. Salt Fog: ASTM B117; No change in appearance at 1,000 hours of exposure.

C. Gates

1. Gates shall be double-door swinging type unless noted otherwise on the Contract Documents.
2. Gate panels shall match the adjacent wall panels in material, thickness, finish, and acoustic performance to the maximum extent practical.
3. Gate assemblies shall be designed to maintain overall wall performance including STC and noise reduction intent when gates are in the closed position.
4. Gate frames shall be structural steel and designed to resist wind, seismic, and operational loads.

5. All gate hardware, including hinges, latches, locking devices, stops, and fasteners, shall be suitable for exterior use.
6. Gates shall be capable of manual operation and shall swing as indicated on approved shop drawings.

2.04 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to:
   1. Structural steel according to ASTM A 123.
   2. Steel sheet metal according to ASTM A 653

2.05 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Steel Finishes:
   1. Powder-Coat Finish: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
      a. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
      b. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
      c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
      d. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify elevations of concrete- and masonry-bearing surfaces and locations of bearing plates, and other embedments, with installer present, for compliance with requirements.

B. Verify substrate is level, smooth, capable of supporting units and imposed loads, and properly prepared for installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Beginning installation means acceptance of conditions.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary

construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 INSTALLATION, GENERAL

A. Install sound barrier wall enclosure in strict accordance with the manufacturer's written instructions and approved shop drawings and structural analysis.

3.04 INSTALLATION, STRUCTURAL SUPPORTS

A. Erect all structural members in strict accordance with the manufacturer's piece-marked installation drawings and details.

B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.

2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.

3. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

3.05 INSTALLATION, BARRIER PANELS

A. Install barrier panels in accordance with manufacturer's installation instructions.

B. Install panels level and plumb with the specified Site tolerances.

C. As each panel is installed check to make sure that it is seated properly on the support channel or tube and secure panel to the support with supplied fasteners. Repeat these steps for each panel.

D. Door panels are assemble in the same manner as the regular wall panels. Install supplied door hardware in accordance with the manufacturer's written instructions.

3.06 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION