STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HONOLULU, HAWAII

# SPECIFICATIONS

FOR

# WAIMALU FIELD OFFICE IMPROVEMENTS

PROJECT NO. HWY-O-01-2019

ISLAND OF OAHU

JANUARY 2019

## 1.1 SCOPE OF WORK

The work consists of building a newly enclosed office space between the existing trailers. At the Department of Transportation Waimalu Field Office, located at 98-314 Ponohale Street, Aiea, Hawaii 96701, the existing three (3) trailers are connected with the wooden deck where the proposed office space will be built. The newly enclosed office space will be constructed with wood structural framing for walls and roof and finished with painted wood siding on the exterior and painted gypsum boards and wall bases as specified. Hollow metal doors and frames and window are provided for access and daylight. The proposed office space will be provided with an HVAC system. Design drawings are provided in the Appendix to these specifications to indicate the general locations of the various types of work to be provided.

The work consists of the following:

(A) Construction of new office enclosure, including wood structural framing, wall finishes, floor finishes, roofing, hollow metal doors and frames, and hollow metal window frames.

(B) Installation of light fixtures, switches, and controls as complete and operational system.

(C) Installation of HVAC system, power supply, and controls as complete and operational system.

The above work shall be done in accordance with the attached design drawings, specifications, and requirements set forth in the "2005 Standard Specifications for Road and Bridge Construction" of the State of Hawaii, Department of Transportation as indicated herein (hereafter referred to as "DOT Standard Specifications").

## 1.2 QUALIFICATIONS

(A) The Offeror shall have all required personnel, labor, equipment (i.e. tools, utility trucks, etc.), permits and licenses necessary to perform all of the specified services in this contract.

(B) The Offeror shall have a valid State of Hawaii General Engineering Contractor's "A" license and valid State of Hawaii General Building Contractor's "B" license prior to bidding.

(C) The Offeror is advised that in order to be awarded a contract under this solicitation, the vendor/contractor/service provider will be required to be compliant with all laws governing entities doing business in the State of Hawaii (State) including the following chapters and pursuant to HRS §103D-310(c):

1. Chapter 237, tax clearance;

2. Chapter 383, unemployment insurance;

3. Chapter 386, workers' compensation;

4. Chapter 392, temporary disability insurance;

5. Chapter 393, prepaid health care; and

6. Section 103D-310(c), Certificate of Good Standing for entities doing business in the State.

The State will verify compliance on Hawaii Compliance Express (HCE) for awards $2,500 or greater. The HCE is an electronic system that allows vendors/contractors/service providers doing business with the State to quickly and easily demonstrate compliance with applicable laws. It is an online system that replaces the necessity of obtaining paper compliance certificates from the Department of Taxation; Federal Internal Revenue Service; Department of Labor and Industrial Relations; and Department of Commerce and Consumer Affairs.

Vendors/contractors/service providers should register with HCE prior to submitting an offer at https://vendors.ehawaii.gov. The annual registration fee is $12.00 and the 'Certificate of Vendor Compliance' is accepted for both contracting and final payment.

(D) The Offeror is further advised that in order to be awarded a contract under this solicitation, the vendor/contractor/service provider will be required to submit a performance and payment bonds executed by a surety company authorized to do business in the State of Hawaii, in an amount equal to one hundred percent of the price specified in the Contract. The performance bond shall be submitted to the contracting agency prior to the award of the Contract. **Performance and payment bonds are not required for bids less than $50,000.00.**

## 1.3 INDEMNIFICATION

The Contractor shall indemnify and hold harmless the State of Hawaii, the contracting agency, and their officers, employees, and agents from and against all liability, loss, damage, cost, and expense, including all reasonable attorney's fees, and all claims, suits, and demands therefore, arising out or resulting from the negligent, reckless, intentional, or wrongful acts, errors, or omissions of the Contractor or the Contractor's employees, officers, agents, or subcontractors under this Contract. The provisions of this paragraph shall remain in full force and effect notwithstanding the expiration or early termination of this Contract.

## 1.4 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall conduct his operations with due regard to the convenience and safety of the public and field office personnel at all times. The protection of persons and property shall be provided by the Contractor.

The Contractor shall provide and maintain in good condition convenient access to the field office and adjacent areas as may be necessary or required.

The Contractor shall limit his work to within the field office area and shall not adversely impact vehicular traffic on adjacent public roads.

The contractor is responsible for compliance with all of the laws, rules, regulations and standards applicable to the safe performance of the work to protect workers and members of the general public. The contractor is responsible for all aspects of the safety and health programs required by Hawaii Administrative Rules Section 12-110 and Hawaii Revised Statute Section 396. The contractor is responsible for the work site and the work practices of all employees on the project site and is the controlling, exposing, correcting as well as the creating employer for purposes of this scope of work. The State of Hawaii Dept of Transportation monitoring of the work in progress is not representative as the controlling employer for purposes of workplace and work practice safety and health compliance.

## 1.5 VEHICLE REQUIREMENTS

The Contractor's vehicles shall:

(A) Have the Contractor's company name and/or logo displayed on doors or side panels and shall be in letters large enough to be easily legible from a distance of one hundred (100) feet. Magnetic signs bearing the contractor's company name/logo are acceptable. Cost for the logo/contractor's company name shall be considered as incidental cost.

(B) Be in good working condition and appearance, and with no fluid leaks. All fueling and maintenance of vehicles shall be done off site and shall be considered as an incidental cost.

(C) Meet all State licensing, registration, and safety requirements, and shall be equipped properly in accordance with City, State, Federal and Occupational Safety and Health Administration (OSHA) requirements.

(D) Have insurance coverage as specified in the DOT Standard Specifications. Insurance coverage shall be considered as an incidental cost.

## 1.6 TERM OF CONTRACT

The term of this contract shall be for four (4) months from the date indicated in the Notice to Proceed from the State of Hawaii, Department of Transportation (Department).

## 1.7 OPTION TO EXTEND TERM OF CONTRACT

This contract may be extended monthly without rebidding, upon mutual agreement in writing prior to the contract expiration date, provided the basic bid price remains equal to the initial bid amount.

## 1.8 MATERIALS

(A) The following materials shall conform to the requirements listed in the applicable sections of the DOT Standard Specifications:

1. Structural Timber and Lumber 714.01

2. Signs 750.01

## 1.9 CONTRACTOR SUBMITTALS

The Contractor shall submit five (5) copies of the following to the Department for approval at least ten (10) days prior to ordering or installation:

### (A) METAL FABRICATIONS

1. Shop Drawings: Submit Four (4) sets of shop drawings for approval of the Engineer before proceeding with the work. Submit shop drawings for the following:
2. Certificates of Compliance: Submit certificates of conformance for the following:
    a. Steel plates
    b. Steel tubes
    c. Steel bolts, nuts, and washers
    d. Welding Electrodes and Rods

### (B) WOOD TREATMENT

1. Product Data: Provide data on all treatment products, including field application instructions if applicable.
    a. Provide manufacturer's Material Safety Data Sheets on all products, and hazardous materials.
2. Preserver Certifications:
    a. Provide a Certificate of Treatment showing compliance with these specifications for the following:
        a. Method of treatment performed, including dip treatment.
3. Contractor's Certification: Provide a certification letter stating that all wood used on this job including cuts and penetration were treated and coated with preservatives in compliance with requirements of this contract.

### (C) ROUGH CARPENTRY

1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
    a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

c. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

2. Fastener Patterns: Full-size templates for fasteners in exposed framing.

3. INFORMATIONAL SUBMITTALS

a. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

b. Evaluation Reports: For the following, from ICC-ES:

a. Wood-preservative-treated wood.

b. Engineered wood products.

c. Metal framing anchors.

(D) FINISH CARPENTRY

1. Shop Drawings: Show all prefabricated millwork. Include details and erection data associated with the work of other trades, materials and species, arrangements, profiles of moldings, thicknesses; sizes of parts, construction, fastenings and clearances. Do not deliver materials to the site until shop drawings and cuts have been approved. The Contractor shall be responsible for errors in detailing and fabrication and for correct fitting of mill-fabricated items.

2. Samples: Submit following for approval prior to fabrication:

a. Plastic laminate, 4-inch square sample of each type and color.

b. Hardwood trim, 6-inch strip of each type.

3. Certificates of Grade: Submit certificates from the grading agency on graded but unmarked lumber or plywood (unmarked for reasons of appearance) attesting that these materials meet the grade requirements specified herein. The acceptance of certificates shall in no case jeopardize the State's right to have lumber or plywood graded by an independent inspection agency when deemed necessary to assure compliance.

4. Five (5) sets of submittals shall be submitted for review.

(E) SHEATHING

1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

    a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.

    b. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

(F) MINERAL FIBER BLANKET INSULATION

1. Manufacturer's Catalog Data: Provide data on product characteristics, performance criteria and limitations.
2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
3. Five (5) sets of submittals shall be submitted for review.

(G) FLASHING AND SHEET METAL

4. Shop Drawings: Indicate on shop drawings, general construction, configurations, jointing methods and locations, fastening methods, locations and installation details for the following:

    a. Fabrication drawings for leader head.
    b. Fabrication drawings for gutters.
    c. Fabrication drawings for roof/wall flashings.

5. Product Data: Provide manufacturer’s catalog data for prefabricated components.

    a. Sheet Metal: Submit Manufacturer’s data indicating percentage of recycle material in sheet metal to verify sustainable acquisition.

(H) SEALANTS

1. Manufacturer’s Data: Submit manufacturer’s product data and specifications for type

of sealant required, to the Engineer for approval.

2. Material Safety Data Sheets (MSDS): Submit MSDS for each sealant product.

3. Color Samples: Submit each of color finish samples of sealants.

4. Guarantee: Submit written guarantee as specified in paragraph entitled "GUARANTY" herinbelow.

(I) THERMOPLASTIC SINGLE PLY ROOFING

1. Product Data and Material Safety Data Sheets (MSDS): For each type of product indicated.

2. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.

    a. Base flashings, cants, and membrane terminations.

    b. Layout of tapered insulation, including slopes.

    c. Crickets, saddles, and tapered edge strips, including slopes.

    d. Insulation fastening patterns.

3. Warranty Drawings: Provide record drawings with information sufficient to satisfy the requirements of the manufacturer's warranty.

4. Samples for Verification: For the following products:

    a. 12 by 12 inch square of base sheet and cap sheet in material and color specified, finished with specified surface coating.

    b. 12 by 12 inch square of cover board.

    c. 12 by 12 inch square of roof insulation.

    d. 12" of edge metal in color selected by owner.

    e. 12 by 12 inch square of walkway pad or walkway cap sheet.

    f. Six insulation fasteners of each type, length, and finish.

5. Certificates:

    a. Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

    b. Signed by roofing system manufacturer certifying that its representative is a permanent employee of the company and authorized to inspect, act, and make commitments on behalf of the manufacturer. Independent inspectors are not allowed.

c. Signed by roof system manufacturer stating the representative will meet Manufacturer Participation and Field Quality Control (Inspections) requirements as set forth in this specification.

d. Signed by adhesive manufacturer showing that roofer is a trained and authorized applicator of the assembly only for condition where insulation is be adhesive applied onto decking. The certificate shall also reference the Project, type of deck, insulation and adhesive materials being used and state the adhesive products are compatible with products intended to be adhered.

6. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system, including edge metal components comply with requirements specified herein.

   a. Submit third party test result evidence of meeting specified requirements.

7. Product Test Reports: By an independent qualified testing agency, for components of roofing system.

   a. Fire classification rating test.

   b. Showing products conform to ASTM requirements as specified.

   c. UL listing for roof system as specified herein.

8. Design Pressure Calculations: Submit roof system manufacturer's design pressure calculations for roof area in accordance with ASCE 7-10 and local building code. Include roof system attachment diagram, certifying the system's compliance with applicable site-specific wind load requirements.

9. Maintenance Data: For roofing system to include in maintenance manuals.

10. Warranties: Sample warranties specified in this Section.

11. Inspection Report: Copy of roofing system manufacturer representative's roofing inspection progress and final inspection reports.

12. Information Card: For each roof project, furnish a typewritten information card for facility records and a card laminated in plastic, attached to the underside of the roof hatch, or as directed by the Contracting Officer. Cards shall be 8-1/2 inches x 11 inches. Information card shall identify facility name and/or facility designation (letter or number), contract number, type of roof system installed, including deck type, type of membrane, number of plies, method of application, manufacturer; manufacturer's representative contact information, insulation and cover board system and thickness; date of completion; installer's warranty expiration date; installing contractor and contact information; membrane manufacture's material warranty expiration date; warranty reference number, and warranty contact information. See Roofing Information Card on next page.

ROOFING INFORMATION CARD

FACILITY

Building Name _____ Building No. _____

DAGS Job. No. _____

ROOF

Type of Roof System _____ Type of Deck _____

MEMBRANE

Type of Membrane_____ No. of Plies _____

APPLICATION

Method of Application _____ (nailed, heat applied, self-adhered, etc.)

INSULATION

Type of Insulation_____ Cover Board _____

Thickness_____ Thickness _____

INSTALLER (Roofing Contractor)

Company _____ Contact person _____

Contact No. _____

MANUFACTURER

Company_____ Representative_____

Contact No. _____

COMPLETION DATE _____

DATE INSTALLER'S WARRANTY EXPIRES _____

DATE MANUFACTURER'S WARRANTY EXPIRES _____

Warranty Reference No. _____ Warranty Contact person_____

Contact No. _____

(J) BIRD SPIKES

1. Product Data: Submit manufacturer’s descriptive literature and product specifications for each product including catalogs, installation instructions and other descriptive material.

2. Provide Warranty on material and installation.

3. Provide samples of each type of spike excluding proposed fastening methods.

4. Provide statement by official indicating that they are a certified installation company.

(K) STEEL DOORS AND FRAMES AND WINDOW FRAMES

1. Shop Drawings: Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details. Include a schedule showing door and frame locations. Submit shop drawings for the following:

    a. Doors

    b. Frames

    c. Window Frames

    d. Accessories

2. Manufacturer's Catalog Data: Manufacturer's descriptive literature for doors, frames and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. Submit manufacturer's catalog data for the following:

(L) FINISH HARDWARE

1. Hardware List and Catalog Cuts: Submit for approval a listing of each item of finish hardware and a manufacturers' catalog cut for each different item of hardware.

2. Hardware Schedule: Include for each item the quantity, manufacturer's catalog number, corresponding reference publication type number, size, finish, and key control symbols.

3. Certified Test Reports: Indicate that each item listed under Hardware Items meets the standard listed for that item. A copy of the listing of proposed hardware items in the current applicable BHMA directories of certified products may be submitted in lieu of test reports.

4. Project Reference Samples: Upon delivery of finish hardware to the site, select and tag one item of each different type. Identify each item by reference publication type or number and manufacturer's catalog number. Items shall remain on file until similar items have been installed, at which time items on file shall be installed in

predetermined locations.

5. Five (5) sets of submittals shall be submitted for review.

(M) GLAZING

1. Manufacturer's Catalog Data: Include glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing materials specified.
2. Certificates: Certify or label each product to indicate that materials meet specified requirements.
3. Samples: Submit 6-inch square of each type of glass.

(N) GYPSUM BOARD

1. Product Data: Submit for each type of gypsum board.
    a. Gypsum board: Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project. Joint Treatment Materials. Submit manufacturer's product data, indicating VOC content.
    b. Fasteners
    c. Joint treatment materials
    d. Accessories
2. Samples: Submit not less than three different textured finish samples; two samples of each texture on 8" x 12" x 1/2" thick gypsum.

(O) RESILIENT BASE AND ACCESSORIES

1. Product Data: For each type of product.
2. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.
3. Samples for Initial Selection: For each type of product indicated.
4. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long. Colors to be selected from the 700 series wall base.
5. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.
6. Adhesives: Manufacturer's descriptive data, documentation stating physical

characteristics, and mildew and germicidal characteristics. Provide Material Safety Data Sheets (MSDS) for all primers and adhesives to the State. Highlight VOC emissions.

7. Manufacturer's Instructions: Manufacturer's printed installation instructions for all flooring materials and accessories, including preparation of substrate, seaming techniques, and recommended adhesives.

8. Five (5) sets of submittals shall be submitted for review.

(P) RESILIENT TILE FLOORING

1. Product Data: For each type of product.

2. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

    a. Show details of special patterns.

3. Samples: Full-size units of each color and pattern of floor tile required.

    a. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

4. Samples for Initial Selection: For each type of floor tile indicated.

5. Samples for Verification: Full-size units of each color and pattern of floor tile required.

    a. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

6. Welded-Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm) Sample applied to a rigid backing and prepared by Installer for this Project.

7. Product Schedule: For floor tile. Use same designations indicated on Drawings.

8. INFORMATIONAL SUBMITTALS

    a. Qualification Data: For Installer.

9. CLOSEOUT SUBMITTALS

    a. Maintenance Data: For each type of floor tile to include in maintenance manuals.

10. MAINTENANCE MATERIAL SUBMITTALS

    a. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing

contents.

a. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

(Q) ACOUSTICAL TILE CEILING

1. Manufacturer's Catalog Data: Submit product data for the following:

   a. Acoustical Ceilings: Cut sheet, product literature or letter from manufacturer that clearly indicates the percentage by weight of post-consumer and pre-consumer (post-industrial) recycled content.

   b. Indicate material cost.

   c. Adhesives

   d. Sealants

   e. List of all installed adhesives and sealants including manufacturer, quantity used in gallons and VOC content.

   f. Suspension systems

(R) PAINTING

1. Schedule of Finishes

   Six (6) sets of proposed painting finish schedule shall be submitted to the Engineer for approval. The schedule shall indicate the wet film thickness (mils) at which the proposed paints/coatings will be applied that are necessary to achieve the final dry film thickness indicated on the Schedule of Finishes under Section 2.02.

2. Color Samples: It shall be the intent to match the existing building color(s) as close as possible. As such, submittal of color brush-outs shall not be required.

3. Schedule of Operations: Before work on the project is commenced, four (4) complete sets of a work schedule showing his sequence of operations and dates shall be submitted by the Contractor to the Engineer.

4. Guaranty: Three (3) copies of a written guarantee shall be submitted to the Engineer.

5. Certifications: Six (6) copies of asbestos-free, lead-free, zinc-chromate-free, strontium-chromate-free, cadmium free and mercury-free paint certificates shall be submitted to the Engineer. Should the Contractor require additional copies for distribution to his suppliers and sub-contractors, he shall include these additional copies along with his submittal.

6. Manufacturer's Product Data Sheets: Six (6) copies of the Manufacturer's Product Data Sheets for the primers, paints, coatings, solvents, sealing and patching materials, sealants and caulking shall be submitted to the Engineer. Data sheets shall indicate thinning and mixing instructions, required film thickness (mil) and application

instructions. Should the Contractor require additional copies for distribution to his suppliers and sub-contractors, he shall include these additional copies along with his submittal.

7. Manufacturer's Material Safety Data Sheets: Six (6) copies of the Manufacturer's Material Safety Data Sheets for coatings, solvents, and other hazardous materials shall be submitted to the Engineer. Should the Contractor require additional copies for distribution to his suppliers and sub-contractors, he shall include these additional copies along with his submittal.

(S) SIGNAGE

1. Manufacturer's Catalog Data: Submit catalog data for each type of sign specified, include descriptions of materials, finishes, color, fastening and anchoring devices and appurtenances.

2. Samples: Submit three (3) representative sample of each type of signs specified for finish and workmanship for approval.

(T) FIRE EXTINGUISHERS AND CABINETS

1. Manufacturer's Catalog Data: Materials to be provided shall be the standard cataloged products of manufacturers regularly engaged in the manufacture of fire extinguishers.

2. Certificates of Compliances: Fire extinguishers shall bear the UL label. In lieu of such label, a written certificate from a Nationally recognized testing agency adequately equipped and competent to perform such services may be submitted stating that the items have been tested and that the units conform to the requirements specified herein, including methods of testing of the specified agencies.

3. Verification of Conditions and Dimensions: The Contractor shall be responsible for the coordination and proper relation of the work to the building structure and to the work of other trades.

4. Five (5) sets of submittals shall be submitted for review.

(U) GENERAL ELECTRICAL REQUIREMENTS

5. Submit shop drawings and catalog cuts of the equipment and products identified in General Electrical Requirements and Electrical Work sections for approval. Each submittal shall be prepared with a summary sheet attached to each copy identifying all items included in the submittal. Incomplete submittals and those without summary sheets will be returned without review.

6. Warranty: Submit warranty as noted under item entitled “WARRANTY” herein below.

(V) ELECTRICAL WORK

1. Submit for approval one (1) set of reproducible transparency and three (3) sets of ozalid prints of shop drawings or six (6) sets of catalog cuts of following equipment and resubmit until approval is received before placing order:

    a. Electric loadcenters

    b. Disconnect switches

    c. Lighting fixtures, including drivers and battery packs

    d. Electrical devices

    e. Junction boxes and outlet boxes

    f. Raceways and wires

    g. Any built-to-order equipment

2. Shop drawings and catalog cuts for substitute materials shall clearly specify compliance with and/or deviation from specified material. Approval of shop drawings and catalog cuts shall not release the Contractor from complying with intent of specifications and drawings. Any deviations from approved shop drawings shall have prior approval by the Contracting Officer.

## 1.10 STORAGE AND HANDLING

(A) The Contractor shall exercise care in the storage and handling of all construction materials and components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the Contractor.

## 1.11 REMOVAL OF RUBBISH AND DEBRIS

(A) The Contractor shall remove all rubbish and debris originating from his operations from the project site before the end of each work day, or immediately, if it creates a traffic hazard, and keep the working area in a neat orderly condition.

(B) No rubbish resulting from Contractor's operations, material or equipment shall be stored where it will interfere with the operations of the field office or adjacent areas. Debris and rubbish shall be disposed of in accordance with City, State, and Federal laws and regulations. Disposal of debris and rubbish shall be considered as an incidental cost.

(C) Disposal of Contractor's solid waste requires a receipt from the certified landfill. The Contractor shall submit to the State the required receipt with his or her monthly invoice. Payments shall not be processed without the required receipt.

(D) Burning of debris and rubbish is prohibited.

## 1.12 BEST MANAGEMENT PRACTICES (BMP)

(A) BMP measures to control pollutants shall be in place before any work is initiated. The BMP measures shall be properly constructed and maintained throughout the construction period.

Submit a Site-Specific BMP Plan along with a completed Site-Specific BMP Review Checklist to the Engineer for acceptance within 30 calendar days of contract execution. The Site-Specific BMP Review Checklist may be obtained from http://www.stormwaterhawaii.com.

Follow the guidelines in the "Construction Best Management Practices Field Manual" dated January 2008, in developing, installing, and maintaining BMP and Honolulu's City and County "Rules for Soil Erosion Standards and Guidelines". The Manual may be obtained from the HDOT Statewide Stormwater Management Program Website at http://www.stormwaterhawaii.com/resources under Construction Best Management Practices Field Manual.

(B) No sediment laden runoff shall leave the site or enter any drainage system or State waters.

(C) Inspect all BMP control measures daily, until all ground disturbing activities have been completed and BMP are approved to be removed by the State.

(D) Maintain all erosion and sediment BMP control measures in good working order. If repair is necessary, initiate repair immediately and complete the repair by the close of the following day. "Immediately" means the Contractor shall take all reasonable measures to minimize or prevent discharge of pollutants until a permanent solution is installed and made operational. The Contractor shall maintain records of all checks and repairs.

(E) The Contractor, at his own expense, shall keep the project areas and surrounding areas free from dust nuisance. The work shall be done in conformance with air pollution control standards contained in Hawaii Administrative Rules: Chapter 11-60, "Air Pollution Control".

(F) The Contractor shall observe and comply with the State Department of Health regulations regarding storm water discharge.

(G) Good housekeeping shall be utilized to ensure protection of roadways from mud, dirt, and debris.

(H) Contractor shall ensure the proper working order and conduct regular maintenance of all construction equipment. All construction equipment shall be serviced offsite and no oil or fuel shall be stored on site.

(I) Water must be discharged in a manner that the discharge shall not cause or contribute to a violation of the basic water quality criteria as specified in the Hawaii Administrative Rules, Section 11-54-04.

(J) Washout or discharge concrete truck drum wash water only at a designated site as far as practicable from storm drain inlets or State waters. Do not discharge water in the drainage system or State waters. Disposal by percolation is prohibited. Clean disposal site as required or as requested by the Engineer.

## 1.13 SITE PREPARATION

(A) The Contractor shall furnish all labor, equipment, materials, and incidentals required to complete the work in accordance with the contract documents.

(B) The Contractor shall field verify the location and dimensions of the proposed improvements. Any discrepancies shall be brought to the attention of the Engineer for further direction.

## 1.14 METAL FABRICATIONS

(A) SUMMARY

1. Provide metal fabrications as indicated and as specified herein.

(B) QUALIFICATION OF WELDERS

1. Qualify welders in accordance with AWS D1.1 using procedures, materials, and equipment of the type required for the work.

(C) DELIVERY AND STORAGE

1. Handle, store, and protect materials in accordance with the manufacturer's recommendations. Replace all damaged material with new material or repair as approved by the Engineer.

(D) MATERIALS

1. Structural Steel Shapes: ASTM A 36.
2. Structural Steel Tubing: ASTM A 500, Grade B.
3. Anchors and Fasteners:
    a. Bolts: ASTM A 307,hot dip galvanized.
    b. Nuts: ASTM A 563, Grade A, heavy hex style, hot dip galvanized.
    c. Washers: ASTM F 844, hot dip galvanized Stainless Steel Fasteners
4. Welding Electrodes: AWS D1.1, E70XX, low hydrogen electrode, unless indicated otherwise.

(E) FABRICATION

1. By mechanics skilled in the trade and in accordance with the manufacturer's directions. Metal work shall be well formed to shape and size, with sharp lines and angles and true curves. Provide welding and bracing of adequate strength and durability, with tight, flush joints, dressed smooth and clean.

2. Measurements: Before fabrication, take necessary field measurements and verify all measurements.

3. Metal surfaces shall be clean and free from mill scale, flake rust and rust pitting; well formed and finished to shape and size, with sharp lines and angles and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Welds shall be used and finished flush and smooth on surfaces that will be exposed after installation.

4. Fastening: Provide the necessary rebates, lugs and brackets so that the work can be assembled in a neat, substantial manner. Holes for bolts shall be drilled.

5. Welding:

    a. Welding of structural steel shall be in accordance with in accordance with AWS D1.1.

    b. Weld in a manner to prevent permanent distortion of the connected parts. Weld continuously along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections. Grind smooth all welds that will be visible in the finished installation.

(F) FABRICATION FINISHES

1. Galvanizing: ASTM A l23 and, ASTM A l53, as applicable. Hot-dip galvanize, except for stainless steel, anchor bolts, fasteners, washers, and parts or devices necessary for proper installation unless indicated otherwise after fabrication where practicable.

2. Galvanize: Steel tube railings, top and base plates, anchor bolts, nuts, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

3. Repair of Damaged Zinc-Coated Surfaces: Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A 780 or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Engineer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick of paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe of excess material.

## 1.15 WOOD TREATMENT

(A) SUMMARY

1. Plant preservative and insecticide treatment of lumber and other wood products specified in other Sections of this Specification by pressure and dip methods.

***2.*** Field treatment of field cut or drilled lumber.

(B) RELATED SECTIONS

1. Section - Rough Carpentry: Lumber products.

(C) REFERENCES: The latest publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. American Wood-Preservers' Association

    a. AWPA C2-00: Lumber, Timber, Bridge Ties and Mine Ties-Preservative Treatment by Pressure Processes.

    b. AWPA C9-00: Plywood-Preservative Treatment by Pressure Processes.

    c. AWPA C31-00: Lumber Used out of Contact with the Ground and Continuously Protected from Liquid Water-Treatment by Pressure Processes.

    d. AWPA M4-01: Care of Preservative-Treated Wood Products.

    e. AWPA C20-99: Structural Lumber- Fire Retardant Treatment by Pressure Process.

    f. AWPA N1-01: All millwork, Preservative Treatment by Non-Pressure Process.

    g. AWPA N2-00: Composite Wood Products, Preservative Treatment by Non-Pressure Process.

(D) REGULATORY REQUIREMENTS

1. Comply with State OSHL (Occupancy Safety and Health Law) and pollution controls regulations of the State Department of Health and EPA.

(E) QUALITY ASSURANCE

1. Source Limitations for Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

2. Comply with the American Wood-Preservers' Association standards as described in the applicable building or residential code. Preservatives shall be EPA registered.

3. Do not use preservatives containing arsenic or other EPA banned chemicals.

4. Do not use Perma-Clear 65 or other zinc napthanate and permethrin products.

(F) DELIVERY STORAGE AND HANDLING

1. Protect AWPA C31 inorganic boron treated wood from contact with the ground, rain or other sources of liquid water until permanent installation of covering construction.

(G) GUARANTEE

1. Provide a two year guarantee to replace all treated wood which is attacked by subterranean termites,

2. Provide a five year guarantee to replace all treated wood which is attacked by dry wood termites or deteriorates due to dry rot. This warranty period supersedes the guarantee provisions of the Interim General Conditions (IGC). The Surety shall not be held liable beyond two years of the project acceptance date.

3. Guarantee periods shall commence on Project Acceptance date.

(H) GENERAL

1. Mill lumber to finish size and shape prior to treating, and treat before assembly. Plywood may be treated in regular panel sizes.

2. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece, or omit marking and provide certificates of treatment compliance issued by inspection agency.

(I) PRESSURE TREATMENT WITH WATER-BORNE PRESERVATIVES

1. Treating solutions:

    a. Copper azole, Type A (CBA-A).

    b. Inorganic boron (SBX).

2. Treatment Methods:

    a. General:

        a. All water-borne treatment methods require incising of lumber of nominal 2 inch thickness (1-1/2 inches actual dimension).

        b. Choice of treatment method and conditions of use of each treating

solution shall conform to the treatment schedule contained in Part 3.

b. CBA-A: Treatment methods, depth of penetration and treating solution retention shall conform to AWPA C2 for lumber and C9 for plywood.

c. SBX: Treatment method shall conform to AWPA C31. Treating solution retention shall be a minimum of 0.28 pounds per cubic foot (equivalent to 0.42 DOT).

3. Drying:

a. Before Treatment:

a. CBA-A Treatment: Wood shall be air dried or kiln-dried before treatment to an average moisture content of 28 percent or less per AWPA standards.

b. SBX Treatment: Wood having a moisture content higher than 28% is acceptable when treating with SBX.

b. After Treatment:

c. All 1 inch and 2 inch lumber and all plywood shall be dried to a moisture content of 19 percent or less after treatment.

(J) PRESSURE TREATMENT WITH OIL-BORNE PRESERVATIVES

1. Treating Solution:

a. 0.50 percent by weight chlorpyrifos, 0.75 percent by weight 3-iodo-2-propynyl butyl carbamate (IPBC). The solvent used in formulating the preservative solution shall meet the requirements of AWPA hydrocarbon solvent Type C, Standard P9, Paragraph 3.1.

b. For interior application use low odor mineral spirits as solvent.

2. Treatment Methods:

a. Treated wood shall attain the following net retention requirements: 0.0175 pounds of Chlorpyrifos per cubic foot of wood, 0.035 pound of 3-Iodo-2 propynyl butyl carbamate per cubic foot of wood.

3. Drying:

a. Before Treatment: All wood treated with oil-borne preservatives shall be kiln-dried to an average moisture content of 12% to 15% per AWPA standards.

b. After Treatment: Wood shall be thoroughly dried and virtually odor-free prior to installation.

(K) PRESERVATION BY DIP TREATMENT

1. Treating Solution:

    a. Any of the Oil-Borne Preservatives listed above.

    b. A solution of 1 quart chlopyrifos in 55 gallons of a 0.50 percent IPBC solution.

2. Treatment Methods:

    a. Immersion treat for a minimum period of 15 minutes.

    b. Do not incise lumber scheduled to be left unpainted or receive a clear finish.

3. Drying:

    a. After Treatment: Wood shall be thoroughly dried and virtually odor-free prior to installation.

(L) FIELD TREATMENT

1. Treatment Method:

    a. Treat in accordance with AWPA Standard M4-98 using two heavy brush coats of a treating solution.

(M) SCHEDULE OF TREATMENTS

1. Species:

    a. Treat all wood species except all-heart redwood.

    b. All water-borne and oil-borne treatment solutions are applicable to douglas-fir and hem-fir species except for CBA-A treatment which is acceptable for hem-fir species only.

2. Application:

    a. Pressure Treatment:

        a. General: Unless otherwise stipulated, all lumber and plywood shall be pressure treated.

        b. Hardwood flooring and exposed lumber 1-1/2" (net thickness) and over that will be unpainted or receive a clear finish shall be and pressure treated with oil-borne preservative. Do not incise lumber.

        c. SBX treated wood shall not be used in areas exposed to direct precipitation (e.g. exposed decking, trellises, fencing, etc.) unless painted or covered with a finish material.

b. Dip Treatment: All finish lumber under 1-1/2 inch net thickness (except hardwood flooring); finish plywood; and mill work items, such as for cabinet work, shelving and similar wood work that will be exposed to view in the finished work.

c. Field Cuts: Treat end cuts, notches and penetrations into treated lumber or plywood. Exception: Cuts and penetrations made in SBX treated wood 2 inches or less in nominal thickness need not be field treated.

## 1.16 ROUGH CARPENTRY

### (A) SUMMARY

1. Section Includes:
    a. Framing with dimension lumber.
    b. Framing with timber.
    c. Framing with engineered wood products.
    d. Wood blocking, and nailers.
2. Related Requirements:
    a. Section SHEATHING for sheathing, subflooring, and underlayment.

### (B) DEFINITIONS

1. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
2. Exposed Framing: Framing not concealed by other construction.
3. Timber: Lumber of 5 inches nominal size or greater in least dimension.

### (C) QUALITY ASSURANCE

1. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

### (D) DELIVERY, STORAGE, AND HANDLING

1. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

(E) WOOD PRODUCTS, GENERAL

1. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

    a. Factory mark each piece of lumber with grade stamp of grading agency.

    b. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.

    c. Dress lumber, S4S, unless otherwise indicated.

2. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

3. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

    a. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

(F) WOOD-PRESERVATIVE-TREATED LUMBER

1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

    a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

    b. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

4. Application: Treat all rough carpentry unless otherwise indicated.

(G) DIMENSION LUMBER FRAMING

1. Partition Walls: No. 2 grade.
    a. Application: Exterior walls and interior partition walls.
    b. Species:
        a. Douglas fir-larch; WCLIB or WWPA.
2. Load-Bearing Partitions: Any species and grade with a modulus of elasticity of at least 1,100,000 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.
    a. Application: Exterior walls and interior partition walls.
3. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
    a. Species:
        a. Douglas fir-larch; WCLIB or WWPA.
4. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,100,000 psi and an extreme fiber stress in bending of at least 600 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

(H) TIMBER FRAMING

1. Comply with the following requirements, according to grading rules of grading agency indicated:
    a. Species and Grade: Douglas fir-larch, No. 1 grade; WCLIB, or WWPA.
    b. Maximum Moisture Content: 19 percent.
    c. Additional Restriction: Free of heart centers.

(I) ENGINEERED WOOD PRODUCTS

1. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
2. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
    a. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal

depth members.

b. Modulus of Elasticity, Edgewise: 2,000,000 psi.

3. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.

    a. Extreme Fiber Stress in Bending, Edgewise: 2900 psi.

    b. Modulus of Elasticity, Edgewise: 2,200,000 psi.

4. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.

    a. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.

    b. Structural Properties: Depths and design values not less than those indicated.

    c. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.

5. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.

    a. Manufacturer: Provide products by same manufacturer as I-joists.

    b. Material: All-veneer product.

    c. Thickness: 1-1/4 inches.

    d. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

(J) MISCELLANEOUS LUMBER

1. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

    a. Blocking.

    b. Nailers.

2. Dimension Lumber Items: No. 2 grade lumber of the following species:

a. Douglas fir-larch; WCLIB or WWPA

3. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

4. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

5. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

(K) FASTENERS

1. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

    a. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

2. Nails, Brads, and Staples: ASTM F1667.

(L) METAL FRAMING ANCHORS

1. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

2. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G90 coating designation.

3. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

    a. Use for wood-preservative-treated lumber and where indicated.

4. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

(M) INSTALLATION, GENERAL

1. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

2. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

3. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

4. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

5. Do not splice structural members between supports unless otherwise indicated.

6. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

    a. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

7. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

8. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

    a. Use inorganic boron for items that are continuously protected from liquid water.

    b. Use copper naphthenate for items not continuously protected from liquid water.

9. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

10. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

    a. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

    b. ICC-ES evaluation report for fastener.

11. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless

otherwise indicated.

12. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

    a. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

    b. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

    c. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

(N) WOOD BLOCKING, AND NAILER INSTALLATION

1. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

2. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

(O) WALL AND PARTITION FRAMING INSTALLATION

1. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs]. Fasten plates to supporting construction unless otherwise indicated.

    a. For exterior walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.

    b. For interior partitions and walls, provide 2-by-6-inch nominal size wood studs spaced 16 inches o.c. unless otherwise indicated.

    c. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

2. Construct corners and intersections with three or more studs.

3. Frame openings with multiple studs and headers. Provide nailed header members of

thickness equal to width of studs. Support headers on jamb studs.

a. For walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

(P) RAFTER FRAMING INSTALLATION

1. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

2. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

(Q) TIMBER FRAMING INSTALLATION

1. Install timber beams with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.

2. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch airspace at sides and ends of wood members.

3. Install wood posts using metal anchors indicated.

4. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

(R) PROTECTION

1. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

2. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

1.17 FINISH CARPENTRY

(A) RELATED SECTIONS

1. Coordinate installation of carpentry work with Section WOOD TREATMENT.

(B) REFERENCES: The latest publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. Architectural Woodwork Institute (AWI)

   AWI-QS - Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program

2. Builders Hardware Manufacturer's Association (BHMA) BHMA A156.9 - Cabinet Hardware

3. National Electrical Manufacturers Association (NEMA)

   NEMA LD 3 - High Pressure Decorative Laminates

4. National Hardwood Lumber Association (NHLA)

   NHLA RMIHC - Rules for the Measurement and Inspection of Hardwood and Cypress Lumber

5. Product Standard (PS)

   PS 1 - Construction and Industrial Plywood

(C) MATERIALS

1. Finish Lumber: Douglas fir, C&Btr, S4S per West Coast Inspection Bureau. Lumber shall be treated, new, dry, sound, undamaged, free from defects which may impair its strength or durability, in sizes indicated. Lumber shall bear grade marks of an approved grading agency.

2. Laminated Plastic: NEMA LD 3, GP 50 and PF 42countertops, BK-20 for horizontal backing sheet, and CL 20 for cabinet vertical liner. Color and pattern shall be as selected. Contact adhesive shall be type as recommended by manufacturer of laminated plastic.

3. Hardwood: White oak, FAS, kilned dried, graded in accordance with National Hardwood Lumber Association (NHLA).

4. Plywood Panel Siding: Product Standard PS-1, exterior type, Grade B-C, medium density overlay one side, 4-feet wide, maximum practicable lengths,5/8-inch thick, smooth face, T-1-11.

5. Rough Hardware: Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of shall be as specified herein. Rough hardware shall be zinc-coated.

(D) FABRICATION

1. Perform work in accordance with AWI QS "Architectural Woodwork Quality Standards, Guide Specification and Quality Certification Program," Sections 400 and 1600, Premium Grade. Construction details shall be flush overlay to the dimensions indicated.

2. Counter: Fabricate with lumber and a core of exterior plywood, glued and screwed to form and integral unit. Bond laminated plastic under pressure to exposed surfaces, using type of glue recommended by laminated plastic manufacturer. Shape exposed edge with hardwood trim as indicated.

3. Base and Wall Cabinets

    a. Cabinet Front and Drawer Style: Flush overlay.

    b. Cabinet Core: 3/4 inch plywood.

    c. Drawer Construction: Four sided drawer box with 1/2 inch thick with plywood sides, multiple dovetailed or chuck and bore, faced and edge with plastic laminate and 1/4 inch thick tempered board drawer bottom. Full extension epoxy coated, 100-pound, telescoping ball bearing suspension.

    d. Doors: Flush overlay, 3/4 inch thick 3-ply solid core with faced and edge with plastic laminate. Concealed self closing type, 170 degree swing.

    e. Drawer/Door Pulls: Stainless steel wire finger pulls.

    f. Shelves: 3/4 inch plywood with 1/8 inch hardwood front edge banding and with faced plastic laminate. Dado metal shelf standards into sides of cabinets.

    g. Side and End Panels: 3/4 inch plywood (7-ply veneer core) with faced and edge with plastic laminate.

    h. Base Unit Bottom: 3/4 inch plywood with faced and edge with plastic laminate.

    i. Toe Space Rail: 3/4 inch by 3-3/4 inch.

    j. Back Panels: 'A inch tempered board.

    k. Cabinet Hardware: Cabinet hardware shall conform to BHMA A156.9, including the following:

        a. Doors: Concealed hinges B01602, 95 degrees opening, self closing.

        b. Pull Wire type, 3-1/2 inches wide, projects 1-5/16 inches, 5/16 diameter, BHMA 630.

        c. Drawers: Slides B85052.

        d. Drawer Pulls: Wire type, 3-1/2 inches wide, projects 1-5/16 inches, 5/16 diameter, BHMA 630.

        e. Adjustable Shelf Standards: B04071, mortised mounted, slots in

standard for shelf adjustment.

f. Supports: B84082, BHMA 603.

(E) INSTALLATION

1. Closely fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid and substantial manner.

2. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Recommended Nailing Schedule contained in NATIONAL FOREST PRODUCTS ASSOCIATION, "Manual for House Framing;" perform bolting in an approved manner. Spikes, nails, and bolts shall be drawn up tight.

3. Nailing

    a. Use only common galvanized wire nails or spikes.

    b. Do all nailing without splitting wood, pre-boring as required; replace all split members.

4. Bolting

    a. Drill holes 1/16" larger in diameter than the bolts being used; drill straight and true from one side only.

    b. Bolt threads must not bear on wood; use washers under head and nut where both bear on wood; use washers under all nuts.

5. Screws

    a. For lag-screws and wood-screws, pre-bore holes same diameter as root of thread; enlarge holes to shank diameter for length of shank.

    b. Screw, do not drive, all lag screws and wood screws.

6. Powder-Actuated Fasteners

    a. Fasteners having chipped coatings shall not be used.

    b. Lumber shall be flush and tight against each other during fastening operations.

    c. Fasteners securing siding, floor and roof sheathing shall be driven flush with the face of the material. Overdriving of the fastener shall be avoided.

    d. Where more than 20% of the fasteners are found to be overdriven up to 1/8 inch deep, or if any fastener is overdriven more than 1/8 inch deep, additional fasteners shall be driven at a rate of one additional fastener for every 2 overdriven fasteners.

    e. Where the corrosion resistant coating on the head of the fastener has been chipped by the device in excess of 25%, the fastener shall be removed and

replaced with new fastener. The device shall not be used until the driver blade has been checked for wear and tear and repaired as necessary.

(F) INSTALLATION

1. Perform work in accordance with AWI QS "Architectural Woodwork Quality Standards, Guide Specification and Quality Certification Program," Sections 900, Premium Grade. Closely fit carpentry work, set accurately to the required lines and levels, and secure in place in a rigid and substantial manner. Provide sizes, materials, and designs as indicated or as specified herein. Joints shall be tight and constructed in a manner that will conceal shrinkage. Miter trim and moldings at exterior angles and cope at interior angles and at returns; align all vertical lines. Material shall show no excessive warp. Install millwork and trim in the maximum practical lengths. Fasten finish work with finish nails. Provide blind nailing where practicable. Set face nails and stop with nonstaining putty to match finish work.

2. Preparation of Cuts: All cuts shall be dressed after wood treatment has thoroughly dried. All wood cut edges shall be sanded smooth. Exposed edges along length shall be chamfered and sanded smooth.

3. Base and Wall Cabinets: Set and secure base and wall cabinets in place rigid, plumb, and level. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops. Carefully scribe cabinets which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overlay trim for this purpose. Secure cabinet and counter bases to floor using appropriate angles and anchorages. Counter-sink anchorage devices at exposed locations used to wall mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

(G) CLEAN UP

1. At the completion of the building, at frequent intervals during construction, remove from the premises all rubbish, debris, and unused materials which has accumulated during the progress of the work.

2. Adjusting and Cleaning: Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly. Clean counters, shelves, hardware, fittings and fixtures.

1.18 SHEATHING

(A) SUMMARY

1. Section Includes:

   a. Wall sheathing.

   b. Roof sheathing.

2. Related Requirements:

    a. Section - Rough Carpentry

(B) QUALITY ASSURANCE

1. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

(C) DELIVERY, STORAGE, HANDLING

1. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

(D) WOOD PANEL PRODUCTS

1. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

3. Factory mark panels to indicate compliance with applicable standard.

(E) PRESERVATIVE TREATED PLYWOOD

1. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

    a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

2. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

3. Application: Treat all plywood unless otherwise indicated.

(F) INTERIOR WALL SHEATHING

1. Plywood Sheathing: DOC PS 1 sheathing.

    a. Span Rating: Not less than 16/0.

    b. Nominal Thickness: As indicated on the drawings

(G) EXTERIOR WALL SHEATHING

1. Plywood Sheathing: DOC PS 1 sheathing.
    a. Span Rating: Not less than 16/0.
    b. Nominal Thickness: As indicated on the drawings

(H) ROOF SHEATHING

1. Plywood Sheathing: Exposure 1 sheathing.
    a. Span Rating: Not less than 48/24.
    b. Nominal Thickness: As indicated on the drawings.

(I) FASTNERS

1. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
    a. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
2. Nails, Brads, and Staples: ASTM F 1667.
3. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
4. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.

(J) INSTALLATION, GENERAL

1. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
2. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
3. Securely attach to substrate by fastening as indicated, complying with the following:
    a. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
    b. ICC-ES evaluation report for fastener.
4. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
5. Coordinate wall and roof sheathing installation with flashing and joint-sealant

installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

6. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

7. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

(K) WOOD STRUCTURAL PANEL INSTALLATION

1. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

2. Fastening Methods: Fasten panels as indicated below:

    a. Wall and Roof Sheathing:

        a. Nail to wood framing.

        b. Space panels 1/8 inch apart at edges and ends unless otherwise noted.

1.19 MINERAL FIBER BLANKET INSULATION

(A) REFERENCES: The latest publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1. ASTM International (ASSTM)

    ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

    ASTM E 84 - Surface Burning Characteristics of Building Materials

(B) DELIVERY AND STORAGE: Deliver materials to the site in the original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect materials from damage. Do not allow insulation materials to become wet or soiled. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

(C) MATERIALS

1. A. Wall and Roof Insulation: ASTM C 665, Type I, blankets without membrane covering, with a flame spread of 25 or less, and smoke developed rating of 150 or less when tested in accordance with ASTM E 84. Materials shall not contain asbestos. Minimum R-value shall be provided as indicated on the Drawings.

2. Adhesive: Type as recommended by the insulation manufacturer.

3. Mechanical Anchors: Type as recommended by the insulation manufacturer.

(D) PREPARATION OF SURFACES: Surfaces shall be clean, dry, and free of any projections.

(E) INSTALLATION

1. Install insulation in accordance with insulation manufacturer's instructions.

2. Install in walls spaces without gaps or voids.

3. Trim insulation neatly to fit spaces.

4. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

5. Fasten in accordance manufacturer's recommendations.

6. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

## 1.20 FLASHING AND SHEET METAL

(A) SUMMARY

1. Provide flashing and sheet metal as indicated and as specified herein.

(B) QUALITY ASSURANCE

1. Conform to SMACNA Manual Drawings for nominal sizing of components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

(C) DELIVERY, STORAGE, AND HANDLING

1. Stack preformed material to prevent twisting, bending, or abrasion, and to aid ventilation. Slope to drain.

2. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

(D) MATERIALS

1. Stainless Steel Sheets: ASTM A 167 for 26/28 gage or ASTM A 240/A 240M for 24 gage, Type 316, 2B finished fully annealed, or 2D finished dead soft tempered.

3. Anchorage Devices: Type recommended by fabricator.

4. Solder: ASTM B 32, Composition Sn 50.

5. Soldering Flux: ASTM B 32, Type OA.

6. Gutter hangers, dimensions: 1"x1/8" stainless steel, minimum.

7. Downspout straps: 2"x1/8"stainless steel, minimum.

8. PVC schedule 80 downspouts.

(E) FABRICATION

1. Form flashings of profiles and to SMACNA requirements.

2. Field measure site conditions prior to fabricating work.

3. Fabricate with required connection pieces.

4. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

5. Hem exposed edges of metal.

6. Pretin edges of copper sheet.

7. Solder metal joints. After soldering, remove flux. Wipe and wash solder joints clean.

8. Fabricate flashing and accessories, solder watertight.

9. Splash Blocks: Provide at outlets of downspouts emptying at grade. Splash blocks shall be precast concrete, 16 inches long, 12 inches wide, and 6 inches thick with smooth-finished countersunk dishes sloped to drain away from the building.

(F) EXAMINATION

1. Verify that surfaces are ready to receive work and conditions are as indicated on shop drawings.

2. Beginning of installation means acceptance of substrate.

(G) INSTALLATION

1. Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry and free from defects and projections which might affect the application. Installation of items not shown in detail or not covered by specifications shall meet the applicable requirements of the SMACNA Architectural Sheet Metal Manual, and the NRCA Roofing and Waterproofing Manual.

2. Install sheet metal work with lines, arises, and angles sharp and true. Exposed surfaces shall be free from visible wave, warp, and buckle, and tool marks. Exposed edges shall be folded back neatly to form a 1/2-inch hem on the concealed side. Sheet metal exposed to the weather shall be watertight with provisions for expansion and contraction.

3. Join lengths with seams soldered watertight. Flash and solder gutters to downspouts

and accessories.

4. Apply backing paint to metal back surfaces.

5. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

6. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizer solution and rinse with water.

7. Finish Touch Up: Using the touch up kit provided by the manufacturer, field coat all cut edges and touch up abraded surface finishes.

8. Flashing: Prefabricate sheet metal flashings in the shapes and sizes indicated.

(H) SCHEDULE: In addition to the drawing details, the following sheet metal items shall be the general design and details desired. Installation of items not shown in detail or not covered by specifications shall be in accordance with the SMACNA Architectural Sheet Metal Manual, and the NRCA Roofing and Waterproofing Manual.

1. Stainless Steel Gutters: The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. The outer edge of gutter shall be beaded or reinforced with a stiffening bar not less than 3/4 by 3/16-inch of material compatible with gutter. Gutters shall be fabricated in sections not less than 8 feet long. The sections shall be lapped a minimum of one inch in the direction of flow. Gutters shall be joined by riveted and soldered joints. Expansion type slip joints shall be provided midway between outlets. Support and fasten gutters on approved type adjustable hangers spaced not more than 30 inches on centers. Gutters shall be adjusted to slope uniformly to outlets, with high points occurring midway between outlets. Hangers and fastenings shall be fabricated from metals compatible with the gutters.

2. PVC schedule 80 downspouts.

(I) CLEANING: Clean all exposed sheet metal work at completion of installation. Grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris shall be removed, and the work scrubbed clean. All exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks.

## 1.21 SEALANTS

(A) SUMMARY

1. Completely close with sealant all joints specified or required to be sealed to a watertight condition.

(B) JOB CONDITIONS

1. Examine joint surfaces and backing, and their anchorage to the structure, and conditions under which joint sealer work is to be performed, and notify Contractor in writing of conditions detrimental to proper completion of the work and performance

of sealers. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in a manner acceptable to Installer. On surfaces to be painted, install sealants prior to painting. Coordinate with SECTION - PAINTING.

2. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions. Proceed with the work only when weather conditions are favorable for proper cure and development of high early bond strength.

(C) PRODUCT HANDLING

1. Delivery: Deliver sealants to the jobsite in sealed containers labeled to show the designated name, formula, or specification number, lot number, color, date of manufacture, shelf life, curing time, manufacturer's directions, and name of manufacturer.

2. Storage: Carefully handle and store all materials to prevent inclusion of foreign materials. Remove from project site all damaged and deteriorated materials and materials exceeding shelf life.

3. All sealant materials shall be installed prior to expiration of shelf life.

(D) GUARANTY

1. Provide a 2-year guaranty against leaks, air infiltration, cracks and other failures of the installation and materials.

2. Repair or replace sealants to seal leaks caused by faulty materials or workmanship.

3. Repair or replace damage to the building or its finishes, equipment or furniture when occasioned by such leaks.

(E) MATERIALS

1. Sealant Backer Rod: Compressible rod stock of polyethylene foam, polyethylene-jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, nonabsorptive material as recommended for compatibility with sealant by the sealant manufacturer to control the joint depth for sealant placement, to break bond of sealant at bottom of joint, to form optimum shape of sealant bead on back side, and to provide a highly compressible backer which will minimize the possibility of sealant extrusion when joint is compressed. Do not use oakum or other types of absorptive materials as backstops.

2. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer.

3. Masking Tape: Non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

4. Primer for Sealants: Non-staining, as recommended by the sealant manufacturer.

5. Sealants at Exterior and Interior Vertical and Overhead Moving Joints: One-part polyurethane-based sealant, conforming to ASTM C 920, Type S, Grade NS, Class 25, Use NT. Provide one of the following, or approved equal:

    a. Dymonic; Tremco, Inc.

    b. Chem-Calk 900; Bostik Construction Products Div.

    c. Sikaflex 1a; Sika Corp.

    d. Dynatrol I; Pecora Corp.

    e. NP-1; Sonneborn.

6. Bedding Compound: For installation of thresholds and similar items indicated to be bedded in sealant, use a preformed butyl-polyisobutylene sealant tape. Size of tape as required for the specific application. Provide one of the following, or approved equal:

    a. Extru-Seal; Pecora Corp.

    b. 440 Tape; Tremco, Inc.

    c. Chem-Tape 40; Bostik Construction Products Div.

(F) MANUFACTURER'S INSTRUCTIONS

1. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

(G) EXAMINATION

1. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

(H) JOINT PREPARATION

1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

    a. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust, paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer, oil, grease, waterproofing, water repellants, water, and surface dirt.

    b. Clean concrete, masonry, and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of

these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

c. Remove laitance and form release agents from concrete.

d. Steel Surfaces in Contact with Sealant: Scrape and wirebrush to remove loose mill scale. Remove dirt, oil, or grease by solvent cleaning, and wipe surfaces with clean cloths.

e. Clean metal and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

2. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

3. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

(I) INSTALLATION OF JOINT SEALERS

1. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Do not apply sealant on wet surfaces or when the surface temperature exceeds 130 degrees F.

2. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

3. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

a. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

a. Do not leave gaps between ends of joint fillers.

b. Do not stretch, twist, puncture, or tear joint fillers.

c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

b. Install bond breaker tape between sealants and joint fillers, compression seals,

or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

c. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

4. Primer: Immediately prior to application of the sealant, clean out all loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete, masonry units, wood, and other porous surfaces in accordance with compound manufacturer's instructions. Do not apply primer to exposed finish surfaces.

5. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

6. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer. Provide concave joint configuration per Figure 5A in ASTM C 1193.

(J) CLEAN UP

1. Immediately scrape off fresh sealant compound that has been smeared on masonry or porous surfaces and rub clean with a solvent as recommended by the compound manufacturer. Upon completion of sealant compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean, uniform, and neat condition.

(K) PROTECTION

1. Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

2. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of project acceptance. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

## 1.22 THERMOPLASTIC SINGLE PLY ROOFING

### (A) SUMMARY

1. This Section includes the following:
    a. Roofing system over newly constructed deck consisting of:
        a. New insulation, cover board.
        b. New Ketone Ethylene Ester (KEE) single ply roof system, fully adhered, with white surface.
        c. New metal flashing components.
2. Related Sections include the following:
    a. SECTION - ROUGH CARPENTRY for wood nailers, cants, curbs, and blocking.
    b. SECTION – SHEET METAL FLASHING AND TRIM for metal roof flashings and counter flashings.
    c. SECTION – JOINT SEALANTS for joint sealants, joint fillers, and joint preparation.

### (B) PERFORMANCE REQUIREMENTS

1. General: Provide installed single ply roof system as specified, including base flashings, metal edge, and coping cap components that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure for the warranty term specified.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
3. Fire-Test-Response Performance: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
    a. Exterior Fire-Test Exposure: Class A ASTM E 108, for application and roof slopes indicated.
4. Provide an average insulation board thermal resistance (R) value of not less than the value indicated on the Drawings. The minimum insulation thickness at any point shall not be less than the minimum required to conform to the roofing system manufacturer’s warranty requirements.

5. Edge metal components shall meet requirements of ANSI-SPRI ES-1 and local building code.

(C) SYSTEM DESCRIPTION

1. Ketone Ethylene Ester (KEE) single ply roof membrane and insulation assembly meeting the performance requirements of this Section and consisting of the following components:

    a. Polyisocyanurate insulation fastened to wood deck. Provide tapered insulation crickets to direct water to roof drains.

    b. Glass-Mat cover board adhered with approved low-rise foam adhesive to the insulation.

    c. KEE single ply membrane roof covering, fully adhered to the cover board substrate installed in conformance with the tested and approved fire rated assembly.

    d. Flashing components applied to roofing membrane.

    e. Roofing edge metal meeting requirements of ANSI-SPRI ES-1.

(D) COORDINATION WITH OTHER SECTIONS

1. Coordinate installation of gutters and counterflashing, etc. with SECTION - SHEET METAL FLASHING AND TRIM.

2. Coordinate installation of wood nailer, curbs and blocking related to roofing with SECTION - ROUGH CARPENTRY.

(E) QUALITY ASSURANCE

1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

2. Manufacturer Qualifications: Manufacturer that has been in continuous business of producing commercial roof sheet good membranes for no less than 20 years and has a UL listing for roofing system identical to that used for this Project.

3. Source Limitations: Obtain all components of roofing system a single manufacturer. Secondary components shall be approved in writing as compliant with roofing materials by roof system manufacturer.

(F) PRE-INSTALLATION MEETING: The General Contractor, the authorized roofing and roofing adhesive manufacturers' representatives or their independent roofing inspectors shall attend a pre-installation meeting at Project site. Include other related trades, such as sheet metal contractor, as applicable. Confirm the required participants with the Contracting Officer. Notify participants at least five days prior to meeting.

1. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

2. Review and finish construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review odor and air quality mitigation procedures, including location of asphalt kettles, ventilation openings and air flow.

4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.

9. Review roof observation and repair procedures after roofing installation.

(G) ROOFING SYSTEM MANUFACTURER'S PROJECT PARTICIPATION

1. Roofing System Manufacturer shall inspect the roof surfaces at the following times. Provide reports for each inspection with photographic documentation and indicating procedures followed, weather conditions, and any discrepancies between field installation and specification or manufacturer instructions.

    a. Prior to the start of the roofing installation.

    b. At the start of the roofing application.

    c. Three times weekly during the roofing application.

2. Roof System Manufacturer’s Final Inspection Report: Provide report from roof system manufacturer certifying the roof system was installed according to manufacturer recommendations and approved details. Certify that any discrepancies between field installation and manufacturer’s recommendations have been corrected.

(H) DELIVERY, STORAGE, AND HANDLING

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

2. General: Each package of single ply roof covering materials shall bear the label of a recognized agency having a service for the inspection of material and finished

products during manufacture (e.g., ASTM, UL, etc.)

3. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

    a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

4. Protect roll goods, roof insulation and any other materials that absorb or are affected by moisture from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation. Do not use wet materials and/or materials which appear to have been deteriorated after getting wet.

5. Storage of Materials at Job Site

    a. Except when placed on roof decks immediately prior to installation, store roofing materials above the supporting surfaces, such as on pallets.

    b. Store materials containing solvents in a dry, cool area with proper fire and safety precautions.

    c. Store roll goods shall be stored on end.

    d. Distribute materials stored on other than the ground, so that their resultant weight does not exceed the design live load on the deck (normally 20 lbs. per square foot on roofs and 40 lbs. per square foot on floors).

(I) PROJECT CONDITIONS

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

(J) WARRANTY

1. The warranty provisions and number of years for the warranty required by this article shall take precedence over the standard provisions in the GENERAL CONDITIONS.

2. Manufacturer’s Warranty: Roofing Manufacturer’s watertight warranty, in which roof manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within the specified warranty period. Roof manufacturer shall investigate leaks and return the roof to a watertight condition at no cost to the owner. Failure includes roof leaks, and materials and adhesion failure due to normal weathering and wind conditions as outlined in ASCE 7-10 wind uplift report.

    a. Manufacturer’s warranty includes roofing membranes, base flashings, insulation, cover board, and metal edge components.

b. Warranty Period: 20 years from the Project Acceptance Date.

c. Warranty shall state the Manufacturer's acceptance that the roof was installed in accordance with the contract requirements and roof system manufacturer requirements, and that the State's personnel were properly instructed in the maintenance procedures.

d. In the event of a failure State, Contractor, Roofing Installer and Manufacturer shall mutually agree and determine roof system failures and remedies. Manufacturer shall not charge a fee for leak investigations.

3. Project Warranty: Submit Contractor's bonded warranty, covering work of this section, including all components of roof system such as roofing membrane, base flashing, roofing membrane accessories, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period and conditions:

a. Warranty Period: Two years from the Project Acceptance Date.

b. Warranty shall cover repairs or replacement of damages to the building and its finishes due to leaks.

4. Warranty Roof Inspections: Manufacturer shall conduct a yearly inspection with the State representative at each anniversary of the Project Acceptance Date while in the warranty period. The purpose of the inspections is to identify and correct deficiencies in all components of the roofing and flashing system.

(K) MANUFACTURERS

1. Basis of Design Manufacturer: The Garland Company, Inc. www.garlandco.com

2. Other Acceptable Manufacturers:

a. All manufacturers of equivalent products also meeting requirements of this specification are acceptable.

(L) KETONE ETHYLENE ESTER (KEE) SINGLE PLY MEMBRANE

1. Roofing Membrane:

a. Basis of Design: SolarBrite

(M) PERFORMANCE CHARACTERISTICS

1. Meets all physical property requirements outlined in ASTM D-6754-02, Standard Specification for KEE sheet roofing.

2. Color: White

3. Thickness: 60 mil

4. Three Year Aged SRI, Minimum: 75

(N) AUXILIARY ROOFING MEMBRANE MATERIALS

1. General: Auxiliary materials supplied or recommended in writing by roofing system manufacturer for intended use and compatible with roofing membrane.

2. Mastic Sealant: Manufacturer's recommended roof mastic.

3. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

4. Metal Flashing Sheet: Metal flashing sheet is specified in SECTION - SHEET METAL FLASHING AND TRIM.

5. Metal Edge and Coping Cap Components: Shall be manufactured by the roof system manufacturer for use in warranted roof system as required in this Specification and compliant with local building code and ANSI-SPRI ES.

    a. Coping cap and drip edge shall have no exposed fasteners.

6. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

(O) ROOF INSULATION

1. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

    **a.** Design Insulation Thickness to Achieve Thermal Performance Required in Paragraph (B).4 Above: As indicated on the Drawings.

2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, glass-fiber mat facer on both major surfaces.

    a. Faced polyisocyanurate insulation Boards complying with ASTM C 1289 (polyisocyanurate only, polyurethane not permitted). Insulation shall have an in-service R-value of

    $$\frac{\text{5.6 degrees F x ft}^2\text{ x hr}}{\text{BTU}}$$ per inch thickness.

    b. Insulation containing chlorofluorocarbon (CFC) in not permitted.

3. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

(P) INSULATION ACCESSORIES

1. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

2. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

3. Insulation Cant Strips: Non-cellulosic-fiber cant strip approved by roof system manufacturer for use with the warranted roof assembly.

4. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

    a. Product: Subject to compliance with requirements, provide "Dens-Deck Prime" by Georgia-Pacific Corporation or approved equal.

5. Substrate Joint Tape: 6- or 8-inch- wide, coated, glass-fiber joint tape, or as recommended by roofing manufacturer.

6. Roof Insulation Adhesive Use to Secure Insulation to Wood Deck Substrates, Insulation to Insulation, and Insulation to Facing Boards: Adhesive shall be asbestos-free, solvent-free, waterproof (non-emulsifying), single or multi-component polyurethane type, compatible with the insulation and substrate as recommended by the roof system manufacturer, specially designed for adhering insulation boards to the specified substrate and conforming to the wind uplift and fire rating requirements of Underwriters Laboratories 1897 or Factory Mutual (FM I-90) and complying with warranty requirements of this Specification.

(Q) EXAMINATION

1. Examine substrates, areas, and conditions, with Installer and Roof System Manufacturer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

    a. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.

    b. Verify that cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

    c. Verify that roof construction and surface meets the requirements of the roofing manufacturer.

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

(R) INSULATION INSTALLATION

1. Comply with roofing system manufacturer's written instructions and ASCE 7-10

attachment diagram for installing roof insulation.

2. Install tapered insulation under area of roofing to conform to slopes indicated.

3. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

    a. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

4. Install one or more layers of insulation under area of roofing to achieve required thickness/ R value. Where overall insulation thickness exceeds NRCA recommendations for a single layer or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

5. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

6. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

7. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

    a. Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof as per roof manufacturer’s ASCE 7-10 attachment diagram.

8. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

    a. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

    b. Attach second layer of insulation according to roof manufacturer instructions.

9. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck. Tape joints if required by roofing system manufacturer.

    a. Fasten to resist uplift pressure at corners, perimeter, and field of roof as per roof manufacturer’s ASCE 7-10 roof attachment diagram.

(S) ROOFING MEMBRANE INSTALLATION, GENERAL

1. Install roofing membrane system according to roofing system manufacturer's written instructions.

2. Start installation of roofing membrane in presence of roofing system manufacturer's

technical personnel.

3. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

4. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

    a. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.

    b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

    c. Remove and discard temporary seals before beginning work on adjoining roofing.

5. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

(T) MEMBRANE APPLICATION - GENERAL

1. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.

2. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.

    a. Repair tears and voids in laps and lapped seams not completely sealed.

    b. Apply roofing granules to cover exuded adhesive at laps.

3. Install roofing membrane sheets so side and end laps shed water.

(U) FIELD QUALITY CONTROL - INSPECTIONS

1. Progress Roof Inspections:

    a. Contractor, roofing installer, <independent roofing auditor/inspector> and roofing system manufacturer's technical personnel shall inspect the roof surfaces at the following times.

        a. At the actual start of the roofing installation.

        b. Three times weekly during the roofing installation.

2. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to

Contracting Officer and to roofing manufacturer as needed to meet warranty requirement.

a. Notify Contracting Officer 48 hours in advance of date and time of inspection.

b. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

c. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

(V) FIELD QUALITY CONTROL – TESTING

1. Testing Agency: At Contracting Officer's discretion the State may at its own expense engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

2. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

(W) PROTECTING AND CLEANING

1. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Contracting Officer.

## 1.23 BIRD SPIKES

(A) SUMMARY

1. Design Requirements: to prevent birds from landing and roosting on specified surfaces.

(B) QUALITY ASSURANCE

1. Single Source Responsibility: Furnish products from one manufacturer for entire project.

2. Obtain all technical information from the manufacturer.

3. Installer shall visit the site to gather all information on existing site conditions.

(C) PRODUCT HANDLING

1. Protect products from damage before, during and after the installation.

(D) PROJECT CONDITIONS

1. Coordination: Furnish samples of system(s) so installation can be coordinated with existing conditions and within on-site conditions.
2. Visit site and field-measure prior to fabrication and delivery of materials.

(E) WARRANTY

1. Product shall carry a minimum 10-year guarantee against manufacturer's defects, U.V. breakdown and stainless steel degradation.

(F) ACCEPTABLE MANUFACTURER

1. Manufacturer:
    a. Bird-B-Gone, Inc. or approved equal or better.

(G) PRODUCT DESCRIPTION

1. Model Designation:
    a. Bird-B-Gone Stainless Steel Bird Spikes™ 8" or approved equal or better.
        a. Width of Coverage: BBG2001/8: 7" - 9" widths
    b. Minimum 40 spikes per foot in linear array with "no gap" center spike and non-staggered design.
    c. Height: 4-3/4"
    d. Base Strip: Flexible. Base can bend up to 360°
    e. Length: 2 ft. sections
    f. Spike thickness must be .05 thousands/1.1 mm diameter.
    g. Packaging: 50 ft. per box. Twenty-five (25) 2 ft. sections per box.
    h. Number of Rows: As determined by the manufacturer and based on project conditions.
    i. Mounting System: As determined by the manufacturer and based on project conditions.

(H) MATERIALS

1. Material: U.V. stabilized polycarbonate. Heat and weather resistant, (+310°F to –200°F) 304 stainless steel spikes (marine grade 316 stainless steel spikes available upon request).
2. Construction: Rigid one-piece construction.

3. Adaptation: Tin snips, hacksaw, etc. can be used to cut / adapt the product to desired length.

(I) MOUNTING SYSTEMS

1. Wood: Use #8 wood screws. For every 2 ft. section of Stainless Steel Spikes, ten (10) #8 wood screws are required.

(J) EXAMINATION

1. Examine the installation area and note any detrimental or hazardous work conditions. Notify contracting officer or inspector of the detrimental work conditions.
2. Do not proceed with installation until conditions are corrected.

(K) SURFACE PREPARATION

1. Surface should be thoroughly cleaned and free of bird droppings, nesting materials, rust, peeling paint or other debris.
2. Remove or repair articles that may damage Stainless Steel Spikes after installation, including overhanging foliage, brush and loose parts on the structure.

(L) INSTALLATION

1. Install Stainless Steel Spikes as recommended by the manufacturer.
2. Stainless Steel Spikes should be installed correctly, covering the entire depth of the surface, not just the perimeter.
    a. Follow the contours and angles closely; cut or break away to fit properly.
    b. Space materials in accordance with manufacturer's recommendations.

(M) INSPECTION

1. Visually inspect Stainless Steel Spikes for any signs of poor installation, including loose screws, fasteners and un-removed debris.
2. Immediately correct and repair as necessary.

## 1.24 STEEL DOORS AND FRAMES AND WINDOW FRAMES

(A) SUMMARY

1. Provide steel doors and frames and window frames as indicated and as specified herein.

(B) DELIVERY AND STORAGE

1. Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Strap welded frames in pairs, with one frame inverted, or provide

temporary steel spreaders securely fastened to the bottom of each frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4-inch air space between doors. Remove damp or wet packaging immediately and wipe all affected surfaces dry. Replace damaged materials with new.

(C) STEEL DOORS

1. ANSI/SDI-100, except as specified otherwise. Doors shall be either hollow steel construction or composite construction. Prepare doors to receive hardware specified in Section - Door Hardware. Undercut doors for door bottoms as specified. Exterior doors shall have top edge closed flush. Doors shall be 1-3/4 inches thick, unless otherwise indicated.

2. Heavy Duty Doors: ANSI/SDI-100, Level 3, physical performance Level A, Model 1 or 2, with core construction Type a, d or f for interior doors, and Type b, c, e or f for exterior doors, of sizes and designs indicated. Where Type f cores are specified or scheduled, the space between the stiffeners shall be filled with mineral-fiber insulation as specified in paragraph (E), "INSULATION CORES."

(D) ASTRAGALS AND MOLDINGS

1. Astragals: For pairs of exterior steel doors, provide overlapping steel astragals with the doors.

2. Moldings: Provide moldings around glass and louvers. Provide nonremovable moldings on the outside of exterior doors and on the corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to the stationary moldings or provide snap-on moldings.

3. Door Light Openings: Provide 1.2 mm cold rolled steel frame, mitered and welded corners, welded reinforcing clips at corners, countersunk mounting screw holes for through bolts, hot dip galvanized. Glazing shall be as specified in Section – GLAZING.

(E) INSULATION CORES: Insulated cores shall be type specified, shall provide maximum assembly U-value of 0.48 in accordance with SDI 113 and shall conform to:

1. Rigid Polyurethane Foam: ASTM C 591, Type 1 or 2, foamed-in-place or in board form, with an oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or

2. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II; or

3. Mineral Board: ASTM C 612, Type I.

(F) STEEL FRAMES: ANSI A250.8, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners.

1. Welded Frames: Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

2. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

    a. Wall Anchors: Provide a minimum of three concealed anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between.

    b. Floor Anchors: Provide floor anchors drilled for 3/8-inch anchor bolts at bottom of each jamb member.

(G) HOLLOW METAL WINDOW FRAMES: First quality cold rolled or hot rolled pickled galvanized steel 16 gauge, U.S. Standard Gauge with standard 16 gauge galvanized glazing stop and neoprene glazing gasket.

(H) HARDWARE PREPARATION

1. Reinforce, drill, and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch door frames to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf in heads of double doors. Set lock strikes out to provide clearance for silencers.

(I) FINISHES

1. Hot-Dip Zinc-Coated and Factory-Primed Finish: Fabricate doors and frames from hot dipped zinc coated steel, alloy type, that complies with ASTM A 924 and ASTM A 653. The coating weight shall meet or exceed the minimum requirements for coating having Designation G60 or A60 (galvannealed). Repair damaged zinc-coated surfaces by the application of zinc dust paint conforming to ASTM A 780, Annex A2. Thoroughly clean and chemically treat to ensure maximum paint adhesion. Factory prime as specified in ANSI A250.8.

(J) FABRICATION AND WORKMANSHIP

1. Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.

(K) INSTALLATION

1. Frames: Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or

powder-actuated fasteners. Build in or secure wall anchors to adjoining construction.

2. Doors: Hang doors in accordance with clearances specified in ANSI A250.8. After erection, clean and dust hardware.

3. Fire Doors and Frames: Install fire doors and frames, including hardware, in accordance with NFPA 80.

(L) PROTECTION

1. Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until all rust is removed, clean thoroughly, and apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

(M) CLEANING

1. Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks. Touch-up finishes to restore damaged or soiled areas.

## 1.26 FINISH HARDWARE

(A) SUMMARY

1. Furnish all labor, materials, tools and equipment necessary to complete all surface preparation work as specified herein. The work includes installation of new doors and frames complete.

(B) DELIVERY AND MARKING

1. Deliver hardware in their original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with manufacturer's name and catalog number as shown in hardware schedule.

(C) HARDWARE MANUFACTURERS AND MODIFICATIONS

1. Provide, as far as practicable, locks and hinges of one lock or hinge manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

(D) HARDWARE DESIGNATIONS

1. Hardware items covered by BHMA standards are specified by BHMA designations.

(E) TEMPLATE HARDWARE

1. Hardware to be applied to metal shall be made to template. Promptly furnish template

information or templates to door and frame manufacturers. Template hinges shall conform to BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

(F) HARDWARE ITEMS

1. Conform to the requirement of ADAAG requirements for the handicapped and to the respective standards listed and to requirements specified herein. Proprietary finish hardware is specified for standard of quality only. Products from other manufacturers conforming to the respective standards listed and to requirements specified herein may be provided. Hinges and locks shall bear the manufacturer's name or trademark where it will be visible after the item is installed. Provide hardware items as specified below and as listed under "Hardware Sets."

2. Hinges: BHMA A156.1, 4-1/2 by 4-1/2 inches unless otherwise specified. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be non-removable when door is closed.

3. Bored Locks: BHMA A156.2, Series 4000, Grade 1. Provide entrance by lever handle, trim of wrought construction and commercial plain design. Locks for exterior doors shall have threaded roses or concealed machine screws.

4. Exit Devices: BHMA A156.3, Grade 1. Provide trim of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges. Provide adjustable strikes for rim type devices. Strikes for vertical rods shall be flush strike on threshold and the strike bolt shall be rectangular in shape.

5. Electric Exit Devices: BHMA A156.3, with factory installed electric lock modification having the capability to lock or unlock from remote location by means of push button. Exit device shall comply with life safety requirements of NFPA 101

6. Closers: BHMA A156.4, Series CO2000, Grade 1, with optional feature (o.f.) PT 4H for handicapped accessibility, unless otherwise specified. Provide closers complete with brackets, arms, mounting devices, fasteners, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 2 through 6, and list sizes in the Hardware Schedule. In addition to the manufacturer's name or trademark, each closer shall bear the manufacturer's size designation where it will be visible after installation. Handicapped accessibility closers shall be option PT 4F, adjustable delayed action type, and option PT'4H, full spring adjustable type.

7. Architectural Door Trim: BHMA A156.6.

8. Special Tools: Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

9. Keying

    a. Locks shall be keyed to the existing master key system.

b. Locks shall have fifteen (15) keys each. Locks for the same rooms shall be keyed alike. During period of construction, all locks shall be operated by a special construction key. All keys shall be stamped "DO NOT DUPLICATE" at the point of manufacture. Proper certification of factory assembly of all locks and cylinders as well *as* factory master keying shall be furnished by the Contractor prior to final acceptance of this portion of the work.

c. In general, keying requirements shall be as follows:

    a. All exterior entrance doors into the building shall be keyed alike.

    b. Multiple doors leading into the same room shall be keyed alike.

    c. Secondary rooms within larger rooms shall be keyed alike.

d. Keying Schedule:

    a. It shall be the responsibility of the hardware supplier or hardware manufacturer's representative to meet with the Engineer to review the keying requirements and establish the final keying arrangements.

    b. Hardware supplier shall submit keying schedule, along with hardware schedule, clearly showing how the Owner’s final instructions on keying of locks have been fulfilled.

10. Threshold: BHMA A156.21. Thresholds shall conform to ADAAG 4.13.8, not to exceed 1/2 inch in height and beveled with a slope no greater than 1:2.

11. Door Gasketing Systems: BHMA A156.22.

(G) FASTENERS:

1. Furnish fasteners of proper type, quality, size, quantity, and finish with hardware. Fasteners exposed to weather shall be of nonferrous metal or stainless steel. Use fasteners of type necessary to accomplish a permanent installation.

(H) FINISHES

1. BHMA A156.18. Hardware shall have BHMA 630 finish (satin stainless steel), unless specified otherwise herein. Surface type door closers shall have aluminum paint finish. Exposed parts of concealed closers shall have finished to match lock and door trim. Hardware for aluminum doors shall be finished to match the doors.

2. Provide matching finishes for hardware units at each door or opening to greatest extent possible, except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where base metal or metal forming process is different for individual units of hardware exposed at same door or opening.

3. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards,

but in no case less than specified for applicable units of hardware by referenced standards.

(I) INSTALLATION

1. Install hardware in accordance with manufacturers' printed instructions. Use machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where necessary for satisfactory installation.

2. Hardware Locations

    a. SDI-100 and ADAAG 4.13.9, unless indicated or specified otherwise.

    b. Accessibility: Conform to ADAAG 4.13 for positioning finish hardware for accessibility.

    c. Mount deadbolts (if any) centerline not more than 5 inches above latchset handle centerline.

3. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protection with finishing work. Do not install surface mounted items until finished have been completed on the substrate.

4. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

5. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

6. Fit face of all mortise parts snug and flush.

7. Operating parts shall move freely and smoothly without binding, sticking or excessive clearance.

8. Protect hardware from damage or marring of finish during construction. Use strippable coatings, removable tapes or other approved means.

9. Ensure that hardware displays no evidence of finish paint after building clean up with exception of prime coated hardware installed for finish painting. The Contractor may achieve this by sequencing installation, removing after fittings and reinstalling after painting is completed, providing protection, cleaning original hardware finish or other means.

10. Latch and Bolt: Install latch and bolt to automatically engage in keeper, whether activated by closer or manual push. In no case shall additional manual pressure be required to engage latch or bolt in keeper.

11. Closers

a. Do not mount closers on corridor side of door except at exterior doors.

b. Carefully adjust closers to operate noiselessly and evenly.

c. Have manufacturer's representative regulate closers prior to acceptance of building.

(J) ACCEPTANCE OF WORK

1. Certified Architectural Hardware Consultant from the door hardware supplier shall inspect, certify that correct hardware has been furnished, and hardware has been installed in accordance with manufacturer's instructions and as specified.

2. Submit notice of operation testing by manufacturer's representative or supplier 15 days before scheduled, so that the testing can be witnessed.

3. Adjust hinges, locks, holders, closers, and other items to operate properly in accordance with ADAAG 4.13.11(b) and (c); doors shall require not greater than 5-pound opening force.

4. Lubricate bearings surface of moving parts and adjust latching and holding devices for proper function.

5. Demonstrate that permanent keys operate respective locks, and deliver the keys to the Engineer.

6. Correct, repair, and finish as directed errors in cutting and fitting and damage to adjoining work.

(K) HARDWARE SETS

Manufacturers and their abbreviations used in this schedule:

| | |
|---|---|
| GLY | Glynn Johnson |
| IVE | H. B. Ives |
| LCN | LCN Door Controls |
| NGP | National Guard Products |
| SCH | Schlage Lock |

VERIFY THRESHOLD CONDITION.
HW SET: 01

| Qty | Description | Catalog Number | Finish | Mfr |
|---|---|---|---|---|
| 3 EA | HW HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 EA | PANIC HARDWARE | 98-L-06 | 626 | VON |
| 1 EA | RIM CYLINDER | 20-057 | 626 | SCH |
| 1 EA | SURFACE CLOSURE | 4040XP EDA SRI | 689 | LCN |
| 1 EA | KICK PLATE | 8400 10” X 2” LDW B-CS | 630 | IVE |
| 1 EA | FLOOR STOP | FS444 | 626 | IVE |
| 1 EA | THRESHOLD | 272A | AL | PEM |

KEY: 1 MASTER KEY AND 15 COPIES

HW SET: 02

| Qty | Description | Catalog Number | Finish | Mfr |
|---|---|---|---|---|
| 6 EA | HW HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 2 EA | PANIC HARDWARE | 98-L-BE-06 | 626 | VON |
| 2 EA | RIM CYLINDER | 20-057 | 626 | SCH |
| 2 EA | SURFACE CLOSURE | 4040XP EDA SRI | 689 | LCN |
| 2 EA | KICK PLATE | 8400 10” X 2” LDW B-CS | 630 | IVE |
| 2 EA | FLOOR STOP | FS444 | 626 | IVE |
| 1 EA | THRESHOLD | 272A | AL | PEM |

KEY: 1 MASTER KEY AND 15 COPIES

## 1.25 GLAZING

### (A) SUMMARY

1. Provide glazing as indicated and as specified herein.

### (B) DELIVERY AND STORAGE

1. Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

### (C) ENVIRONMENTAL CONDITIONS

1. Do not start glazing work until the outdoor temperature is above 60 degrees F and rising unless approved provisions are made to warm the glass and rabbet surfaces. Provide sufficient ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

### (D) GLASS

1. In doors provide safety glazing material conforming to CPSC 16 CFR Part 1201.

2. Laminated Insulated Glass: Laminated insulated glass shall be two ¼ inch thick layers with 1/2 inch air space between, U-Factor: 0.30 or less; SHGC: 0.32. The inner and other layers, conforming to ASTM C 1172, Kind LHS (flat heat strengthened glass conforming to ASTM C 1048, Kind FT (fully tempered), shall be bonded by an 0.030 inch clear polyvinyl butyral (PVB) interlayer, determined from, ASTM E 1300 or equal to the 3-second duration equivalent design load determined from ASTM F 2488. The inner layer shall be tinted. The total thickness shall be nominal 1-inch thick. Provide metal glazing beads, vinyl inserts, and glazing gaskets for securing glass. Provide tamper-proof glazing. Provide laminated glass for windows. Color and tint of glass will be selected by the Engineer.

    a. Low-e glazing with blue color tint, PPG or equal.

3. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), , Condition A (uncoated surfaces), Type I, Class 1 (clear), Quality $q_3$, 1/4 inch thick. Provide tempered glass in doors.

(E) SETTING MATERIALS

1. Provide types required for the applicable setting method specified in the FGMA SM, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers or impregnated preformed gaskets. Materials which will be exposed to view and unpainted shall be medium bronze color.

2. Elastomeric Sealant: ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Use for channel or stop glazing metal sash. Color of sealant shall be medium bronze.

3. Sealing Tapes: Preformed, semisolid, polymeric based material of proper size and compressibility for the particular condition. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes.

4. Accessories: As required to provide a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass or sealant manufacturers.

(F) PRECAUTIONS AND PROCEDURES

1. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glazing materials. Grind smooth all edges of glazing materials that will be exposed in finish work. Leave labels in place until the installation is approved. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

(G) SETTING

1. Items to be glazed shall be either shop or field glazed using glazing materials of the quality and thickness specified or indicated. Preparation and glazing, unless otherwise

specified or approved, shall conform to applicable recommendations in the FGMA GM and FGMA SM. Aluminum windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced. Handle and install glazing materials in accordance with the manufacturer's instructions. Use points, beads and stops which are furnished with the items to be glazed to secure the glass in place.

2. Glass shall be set true and tight by skilled glaziers. Glazing compound shall be neatly and cleanly run with corners carefully made, using putty knife. Glazing stops shall be carefully handled and accurately secured in place.

3. Glass where required shall be set in extruded vinyl or neoprene glazing strips and shall be installed in accordance with manufacturer's instructions.

4. Sheet Glass: Cut and set with the visible lines or waves horizontal.

(H) PROTECTION AND REPLACEMENT

1. All glass shall be protected against damage. At completion of work, all imperfect materials which cannot be properly cleaned shall be removed and renewed. All broken or cracked glass shall be renewed with new glass.

(I) CLEANING

1. Thoroughly clean glass surfaces and remove labels, paint spots, and other defacement. Glass shall be clean at the time the work is accepted.

## 1.26 GYPSUM BOARD

(A) SUMMARY

1. Provide gypsum board as indicated and as specified herein.

(B) DELIVERY, HANDLING, AND STORAGE

1. Delivery: Deliver all materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

2. Handling: Neatly stack gypsum board flat to prevent sagging or damage to the edges, ends, and surfaces.

3. Storage: Keep all materials dry by storing inside a sheltered building. Where necessary to store gypsum board outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation.

(C) EXPOSURE TO WEATHER

1. Protect gypsum board products from direct exposure to rain, sunlight, and other excessive weather conditions.

(D) MATERIALS

1. Conform to the respective specifications and standards and to the requirements specified herein. All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. Provide gypsum board and joint compound free of asbestos materials.

2. Gypsum Wallboard: ASTM C 36 and ASTM C1396.

    a. Type X (Special Fire-Resistant), 48 inches wide, thickness as indicated, tapered edges.

3. Glass-Mat Gypsum Sheathing Board: ASTM C 1177, with silicone treated core penetrated by fiberglass mats front and back, and alkali resistant coating. Follow manufacturer's instructions for installation and joint finishing.

    a. Type X (Special Fire-Resistant), 48 inches wide, thickness as indicated.

4. Joint Treatment Materials: ASTM C 475.

    a. Embedding Compound: Specifically formulated and manufactured for use in embedding tape at gypsum board joints and completely compatible with tape, substrate and fasteners.

    b. Finishing or Topping Compound: Specifically formulated and manufactured for use as a finishing compound.

    c. All-Purpose Compound: Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

    d. Joint Tape: Cross-laminated, tapered edge, reinforced paper, or special tape recommended by the manufacturer.

5. Screws: ASTM C 1002. Type "G" or Type "S" steel drill screws. Use specially designed steel screws as recommended by the manufacturer of the gypsum board for the screw application of gypsum board to gypsum board or to steel framing.

6. Accessories: ASTM C 1047. Fabricate from protective-coated steel or plastic designed for its intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free from dirt, grease, and other materials that may adversely affect the bond of joint treatment.

7. Water: Clean, fresh, and potable.

(E) INSPECTION

1. Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board. Do not proceed with work until framing and furring are acceptable for application of gypsum board.

(F) APPLICATION OF GYPSUM BOARD

1. Apply gypsum board to framing and furring members in accordance with ASTM C 840 or GA 216 and the requirements specified herein. Apply gypsum board with separate boards in moderate contact; do not force in place. Stagger end joints of adjoining boards. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length. Cut out gypsum board as required to make neat close joints around openings. In vertical application of gypsum board, panels shall be of length required to reach full height of vertical surfaces in one continuous piece. Cut gypsum boards for loose fit around perimeter and partition intersections. Leave a space not more than 1/8 inch wide for sealant. Apply a 1/4 inch minimum round bead of sealant. Immediately install boards, squeezing sealant into firm contact with adjacent surfaces. Fasten boards in normal manner. Joint treatment shall be applied over sealed joints. Sealants shall be as specified in Section SEALANTS. Type of gypsum board for use in each system specified herein shall be as indicated.

2. Solid Gypsum Board Partitions: Provide in accordance with ASTM C 840, System V or GA 216.

3. Sealants in Acoustical Application: Comply with the requirements of ASTM C 919 to reduce the sound transmission characteristics of interior walls, ceilings, and floors by proper application of sealants to joints, voids and penetrations.

(G) FINISHING OF GYPSUM BOARD

1. Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance GA 214. Finish water resistant backing board, ASTM C1396/C 1396M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive heavy grade wall covering or heavy textured finish before painting to Level 3 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paint, light textures, or wall coverings without critical lighting to Level 4 in accordance with GA 214. Unless otherwise specified, finish all gypsum board walls, partitions and ceiling to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only.

2. Skim Coat (Level 5): Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, apply a thin skim coat of joint compound to the entire gypsum board surface, after the three-coat joint fastener treatment is complete and dry. Apply skim coat with trowel, broadknife or long-nap roller. Wipe tightly with trowel or broadknife.

(H) PATCHING

1. Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finish as specified.

## 1.27 RESILIENT BASE AND ACCESSORIES

### (A) SUMMARY

1. Section Includes:

    a. Resilient Base.

2. ASTM INTERNATIONAL (ASTM)

    ASTM F 1861 - Resilient Wall Base

    ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

### (B) DELIVERY, STORAGE, AND HANDLING

1. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

### (C) FIELD CONDITIONS

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods: 1. 48 hours before installation. 2. During installation. 3. 48 hours after installation.

2. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

3. Install resilient products after other finishing operations, including painting, have been completed.

### (D) WARRANTY

1. Provide manufacturer's standard performance guarantees or warranties that extend beyond a two-year period.

### (E) PERFORMANCE REQUIREMENTS

1. FloorScore Compliance: Resilient base and stair accessories shall comply with requirements of FloorScore certification.

### (F) THERMOPLASTIC-RUBBER BASE

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

a. Roppe Corporation, USA.

2. Product Standard: ASTM F 1861, Type TP (rubber).
    a. Group: I (solid, homogeneous).
    b. Style and Location:
        a. Style B, Cove: Provide in areas with resilient flooring.
3. Thickness: 0.125 inch (3.2 mm).
4. Height: 4 inches (102 mm).
5. Lengths: Coils in manufacturer's standard length.
6. Outside Corners: Preformed.
7. Inside Corners: Preformed.

(G) RUBBER MOLDING ACCESSORY

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
    a. Roppe Corporation, USA.
2. Description: Rubber reducer strip for resilient flooring, transition strips.
3. Profile and Dimensions: As indicated verify conditions.
4. Locations: Provide rubber molding accessories in areas indicated on the drawings.
5. Colors and Patterns: As selected by Architect from full range of industry colors.

(H) INSTALLATION MATERIALS

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
2. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
    a. Adhesives shall have a VOC content of 50 g/L or less except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.
3. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

(I) EXAMINATION

1. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

    a. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products

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

    a. Installation of resilient products indicates acceptance of surfaces and conditions.

(J) PREPARATION

1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

2. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

    a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

    b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

    c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

    d. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

        a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

        b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

3. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

4. Do not install resilient products until they are the same temperature as the space

where they are to be installed.

a. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

5. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

(K) RESILIENT BASE INSTALLATION

1. Comply with manufacturer's written instructions for installing resilient base.

2. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

3. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

4. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

5. Do not stretch resilient base during installation.

6. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

7. Preformed Corners: Install preformed corners before installing straight pieces.

(L) RESILIENT ACCESSORY INSTALLATION

1. Comply with manufacturer's written instructions for installing resilient accessories.

2. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

(M) CLEANING AND PROTECTION

1. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

2. Perform the following operations immediately after completing resilient-product installation:

a. Remove adhesive and other blemishes from exposed surfaces.

b. Sweep and vacuum horizontal surfaces thoroughly.

c. Damp-mop horizontal surfaces to remove marks and soil.

3. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of

construction period.

4. Cover resilient products subject to wear and foot traffic until Substantial Completion.

## 1.28 RESILIENT TILE FLOORING

### (A) SUMMARY

1. Section Includes:

    a. Rubber Flooring Tile.

### (B) QUALITY ASSURANCE

1. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

    a. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

### (C) DELIVERY, STORAGE, AND HANDLING

1. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F. Store floor tiles on flat surfaces.

### (D) FIELD CONDITIONS

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:

    a. 48 hours before installation.

    b. During installation.

    c. 48 hours after installation.

2. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F.

3. Close spaces to traffic during floor tile installation.

4. Close spaces to traffic for 48 hours after floor tile installation.

5. Install floor tile after other finishing operations, including painting, have been completed.

(E) PERFORMANCE REQUIREMENTS

1. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
    a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
2. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

(F) RUBBER FLOOR TILE

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
    a. Roppe Corporation, USA. (Safe Tcork)
2. Tile Standard: ASTM F 1344, Class I-B, homogeneous rubber tile, through mottled.
3. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.
4. Wearing Surface: Smooth.
5. Thickness: 0.125 inch (3.2 mm).
6. Size: 24” x 24”
7. Colors and Patterns: As selected by Architect from full range of industry colors.
8. Test Data:
    a. Hardness, ASTM D 2240: Passes with minimum 85 shore A.
    b. Abrasion Resistance, ASMT D 3389: Less than 1 gram loss after 1000 cycles.
    c. Dimensional Stability, ASTM F 2199: Does not exceed 15%.
    d. Squareness, ASTM F 2055: Maximum 0.010 inches.
    e. Resistance to heat, ASTM F 1514: Passes with DE≤8.
    f. Static Coefficient of Friction, ASTM D 2047: Minimum 0.8 SCOF.
    g. Resistance to Chemicals, ASTM F 925: Passes.
    h. Static Load Limit, ASTM F 970: Passes 250 psi with no greater than 0.005 inch residual indentation.

(G) INSTALLATION MATERIALS

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

2. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

    a. Adhesives shall comply with the following limits for VOC content:

        a. Vinyl Composition Tile Adhesives: 50 g/L or less.

        b. Rubber Floor Adhesives: 60 g/L or less.

3. Seamless-Installation Accessories:

    b. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

        a. Color: Match floor tile.

4. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

(H) EXAMINATION

1. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

    a. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

(I) PREPARATION

1. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

2. Concrete Substrates: Prepare according to ASTM F 710.

    a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

    b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

c. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

d. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.

b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

3. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

4. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

a. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

5. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

(J) FLOOR TILE INSTALLATION

1. Comply with manufacturer's written instructions for installing floor tile.

2. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

a. Lay tiles.

3. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

a. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

4. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

5. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

6. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

7. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

8. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

9. Seamless Installation:

    a. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

(K) CLEANING AND PROTECTION

1. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

2. Initial Cleaning and Sealing: Dry-mop, removing all dust and debris. Clean surface with a neutral cleaner using green pad and floor machine. Clean with a fine abrasive where necessary to remove any stains or cement smears. Clean edges, baseboards, door jambs, and corners using a Doodle Bug pad and holder with a green pad. Pick up all solutions using a wet/dry vacuum. Thoroughly rinse twice with clear water.

3. Sealing: Where required, apply two coats of water-based sealer and 3 coats of water-based finish using a fine strand rayon mop. Allow a minimum of 45 minutes between coats. All prior coats shall be dry to the touch before any subsequent coats are applied. Apply first coat of sealer and first coat of finish wall to wall. Stop subsequent coats of sealer and finish 1-inch from baseboards, door jambs, and other vertical edges.

4. Protection: Cover floor surface, and protect from soiling, staining, marring, scratching, and other damage. Construction traffic, including foot traffic, is strictly prohibited on completed surface. Maintain protection until final completion unless floor is put into service at time of substantial completion.

## 1.29 ACOUSTICAL TILE CEILING

### (A) SUMMARY

1. Provide acoustical tile ceiling as indicated and as specified herein.

### (B) DESIGN CRITERIA FOR CEILING SYSTEM

1. Ceiling Sound Absorption: Determine the NRC in accordance with ASTM C 423 Method of Test.

### (C) DELIVERY AND STORAGE

1. Deliver acoustical units in the manufacturer's original unopened containers with brand name and type clearly marked. Handle materials carefully and store them under cover in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed (if needed).

### (D) ENVIRONMENTAL CONDITIONS

1. For 24 hours before, during, and 24 hours after installation of acoustical units, maintain temperature and relative humidity at typical in-service conditions (if needed). Interior finish work such as concrete work shall be completed and dry before installation. Mechanical, electrical and other work above the ceiling line shall be completed and approved prior to the start of acoustical ceiling installation.

### (E) SUSPENDED CEILING ACOUSTICAL CEILING SYSTEMS

1. Basis-of-Design: Provide Rockfon Artic Square Lay In (#600) or an approved product by one of the following:
    a. Rockfon
    b. USG Interiors
    c. Armstrong World Industries
2. Classification: Provide panels complying with ASTM E 1264 for type, pattern, material, edge detail, size, thickness, NRC, fire class, and LR as follows:
    a. Type: XX.
    b. Pattern: G
    c. Material: Stone Wool (Mineral Wool).
    d. Edges: Square Lay In.
    e. Size: 24 by 48 inches.
    f. Thickness: 5/8 inch.

g. NRC: 0.75.

h. Fire Class: Class A.

i. Light Reflectance: 0.85.

(F) SUSPENSION SYSTEM

1. Performance Standard: Suspension system manufacturer's standard direct-hung metal suspension system and attachment devices complying with project requirements and applicable building codes and regulations applicable at the location of the project and as follows:

   a. Structural Classification: Intermediate duty system, ASTM A 635.

   b. Face Design: Flat, flush.

   c. Cap Material: Steel cold-rolled sheet.

   d. Cap Finish: Factory painted white color.

   e. Accessories: Provide manufacturer's hold down clips, wall, edge pieces or moldings as indicated.

   f. Seismic Requirements: ASTM E 580.

   g. Hanger Wires: ASTM A 641, composition 1010, soft annealed, light zinc coated finish, 0.1055 inch in diameter (12 gage).

(G) CONDITION OF SURFACES: Examine surfaces to receive directly attached acoustical units for uneveness, irregularities, and dampness that would affect quality and execution of the work. Areas to which acoustical units will be cemented shall be free of oils, form residue, or other materials that reduce bonding capabilities of the adhesive.

(H) INSTALLATION

1. Suspended Ceilings: Install the suspension system in accordance with ASTM C 636 and the following additional requirements.

2. Hangers: Space hangers 4 feet on centers each direction. Hangers shall be laid out for each individual room or space. Install additional hangers where required to support framing around beams, ducts, columns, grilles and other penetrations through the ceiling.

3. Suspension Members: Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span.

4. Acoustical Units: Edges of ceiling tiles shall be in close contact with metal supports and in true alignment. Arrange units so that units less than 1/2 width are minimized.

5. Wall or Edge Molding: Install wall molding at intersection of suspended ceiling and

vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

6. Caulking: Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

7. Seismic Restraint System: Provide seismic restraint for the suspension system in accordance with ASTM E 580.

(I) CLEANING

1. Clean soiled or discolored unit surfaces after installation. Touch up scratches, abrasions, voids and other defects in painted surfaces. Remove damaged or improperly installed units and provide new materials.

## 1.30 PAINTING

(A) SUMMARY

1. Provide equipment, materials, tools, and labor to paint all repairs and new items of work requiring painting, complete, as indicated on the drawings and specified herein.

2. Related Sections include the following: SEALANTS

(B) GENERAL REQUIREMENTS

1. Airless Spraying: Airless spraying is not permitted. All application shall be by roller or brush.

2. Inspection and Approvals: The Contractor shall obtain approval from the Engineer upon completion of each phase of work (phases of work are: surface preparation and spot prime, prime, first finish coat, second finish coat) before proceeding into the next phase of work. The Contractor shall give the Engineer one day (24 hours minimum) advance notice of completion of any phase of work for a work area when he deviates from the previously submitted work schedule noted under Section 1.03 C. The Contractor shall provide necessary access to areas to be inspected.

    a. Failure to obtain approval of any phase of work for a work area may result in redoing the operation at no cost to the State.

3. Right of Rejection: The Engineer shall have the right to reject all work which is not in compliance with the plans and specifications. Rejected work shall be redone at no cost to the State.

(C) ANALYZING AND TESTING

1. All paints shall be subject to laboratory tests whenever the Engineer deems necessary to determine conformation to the requirements of these specifications. Cost of testing will be borne by the State. All rejected material shall be removed from the job site immediately. Surfaces painted with rejected material shall be redone at no additional cost to the State.

(D) GUARANTY

1. The Contractor shall guarantee that the work performed under this section conforms to the contract requirements and is free of any defect of material or workmanship performed by the Contractor. Such guarantee shall continue for a period of 2 years from the date of project acceptance during which period the Contractor shall remedy at his own expense any such failure to conform or any such defect.

2. The Engineer shall notify the Contractor in writing within a reasonable time after discovery of any failure or defect.

3. Should the Contractor fail to remedy any failure or defect described in Paragraph A above within 10 working days after receipt of notice thereof, the State shall have the right to repair or otherwise remedy such failure or damage at the Contractor's expense.

(E) SPECIAL REQUIREMENTS

1. Codes

    a. The Contractor shall comply with the State OSHL (Occupational Safety and Health Law) and all pollution control regulations of the State Department of Health.

2. Protection Persons

    a. The Contractor shall take all necessary precautions to protect public pedestrians including tenants from injury.

    b. The Contractor shall provide, erect and maintain safety barricades around scaffolds, hoists and wherever Contractor's operations create hazardous conditions in order to properly protect the public and tenants.

    c. Completed Work: The Contractor shall provide all necessary protection for wet paint surfaces.

    d. Protective Covering: The Contractor shall provide and install protective covering over light lens, equipment, floor and other areas that are not scheduled for treatment. Protective covering shall be clean sanitary drop cloth or plastic sheets. Paint applied to surfaces not scheduled for treatment shall be completely removed and surfaces shall be returned to original condition.

    e. Safeguarding of Property: The Contractor shall take whatever steps may be necessary to safeguard his work and also the property of the State and other individuals in the vicinity of his work area during the execution of this Contract. He shall be responsible for and make good on any and all damages and for losses to work or property caused by his or his employee's negligence. Also see "General Conditions”.

    f. Fire Safety: The Contractor shall direct his employees not to smoke in the

vicinity and exercise precautions against fire at all times. Waste rags, plastic (polyester sheets), empty cans, etc. shall be removed from the site at the end of each day.

3. Storage Area for Materials: No paint material, empty cans and paint brushes and rollers may be stored in buildings, but shall be stored in separate storage facilities away from the buildings. The Contractor may furnish a job site storage facility. Such facility shall comply with requirements of the local Fire Department. The storage area shall be kept clean and facility shall be locked when not in use or when no visual supervision is possible.

4. Sequence of Operations: The sequence of operations shall divide the surfaces into work areas and present a schedule for:

    a. Surface preparation and spot prime.

    b. Prime coat.

    c. First finish coat.

    d. Second finish coat.

(F) AREAS (SURFACES/STRUCTURES) TO BE PAINTED

1. Structures:

    a. Paint/repaint all new and renovated/altered areas as indicated on the drawings.

    b. Miscellaneous.

2. Surfaces to be Painted

    a. Exterior: All new and renovated/altered exterior painted surfaces shall be painted unless otherwise indicated on the plans and/or specifically deleted in these specifications. Exterior surfaces to be painted shall be any surface exposed to weather in an area not enclosed by 4 walls and a roof. Extent of treatment for special items is as follows:

        a. All surfaces of the new construction exposed to view including, but not limited to, siding, eaves, soffit, doors and frames, and windows on the exterior, and walls, soffits, doors and frames, and windows on the interior.

        b. All surfaces of the existing buildings that become a part of the newly enclosed spaces including, but not limited to, siding, doors and frames, and windows.

        c. G.I. pipes and conduits, electric boxes, metal connectors, and similar appurtenances.

(G) MATERIALS

1. Lead Prohibition: All paints shall be lead-free.
2. Mercury Prohibition: All paint shall be mercury- free.
3. Chromate Prohibition: All paint shall be free of zinc-chromate and/or strontium-chromate.
4. Cadmium Prohibition: All paint shall be cadmium free.
5. Material shall be equal in quality to that specified under the Schedule of Finishes and any given finish shall be as labeled by one manufacturer.
6. All materials shall be delivered to the job site in undamaged original containers bearing the manufacturer's label and shall be stored in such a manner as to prevent damage. All rejected materials shall be removed from the job site immediately.
7. Paints shall be as manufactured by Ace, Benjamin Moore, Cabot's, Carboline, Decratrend, DuPont, Dutch Boy, Fine Line Paint Corp., ICI Devoe, ICU Dulux, ICI Fuller-O'Brien, ICI Glidden, ICI Sinclair, Martin Senour, Olympic Stain, Pervo, Pittsburgh, Porter Intl., Pratt & Lambert, Rust-Oleum, Sherwin-Williams, Smiland (Styleone), Spectra-Tone, Thoro Systems, Tnemec, United Paint and Coatings or approved equal.
8. Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's printed specifications. Compound thinner, mineral oil, kerosene, refined linseed oil, or gasoline shall not be used for thinning.
9. Except for metal primers all paint shall contain the maximum amount of mildewcide per gallon of paint permitted by the mildewcide manufacturer without adversely affecting the quality of the paint.
10. The supplier shall submit a signed certificate indicating the amounts of mildewcide added by both the paint manufacturer and the paint supplier.

(H) SCHEDULE OF FINISHES

1. The schedule of Finishes is made for the convenience of the Contractor and indicates the types and quality of finishes to be applied to the surfaces.
2. Any existing painted surface not specifically noted in the finish schedule shall be finished to match adjoining work.

Exterior System:
(System indicated are as manufactured by PPG/ Glidden Professional Paints)

1. Wood (New and Existing):

| | | |
|---|---|---|
| New or Existing with Latex-Based Finish: | | |
| Prime Coat: Spot Prime | DFT 1.5 mils @ 375 s.f./gal. | 6001 Glidden Professional HYDROSEALER Primer-Sealer |
| or | DFT 2.4 mils @ 479 s.f./gal. | Existing with Solvent –Based Finish: 2110N Glidden Professional Stain Stomper Exterior Primer-Sealer |
| Finish (2) Coats: | DFT 1.5 mils @ 374 s.f./gal. Per coat | 2406V Glidden Professional FORTIS 350 Exterior Semi-Gloss Paint |

2. New Gypsum Wall Board:

| | | |
|---|---|---|
| Prime Coat: | DFT 1.0 mils @ 400 s.f./gal | 6-2 Interior, SPEEDHIDE Latex Sealer QD |
| Finish (2) Coats: | DFT 1.4 mils @ 400 s.f./gal. Per coat | 6-500 Series, SPEEDHIDE Interior Latex Enamel Semi-Gloss |

3. Incidental/Miscellaneous PVC items (New and Existing):

| | | |
|---|---|---|
| Prime Coat: | DFT 1.6 mils @ 400 s.f./gal | 17-921 Int/Ext , PPG SEALGRIP Acrylic Universal Prime Sealer |
| Finish (2) Coats: | DFT 1.4 mils @ 400 s.f./gal. Per coat | 6-500 Series, SPEEDHIDE Interior Latex Enamel Semi-Gloss |

4. Exterior Metal Doors, Windows and Frames (New and Existing):

| | | |
|---|---|---|
| Prime Coat: | DFT 2.3 mils @ 359 s.f./gal | 4160 Devguard 4160 Alkyd Metal Primer |
| Finish (2) Coats: | DFT 2.0 mils Per coat | 4216 Pitt-Tech Plus DTM Industrial Enamel Semi-Gloss |

5. Interior Metal Doors, Windows and Frames (New and Existing):

| | | |
|---|---|---|
| Prime Coat: | DFT 1.5 mils @ 425 s.f./gal | 9116 PPG Glidden, LIFEMASTER 100% Acrylic Interior No-VOC Primer |
| Finish (2) Coats: | DFT 1.3 mils @ 450 s.f./gal. Per coat | 9200 PPG Glidden, LIFEMASTER 100% Acrylic Interior No-VOC Semi-Gloss |

6. Metal-Ferrous (New and Existing):

| | | |
|---|---|---|
| Pretreatment | | Ospho Metal Treatment of SSPC SP-1 |
| Primer | DFT 2.3 mils @ 359 sf/gal | MPI-79 PPG Devguard 4160 Alkyd Metal Primer |
| 2nd & 3rd coats | DFT 2.0 mils Per coat | MPI-163 Pitt-Tech Plus 4216 Semi-Gloss DTM Industrial Enamel (90 VOC) |

(I) WORKMANSHIP

1. Apply all materials in strict accordance with the manufacturer's printed instructions using skilled mechanics with paint evenly spread and well brushed with no drops, runs, or sags. Do not apply paint on wet or damp surfaces nor until preceding coat of paint is thoroughly dry, and in the case of woodwork, well sanded. A high class finish is required on all interior painted surfaces and particular attention will be paid to sanding between coats on all woodwork. All finishes are intended to thoroughly cover in the number of coats listed, using the quality of paint specified. If paints are thinned or other manufacturer's paints are used, apply sufficient additional coats as required to provide full and complete coverage, with no shadows, spots, streaks, voids, color bleed-through, or other defects.

2. Identification of coatings: Each coat shall be tinted a slightly different shade from the preceding coat so that it can be readily identified. Finish coat shall match approved sample for each portion of work. (Each application of treatment or coating shall be approved by the Engineer before next coating is applied. Failure to get such approval may result in condemnation entailing additional applications).

3. All surfaces adjacent to areas being finished shall be protected and left clean of paints, stains, etc. Clean drop cloths shall be used until completion of job.

4. All mixing shall be done outside the building.

5. All waste materials shall not be left in or near the building but shall be stored in proper metal containers.

(J) PREPARATION OF NEW SURFACES

1. The painting contractor shall be wholly responsible for the finish of his work and shall not commence any part of it until surfaces are in proper condition. If painting contractor considers any surfaces unsuitable for proper finish of his work, he shall notify the Engineer of this fact in writing and he shall not apply any material until the unsuitable surfaces have been made satisfactory, or until the Engineer has instructed him to proceed. Major defects shall be restored by the proper trades. In general, follow paint manufacturer's directions for surface preparation for the paint to be applied.

2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting

fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

3. All necessary puttying of nail holes, cracks and blemishes shall be done after priming coat has become hard and dry and before second coat is applied.

4. Unprimed galvanized metal shall be washed with a solution of chemical phosphoric metal etch and allowed to dry.

5. All metal surfaces shall be made clean and free of any defects or condition that may produce unsatisfactory finish. Touch-up any chipped or abraded places on surfaces that have been shop coated with the proper primer.

(K) PAINT APPLICATION

1. General

   a. All work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.

   b. All materials shall be applied in accordance with the manufacturer's specifications and the finished surfaces shall be free from runs, sags, drops, ridges, waves, laps, streaks, brush marks and variations in color, texture and finish (glossy or dull). The coverage shall be complete and each coat shall be so applied as to produce a film of uniform thickness. No paint, varnish or enamel shall be applied until the preceding coat is thoroughly dry and approved.

   c. No exterior painting of unprotected surfaces shall be done in rainy, damp weather. Coats shall be applied only to surfaces that are thoroughly dry and only under such combination of humidity and temperature that will ensure proper paint application.

2. Application: Shall be by brush or roller.

3. Colors: Each coat shall be tinted a different shade from the preceding coat. Colors shall be in accordance with the schedule.

(L) PROTECTION OF PROPERTY

1. The Contractor shall be responsible for condition of building in his charge. He shall protect adjacent work and materials from soiling or damage as well as his own. The storage and handling of paints and thinners shall be in accordance with the safety provisions and codes covering such handling and storage.

(M) INSPECTION

1. Every facility shall be provided for inspection of the work by the Engineer at any time. Any work not conforming to these specifications shall be cleaned off, and repainted at the expense of the Contractor.

(N) MISCELLANEOUS

1. Installation of Removed Items: After completion of final paint coat, removed items shall be reinstalled.

2. Clean-up

    a. During the progress of the work, all debris, empty crates, waste, drippings, etc. shall be removed by the Contractor and the grounds about the areas to be painted shall be left clean and orderly at the end of each work day.

    b. Upon completion of the work, staging, scaffolding, containers and all other debris shall be removed from the site. All paint, shellac, oil, or stains splashed or spilled upon adjacent surfaces not requiring treatment (hardware, fixture, floor, glass) shall be removed and the entire job left clean and acceptable.

3. Extra Paint: The Contractor shall provide extra paint, in each of the different colors of exterior and interior paints, used to the facility upon completion of the project. The paint shall be in unopened one gallon cans, one gallon of each color.

## 1.31 SIGNAGE

(A) SUMMARY

1. Section Includes: All labor, tools and equipment necessary to install all signage and miscellaneous related work as called for, or required by the drawings and specifications.

(B) REFERENCES

1. The latest publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

    ASTM International (ASTM).

    ADA Standards for Accessibility Design.

    ADAAG – Architectural Barriers Act Accessibility Standards.

(C) DELIVERY AND STORAGE

1. Deliver materials to the site in unopened containers, labeled with the manufacturer's names and brands, ready for installation. Store signs and accessories in safe, dry

locations until needed for installation.

(D) WARRANTY

1. The Contractor shall execute to the State a 2-year written warranty after the Project Acceptance Date that the installations of the Signs and Accessories are in accordance with the manufacturer's requirements. Any damages which develop during that period which are not due to improper use or willful damage will be repaired at no cost to the State. The guarantee shall provide the following at no cost to the State.

(E) ADAAG SIGNAGE REQUIREMENTS

1. General: Unless otherwise indicated or specified, signs shall comply with 703. Where both visual and tactile characters are required either one sign with both visual and tactile characters, or two separate signs, one with visual and one with tactile characters, shall be provided.

2. Raised Characters: Raised characters shall comply with ADAAG 703.2 and shall be duplicated in Braille complying with ADAAG 703.3. Raised characters shall be installed in accordance with ADAAG 703.4.

    a. Depth ADAAG 703.2.1: Raised characters shall be 1/32 inch (0.8 mm) above their background.

    b. Case ADAAG 703.2.2: Characters shall be upper case.

    c. Style ADAAG 703.2.3: Characters shall be sans serif, Characters shall not be italic, oblique, script, highly decorative, or other unusual forms.

    d. Character Proportions ADAAG 703.2.4: Characters shall be selected from fonts where the width of the uppercase letter "O" is 55 percent and 110 percent maximum of the height of the uppercase "I".

    e. Character Height ADAAG 703.2.5: Character height measured vertically from the baseline of the character shall be 5/8 inch (16 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase "I".

    f. Stroke Thickness ADAAG 703.2.6: Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.

    g. Character Spacing ADAAG 703.2.7: Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spaces between individual raised characters shall be 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch (1.6 mm) minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch (3.2 mm) minimum and 4 times the raised character stroke width maximum at

the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch (9.5 mm) minimum.

h. Line Spacing ADAAG 703.2.8: Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.

3. Braille: Braille shall be contrasted (Grade 2) and shall comply with ADAAG 703.2 and 703.4.

4. Installation Height and Location ADAAG 703.4: Signs with tactile characters shall comply with ADAAG 703.4.

5. Visual characters ADAAG 703.5: Visual characters shall comply with ADAAG 703.5.

6. Pictograms ADAAG 703.6: Pictograms shall comply with ADAAG 703.6.

7. Symbols of Accessibility ADAAG 703.7: Symbols of accessibility shall comply with ADAAG 703.7.

8. Finish and Contrast ADAAG 703.5.1:

   a. Characters and background of sign shall have matte or non-glare finish.

   b. Characters and symbols shall contrast with their background, either light characters on dark background or dark characters on a light background.

(F) MATERIALS

1. Materials and Fabrication: Tactile signs with raised letters shall be fabricated of photo polymer laminated to acrylic backing for a total thickness of 1/4" to match signs in layout and size, but copy is raised 1/32". Grade II Braille will be used as specified for compliance, ADAAG 703. Finish colors on sign face and finished edges. Each sign shall be secured to wall on the latch side of the door as indicated on drawings or as directed by the Contracting Officer. Signs shall be fastened with one-way, tamper-proof, non-corrosive fasteners. Shields shall be provided as required to suit the mounting conditions. The lettering of signs shall be as directed in schedule shown on drawings. All room signage shall conform to the Americans with Disabilities Act and Architectural Barriers Act Accessibility Standards (ADAAG), Section 703.5.1. Background and letter/character colors shall be contrasting. Colors shall be as selected by the Contracting Officer.

2. International Symbol of Accessibility (ISA) and Symbols of Accessibility Signs:

   ISA signs and Symbols of Accessibility signs shall be the same type as room signs except that the ISA and Symbols of Accessibility portion of the signs shall be 6" x 6" with proportionate raised handicap symbol. Conform with ADAAG, Section 703.7.

(G) FABRICATION

1. All signs shall be fabricated according to specifications of approved construction drawings and submittals and will conform exactly to approved construction submissions in quality, fabrication and material.

2. All fasteners used to secure photo polymer laminated to acrylic backing pieces shall be inserted into drilled and tapped holes. Allow a minimum of l/8-inch over depth to prevent bottoming of fasteners. National coarse machine threads shall be used throughout.

(H) EXAMINATION

1. Do not begin installation until substrates have been properly prepared.

2. If substrates are the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before proceeding.

(I) INSTALLATION

1. Surfaces of fastening devices exposed after installation shall have the same finish as the attached accessory. Exposed fasteners shall be fastened with one-way, tamper-proof, non-corrosive fasteners. Shields shall be provided as required to suit the mounting conditions. Installed location and height of signs as indicated. Protect exposed surfaces of signs with strippable plastic or by other approved means until the installation is accepted. Coordinate sign manufacturer's mounting details with other trades as their work progresses, and with installation requirements of ADAAG 216 and 703. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

2. Signs shall comply with ADAAG 703.

(J) PROTECTION AND CLEANING

1. Check and clean all signage, replace damaged products before substantial completion.

2. At the completion of his work, the Contractor shall clean up and remove from the premises, all rubbish, debris and unused materials. He shall also clean and protect installed products until completion of project.

## 1.32 FIRE EXTINGUISHERS AND CABINETS

(A) DELIVERY AND STORAGE

1. Materials delivered to the site shall be inspected for damage, unloaded and stored with a minimum of handling. The storage spaces shall be dry locations with adequate ventilation, free from dust or water, and shall permit easy access for inspection and handling.

(B) FIRE EXTINGUISHER CABINETS

1. Fire extinguisher cabinets shall be of extruded aluminum. All cabinets shall have a continuous hinge allowing the door to swing open 180 degrees, full glass door, horizontal silk screened red lettering (FIRE EXTINGUISHER) on door, chrome handle, chrome plated latch and stainless steel glass clips. Exposed aluminum surfaces shall be cleaned and given an anodized finish conforming to AA "Designation Systems For Aluminum Finishes." Finish shall be clear (natural) designation AA-M10-C22-A41, Architectural Class 1(0.7 mil or thicker). Cabinets shall be surface mounted as indicated, sized for fire extinguishers specified. Manufacturer's accessible latch and lever type door pull for all cabinets in accordance with ADAAG, 4.27.4. Fire extinguisher cabinets shall be clearly numbered at the front face of each cabinet, numbering system to be provided by Engineer.

(C) FIRE EXTINGUISHERS

1. Multi-purpose dry chemical fire extinguishers, 4A:60B:C, 10-pound normal capacity, capable of extinguishing Class A, B, and C fires, meeting Underwriters Standard 299, fully approved and listed by Underwriters Laboratories, Inc.

(D) INSTALLATION

1. Fire extinguisher cabinets shall be installed in accordance with manufacturers' printed instructions. Bottom of fire extinguisher cabinets shall be mounted 2.5-feet to finish floor level. Cabinets shall be mounted so that extinguisher operating instructions face outward, the location of the extinguisher shall be marked conspicuously. Cabinets shall be numbered clearly at the front face of the cabinet.

## 1.33 GENERAL ELECTRICAL REQUIREMENTS

(A) SUMMARY

1. This specification covers the requirements for furnishing and installing of all electrical work.

(B) WORK INCLUDED

1. The Contractor under this Division shall provide all labor, materials, equipment, supervision and services required for the construction of the electrical systems. The finished installations shall be complete, operable and shall include all work specified herein and shown on the Drawings.

2. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All systems shall be properly adjusted and in working order at the time of final acceptance.

3. All painting and other finishing work shall conform to the applicable requirements of the specifications as prescribed in appropriate sections.

4. It is the intent of these Specifications and other Contract Documents to require an installation complete in every detail. Consequently, the Contractor will be responsible for minor details or for any special construction which may be found necessary to properly furnish, install, adjust, test, and place in successful and continuous operation, the entire electrical system, and the cost of same shall be included in the contract price.

(C) DESCRIPTION OF WORK

1. Work specified in this Division shall include, but not be limited to the following:

    a. Complete disconnecting and removal of existing light fixtures and electrical devices as shown on plans.

    b. Complete lighting and general-use receptacles.

    c. Empty raceways and outlets for telephone/data.

    d. Complete new wiring for air conditioning equipment (connections to equipment by others).

    e. Testing.

(D) REFERENCES

1. Comply with the applicable requirements of the following standards unless otherwise indicated:

    a. Comply with local ordinances; National Electrical Code; applicable regulations of the National Board of Fire Underwriters; specifications of ANSI, NEMA, UL, and IPCEA; and regulations of the City and County of Honolulu.

    b. In the event of conflict between pertinent codes and regulations, and the requirements of the referenced standards, or those indicated in Specifications and on drawings, the provision of the more stringent shall govern.

(E) PERMITS AND INSPECTION

1. All permits required by local ordinances shall be obtained and paid for by the Contractor.

2. After completion of the work, the Contracting Officer shall be furnished a certificate of final inspection and approval from the Building Division Electrical Code Inspection Section.

(F) COORDINATION

1. Refer to all project Drawings and to all Sections of the project Specifications. Coordinate and fit all work accordingly so that all electrical outlets and equipment will be properly located and readily accessible. The Drawings indicate the relation of wiring and connections and must not be scaled for exact locations. Verify all construction dimensions at the project and make changes necessary to conform to the buildings as constructed. Work improperly installed due to lack of construction verification shall be corrected at the Contractor's expense.

2. Work shall be scheduled to avoid delays, interferences, and unnecessary work. If any conflicts occur necessitating departures from the Drawings and Specifications, details of departures and reasons therefore shall be submitted immediately for consideration to the Contracting Officer.

(G) DELIVERY, HANDLING AND STORAGE

1. Deliver all materials of this Division in manufacturer's original unopened packages or containers with label intact and legible.

2. Use means necessary to protect the materials of this section before, during and after installation; to protect the installed work and materials of all other trades; and to protect the original structure, work and materials of the State.

3. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Contracting Officer and at no additional cost to the State.

(H) WARRANTY

1. Installation shall be complete in every detail as specified and ready for use. Any items supplied by the Contractor developing defects of design, construction, or quality within two (2) years of final acceptance by the Contracting Officer shall be replaced by such new materials, apparatus or parts to make such defective portion of the complete system conform to the true intent and meaning of the Drawings and Specifications at no additional cost to the State.

2. The warranty shall be countersigned by the Contractor.

(I) MATERIALS AND WORKMANSHIP

1. All materials shall conform to the latest issue of all applicable standards as established by NEMA, NFPA, ANSI, IEEE, ASTM and Underwriters Laboratories, and shall bear the manufacturer's name, trade name and when available, the Underwriters' Label.

2. Within twenty (20) days after the contract has been awarded, or as otherwise directed, forward to the Contracting Officer a complete list of all materials and equipment proposed for installation. The intent to use the exact makes specified does not eliminate the responsibility of submitting such a list. List shall include sufficient information to permit ready and complete identification. After the work is completed,

Contractor shall provide drawings showing the as-built conditions.

3. Neat appearances in the finished work will be required. Only experienced electrical workers shall be employed for the electrical installation.

4. All work not installed and completed in accordance with the latest rules and regulations of the NEC, OSHA, NESC, and all local ordinances shall be removed and reinstalled correctly at the Contractor's expense.

(J) EXECUTION – GENERAL

1. Install all electrical materials and equipment in accordance with manufacturer's recommendations and as approved by the Contracting Officer.

2. Cut, break, drill and patch as required to install electrical system. Repair any surface damaged or marred by notching, drilling or any other process necessary for installation of electrical work. Patch any damaged surfaces to match the adjacent surface.

3. The Electrical Contractor shall coordinate his work with other trades on campus to avoid conflicts.

(K) JOB CONDITIONS

1. These specifications are accompanied by construction drawings including plans showing locations of all wiring, outlets, devices, and other electrical equipment. The locations are approximate and before installing, study adjacent structural and architectural details and make installation in most logical manner. Any device may be relocated within 10'-0" before installation at direction of the Contracting Officer without additional cost to the State.

2. Before installing, verify all dimensions and sizes of equipment.

3. Verify that electrical system may be installed in strict accordance with the original design, the Drawings and Specifications and the manufacturer's recommendations.

4. In the event of discrepancy, immediately notify the Contracting Officer. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

(L) DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

1. Submit written certification that electrical systems are complete and operational. Submit certification with Contractor's request for final inspection.

2. At the time of final review of electrical work, demonstrate the operation of electrical systems. Provide labor, apparatus and equipment for systems' demonstration. The various tests shall be under the direction and supervision of the Contracting Officer.

3. The Contractor shall perform start-up and all tests as required to obtain final field acceptance from the State. All tests shall be conducted in the presence of the Contracting Officer or his representative.

4. The Contractor shall be responsible for all tests. Testing shall be performed by and under the immediate supervision of the Contractor.

5. A visual inspection of all electrical equipment, to check for foreign material, tightness or wiring and connection, proper grounding, matching nameplate charts with specification, etc., shall be made prior to actual testing.

## 1.34 ELECTRICAL WORK

### (A) SUMMARY

1. Furnish all labor and materials required to complete all electrical work indicated on the drawings and/or as specified.

2. In general, the following work is included:

    a. Complete disconnecting and removal of existing light fixtures and electrical devices as shown on plans.

    b. Complete lighting and general-use receptacles.

    c. Empty raceways and outlets for telephone/data.

    d. Complete new wiring for air conditioning equipment (connections to equipment by others).

    e. Testing.

3. The term "wiring" shall include raceways, outlets, conductors, and devices.

4. Wiring and connecting of all electrical equipment supplied for installation and use in this contract and not specifically listed as work by others.

5. Test complete installation.

### (B) RULES

1. The entire installation to be made in strict accordance with applicable provisions of 2008 edition of the National Electrical Code, Local Ordinances, and rules and regulations of the City and County of Honolulu and State of Hawaii.

### (C) GUARANTEE

1. All work and material executed under this Section shall be guaranteed to be free from defects of materials and workmanship for two (2) years from date of final acceptance of a project as a whole. All work of repair and replacement required, including other work damaged by this work's defects shall be performed without cost to the State.

### (D) DRAWINGS

1. Specifications are accompanied by drawings of building and diagrammatic electrical plans showing locations of wiring, devices, outlets, and other electrical equipment. Locations are approximate. Before installing, study adjacent construction details and make installation in most logical manner. Any device or equipment may be relocated within 10 feet-0 inches before installation at direction of the Contracting Officer without additional charge to the State.

2. Before installing, verify all dimensions and sizes of equipment at jobsite, including electrical connections to mechanical and electrical equipment. Circuit and conduit routing is typical and may be altered in any logical manner; however, all changes shall be approved by the Contracting Officer and shown on "as-built" drawings. See SECTION - CLOSEOUT PROCEDURES for "As-Built" reproducible drawings and CD's.

(E) MATERIALS

1. All materials shall be new and of the best quality available in their respective kinds, free from all defects and shall conform to standards of Underwriters' Laboratories, Inc., NEMA, ANSI, ASTM, and IEEE. Materials and equipment listed by Underwriters' Laboratories shall bear "UL" label of approval. Brand names, manufacturer's names, and catalog numbers indicate standards of design and quality required. Substitute materials other than those listed in each paragraph will not be solicited unless indicated with "or approved equal".

   Example:

| Item | Manufacturer and Catalog No. Specified | Substitute Manufacturer and Catalog Number |
|---|---|---|
| Cable | Joe Doe - No. 3200 | King - No. 2200 |

   Qualifying data shall include cuts, shop drawings, and specifications to show equality with materials specified herein and in drawings.

2. Raceways:

   a. Rigid Steel: Zinc-coated, 3/4 inch diameter minimum. Use in interior exposed locations below 8 feet.

   b. Electrical Metallic Tubing (EMT): Thin walled steel tubing, zinc coated, 3/4 inch minimum diameter. Use concealed and in interior exposed locations above 8 feet.

   c. Flexible Conduits: Flexible steel, zinc-coated, 1/2 inch minimum, and used with factory approved fittings. In wet locations, use watertight type jacketed with polyethylene.

3. Device and Cover Plates: Device plates for interior construction shall be satin finished 302 high nickel stainless steel, 18 percent chrome, 8 percent nickel with suitable hole for device. Pass & Seymour, General Electric, Hubbell and Leviton

equals.

4. Outlet Boxes:

    a. Exposed boxes shall be galvanized cast iron or alloyed aluminum with threaded hubs for conduit connections.

5. Wires and Cables: Wires and cables shall meet the applicable requirements of ASTM and UL for the type of insulation, jacket, and conductor specified or indicated. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

    a. Conductors: Conductors No. 10 AWG and smaller shall be solid or stranded, and those No. 8 AWG and larger shall be stranded. Unless indicated otherwise, conductor sizes shown are based on copper. All conductors shall be copper.

    b. Minimum Conductor Size: Minimum size shall be No. 12 AWG.

    c. Color Coding: All branch circuit conductors shall be color-coded. Color shall be green for grounding conductors, and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, the other neutral shall be white with a colored (not green) stripe. The color of the ungrounded conductors in different voltage systems shall match existing color-coding. If not available, use the following:

        120/208V, 3-phase

        | | |
        |---|---|
        | Black | Phase A |
        | Red | Phase B |
        | Blue | Phase C |
        | White | Neutral |
        | Green | Ground |

    d. Insulation: Unless specified or indicated otherwise, or required to be otherwise by NFPA 70, all power and lighting wires shall be 600-volt, Type THWN or XHHW, except that grounding wire may be Type TW.

    e. Equipment Grounding Conductors: ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger.

6. Splices and Termination Components:

    a. UL 486A and UL 486B, as applicable for wire connectors, and UL 510 for insulating tapes. Connectors for wires No. 10 AWG and smaller shall be insulated pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

7. Conduit Accessories: Couplings, spacers, plugs, and accessories shall be as recommended by the manufacturer of conduits.

8. Outdoor Exposed Raceways: Raceways shall be hot dipped galvanized inside and outside, round bore, 3/4 inch diameter, except as noted.

9. Wiring Devices:

    a. Duplex Receptacle, Heavy Duty, Industrial Grade: Ivory phenolic molded body, duplex NEMA 5-20R, 20A, 125V, 2-pole, 3-wire, grounded, back and side wiring, U-shaped grounding slot, parallel double wipe phosphor bronze spring tensioned contacts, heavy-duty corrosion resistant wrap-around body bridge strap with grounding screws and automatic grounding clip, back wiring holes for feed through wiring and rated engraved on body. Install in outlet box with appropriate device or cover plate. Manufacture and install according to NEC Articles No. 210 and 406. Hubbell No. 5362-I.

    b. Weatherproof Receptacle: Provide GFI type receptacle in flush cast metal box with gasketed, cast metal weatherproof cover plate. Cover plates shall be listed for "wet locations" while in use. Receptacle shall be weather resistant, ivory phenolic molded body, NEMA 5-20R, 20A, 125V, 2-pole, 3-wire, grounded, side wired, U-shaped grounding slot, parallel double wipe phosphor bronze spring tensioned contacts, automatic grounding clip, solid state ground fault sensing and test circuit designed to trip open when ground current exceeds 5.0 milliamperes, resettable, and with rating engraved on body. Manufacture and install according to NEC Article Nos. 210 and 406. Hubbell No. GFR-5362-SGI.

    c. Light Switch, Heavy Duty, Industrial Grade: Non-mercury, number of poles required, quiet operating, rated for 20A, 120-277 volts, one piece heavy-duty toggle handle which makes continuous contact with spring contact arms, two piece heavy-duty body bolted to bridge strap, large binding head screws for terminating conductors silver cadmium oxide contacts, high conductivity and fatigue resistant contact arms, spring loaded cam mechanism, back and side wiring, with ground terminal, heavy-duty bridge strap.

        U.L. labeled, and rated for 10,000 cycles of operation. Manufacture and install according to NEC Articles No. 110 and 404. Device shall be installed in outlet box complete with device plate. Connection shall be made on side screws only. Hubbell No. 1121-I series.

        Switches shall be color matched according to device plate, single, double pole, 3-way, or 4-way and locking type as required. Locking type switch shall operate using a manufacturer provided key which is inserted in the vertical slot of the switch. Provide two (2) additional keys for each locking type switch. Switches for direct motor control shall be horsepower-rated for the motor being controlled and shall be manual motor starter type with thermal overload protection except when used only as disconnect or controller.

    d. Equal devices by Arrow Hart, General Electric, Bryant, Leviton and Pass &

Seymour are approved.

10. Telecom Outlet: Wall, 4-11/16 inch square x 2-1/8 inches outlet box, raised ring, and straps. Provide with blank device plate.

11. Equipment Disconnect and Fused Switches: Heavy duty, fusible or non-fusible safety switch. Horsepower rated when used as motor disconnect. Contacts shall be lever operated, spring loaded and enclosed in NEMA 1 enclosures for interior locations and NEMA 3R enclosures for exterior locations. When for use with fuses of current limiting type, clips shall be rejection type. Manufacture and install according to NEC Articles 240, 404 and 430. Provide three (3) spare fuses of each ampere rating. Siemens, Cutler-Hammer, General Electric, Square-D or approved equal.

12. Motor Disconnect Switch (Fractional Horsepower): Horsepower rated, fusible or non-fusible motor disconnect switch. Contacts shall be lever or rotary operated, enclosed in NEMA 1 enclosures for interior locations (and ceiling spaces) and NEMA 4X, stainless steel (or thermoplastic) enclosures for all other locations. When for use with fuses of current limiting type, clips shall be rejection type. Manufacture and install according to NEC Articles 240, 404 and 430. Provide 3 spare fuses of each ampere rating. Siemens, Eaton, Square-D, General Electric or pre-approved equal.

13. Individual Circuit Breaker: Molded plastic case circuit breaker with toggle operated mechanism thermal-magnetic overload trips. Toggle positions "ON", "TRIPPED", and "OFF", engraved on body or toggle. Circuit breaker shall be compatible to fit into existing panel where called for on plans.

14. Equipment and Motor Connection: Power connection to motor and equipment from nearest box with watertight flexible conduit and locknut type or threaded connector.

15. Junction Boxes: Junction boxes, unless otherwise specified, shall be NEMA 1 and NEMA 3R. NEMA 1 junction boxes shall be fabricated from galvanized steel. Prime paint and enamel finish according to NEMA specifications. NEMA 3R junction boxes shall be water resistant. Manufacture and install according to NEC Article 314.

16. Hardware, Support, Backing, etc.: Provide all hardware, supports, backing, and other accessories necessary to install electrical equipment. Wood material shall be termite treated, iron or steel materials shall be galvanized for corrosion protection, and non-ferrous materials shall be brass or bronze. All wood screws shall be brass or galvanized steel.

17. Loadcenters:

    a. General: Furnish and install circuit breaker lighting and appliance loadcenters where shown on the drawings and as indicated in the loadcenters schedule.

       Loadcenters shall comply with the following industry standard:

        a. NEMA Standard PB-1

        b. UL Standards; Cabinets and Boxes-UL 50; Panelboards-UL 67

       Loadcenters shall be labeled as suitable for use as service equipment in

accordance with Article 384 of the National Electrical Code.

b. Box: The panel box shall be fabricated from galvanized or galvannealed steel. Box shall have adjustment screws to provide easy alignment. Removable end walls to be blank. Loadcenter box is to have separate UL label and minimum wire bending and gutter requirements to meet the NEC and UL standards. Wiring gutters shall be completely free of any part of trim clamp to prevent damaging wire insulation.

c. Interior: All interiors shall be completely factory assembled. The design of the interior shall permit replacement of circuit breakers without disturbing adjacent units and without machine drilling or tapping. All circuit breaker connections shall be in a hole tapped by the manufacturer. Main bus shall be tin finished 55 percent conductivity aluminum. Branch bus shall be tin finished copper only. Sizing of conductor shall be in accordance with UL 67. Bus bars shall be supported by a VO rated, UL recognized, Polymeric material. Bus sequence shall start at the top left phase bus of the interior for both top and bottom fed panels. Loadcenters shall be rated 100A maximum. Interiors shall be designed to permit installation of feed-thru lugs without increasing the enclosure size. Main and sub-feed breakers shall be bus connected, not cabled. Interior shall be convertible from main lug to main breaker with the addition of an appropriate field-installable kit. Interior shall be changeable from top to bottom feed and vice-versa, while maintaining readability of dead-front labeling.

   Dead-front shall be provided with a flange for easy attachment of trim. Incoming cable lugs shall be grouped at one end to separate them from the load side cables. Main lugs shall be lay-in construction to facilitate connections. Neutral bussing shall have a lug for each outgoing branch requiring a neutral connection. For easy wiring and shortest cable run possible, load size neutral connection lugs to be split with each side taking 50 percent of load neutral connections. The interior shall be provided with wing nuts for securing to box without tools.

d. Trim: The loadcenter trim shall be surface or flush as indicated on the drawings. It shall be fabricated from cold-rolled steel, painted with an ANSI-61 light gray finish and equipped with concealed hinges, flush lock and a holder for circuit directory card. Trim shall have two separate supports designed to engage the box flange to stabilize and secure the trim during installation. Trim screws to be located behind the lockable door for tamper resistance.

e. Description: The loadcenters shall be for use with the following system or as indicated on each loadcenter schedule:

   208/120 volts, 3 phase, 4 wire

   The loadcenter enclosures shall be NEMA Type 1 construction for top or bottom cable entrance and suitable for flush mounting unless otherwise noted on loadcenter schedules. Short circuit rating shall be 10,000 amperes

symmetrical based on the smallest rating on any circuit breaker installed in the loadcenter.

Provide main lug only or main circuit breaker loadcenters as shown on loadcenter schedules. Also provide branch and sub-feed circuit breakers of the quantity, trip rating and number of poles as shown on schedules. Molded case circuit breakers shall be thermal-magnetic, quick-make, quick-break, trip free. Multi-pole breakers shall be common trip. If current limiting circuit breaker mains are indicated on schedules, provide breakers with inverse time delay, instantaneous circuit protection and limit let-through $I^2t$ to a value less than $I^2t$ of one-half cycle wave of the symmetrical prospective current without any fusible elements. All breakers shall be equipped with anti-turn solderless, pressure type connectors. All provisions shall be located at the bottom of the loadcenter and be fully bussed complete with all necessary mounting hardware less the breaker.

Provide sub-feed lugs, feed though lugs, handle blocking devices, padlocking devices, shunt trips and ground bus bars as shown on schedules.

f. Manufacturer: Siemens, Square-D, Cutler Hammer or General Electric equals.

18. Lighting: Lighting system shall be complete with all necessary mounting hardware and accessories, drivers, LED and accessories to provide a complete system in accordance with NEC Article No. 410 and the intent of the contract.

a. Fixtures manufactured from sheet steel shall be die formed, embossed for strength, welded for permanent rigidity, corrosion protected by process bonding phosphate material to metal, finished after fabrication with baked white enamel having minimum of 88 percent reflectivity in all light reflecting surfaces and of baked white enamel for all other surfaces. All unpainted parts and hardware shall be dip zinc plated. When subjected to 300 hours salt spray testing, the fixture shall not show corrosion deterioration. Light-tight construction and sealing gaskets of resilient neoprene seals at openings shall be provided. Ballast and lamp compartments shall be isolated from each other. Provide separate wiring channel for through wiring.

b. Fixtures manufactured from aluminum shall be cast or extruded. Corrosion protection shall be provided by anodizing process. Color of finish shall be dark bronze unless otherwise specified in fixture description.

c. Plastic lens of fluorescent fixtures shall be virgin acrylic, Type K12, 0.125" minimum thickness.

d. LED fixtures shall be composed of an LED light engine and an LED driver. Light engines shall consist of multiple LED modules mounted on an aluminum heat sink. Rated life of light engine shall be 50,000 hours minimum at 70 percent lumen maintenance. LED drivers shall be solid state electronic type with current rating appropriate for fixture. Units shall be UL listed, temperature rated for the ambient anticipated by the fixture

manufacturer and rated for system voltage.

(F) CONSTRUCTION METHODS

1. A. Comply with local ordinances and regulations of the City and County of Honolulu. Workmanship subject to approval of the Contracting Officer who shall be afforded every opportunity to determine skill and competency. Concealed work reopened at random during formal inspection by the Contracting Officer without additional charge to the State.

2. B. Construction shall conform to construction practices as recommended by American Electricians Handbook by Croft (latest edition), National Electrical Code, National Electrical Safety Code, and applicable instructions of manufacturers of equipment and materials for this project.

(G) RACEWAYS

1. All raceways within building line shall be conduit, surface metal raceway or electrical metallic tubing. All exterior exposed raceways and interior exposed raceways below 8 feet shall be rigid steel. Electrical metallic tubing may be used only above ground level slab. Electrical metallic tubing may be used in interior locations concealed and exposed above 8 feet. Provide No. 14 galvanized steel pull wire or nylon cord in all empty conduits.

2. Cut raceways square and ream inner edges. Butt together evenly in couplings.

3. Make bends and offsets with conduit bending machine; do not use vise or pipe tee. Make bends so that interior cross-sectional area will not be reduced. Radius of curve of inner edge of field bend not less than 10 times internal diameter of raceway. Use of running threads not permitted. Where raceways cannot be joined by standard threaded couplings, use approved watertight raceway unions.

4. Cap raceways during construction with plastic or metal-capped bushings to prevent entrance of dirt or moisture. Swab all raceways out and dry before wires or cables are pulled in.

5. Mount raceways free from other piping, valves or mechanical equipment.

6. Fish wires, cords, strings, chains, or the like shall not be placed or inserted in the conduit system during installation.

7. Install insulating bushings and two (2) locknuts on each end of every run of conduit at enclosures and boxes. Provide grounding bushings as required to grounding receptacles and connect conduits to service ground, per NEC Article 250.

8. Project adequate number of conduit threads through box for bushings.

9. Run exposed conduit or raceway parallel with, or at right angles to, structural or architectural elements.

10. Securely fasten conduits with galvanized pipe straps with screws or bolts spaced not more than 7 feet apart, or with approved beam clamps, or approved single or gang pipe hangers spaced not more than 7 feet apart, as conditions require. Vertical runs supported at intervals not exceeding 5 feet by approved clamp hangers. Conduit runs with one 90 degree bend or equivalent, 150 feet maximum without pullbox.

    Conduit runs with two (2) 90 degree bends or equivalent, 100 feet maximum without pullbox.

(H) OUTLET BOXES

1. Provide outlet boxes to suit conditions encountered.

(I) CONDUIT FILL IN RACEWAY

1. Conform to NEC Chapter 9, Table 1 and Annex C (based on Type RHW wires) unless torque-limiting type and not used for No. 2 AWG and smaller wires. Pulling tension shall not exceed wire manufacturer's recommendations. Where necessary, chemically neutral lubricant may be used for drawing wires through conduit. Other means of lubricating allowed with written approval of the Contracting Officer.

(J) WIRE SPLICING

1. Form wires neatly in enclosures and boxes.
2. Splice in accordance with NEC Article 110.
3. Conductors No. 10 and smaller with solderless-tapeless connectors, "Ideal Wire Nuts" or equal. Splice Conductors No. 8 through No. 4/0 with high pressure compression (indent) copper sleeve connectors. Do not use bolt-on connectors. Re-insulate splices and make waterproof.
4. Re-insulate splices according to wire manufacturer's instructions. Splice insulation shall be 150 percent in thickness of original wire insulation and of same electrical and mechanical characteristics.

(K) INSTALLATION OF LIGHTING FIXTURES

1. Support fixtures securely and safely by means of fixture studs in outlet boxes or other approved means. Provide accessories, such as straps, mounting plates, stems, nipples, or brackets for proper installation. All lay-in type light fixtures shall be supported from the concrete slab with two (2) 12 gauge wires attached at opposing corners of the light fixture per IBC SECTION 1621.

(L) FINISHING

1. Patch, repair, and restore all structural and architectural elements cut or drilled for installation of electrical system. Drilling, cutting, patching, repairing, and restoring shall be subject to approval of the Contracting Officer.
2. Attach electrical equipment to wood by wood screws, and attach to concrete by

embedded or expansion inserts and bolts. Use powder-driven charge with approval only. Close unused knockouts on boxes or enclosures with metal cap.

3. Wipe clean all exposed raceways and enclosures with rag and solvent. Prime paint and finish all exposed raceways and enclosures. Factory finished enclosures shall not be painted unless specifically called for.

4. Identify circuit breakers and safety switches by nameplates on door, including equipment being served, panel source/circuit, voltage and phase. Provide nameplate with voltage and designated use of equipment on front of disconnect switches and junction boxes, where wires are terminated for connection to air-conditioning equipment.

5. Complete all panel directories with typewriter.

6. Nameplates: Laminated plastic, black/white, engraved with 3/16 inch high commercial letters to expose white. Screw mounted. Impression type adhesive tapes not acceptable.

(M) GROUNDING

1. Conform to applicable requirements in National Electrical Code, National Electrical Safety Code, and to requirements herein.

2. Provide grounding for entire electrical installation as indicated and specified herein. Following are included as requiring grounding:

    a. Conduits, cable shields, and other conductor enclosures.

    b. Neutral or identified conductor of interior wiring system.

    c. Non-current carrying metal parts of fixed equipment, such as motors, starter and controller cabinets, etc.

(N) TESTS

1. Operating Test: After installation has been completed, and at such time as the Contracting Officer may direct, Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with requirements of this section of specifications. Test shall be performed in the presence of the Contracting Officer. Contractor shall furnish necessary instruments and personnel required for test. Balance loading on each feeder.

2. Contractor shall perform 600 volt wiring tests to verify that no short circuits or accidental grounds exist. Insulation resistance tests shall be performed on all conductors No. 6 AWG and larger.

3. Contractor shall perform grounding testing ofall new grounded installations to ensure continuity and that resistance to ground is not excessive.

## 1.35 SAFETY AND ACCIDENT PREVENTION

(A) The Contractor shall be in compliance with Section 107.11 – Safety: Accident Prevention of the DOT Standard Specifications.

(B) The Contractor and his/her employees shall exercise due care in performing any work. The Contractor and his/her employees may be subject to slip, trip, fall, vehicular hazards and other workplace hazards.

(C) The Contractor shall take all necessary precautions to protect all his/her employees and all other personnel from hazards and injuries. All methods and practices shall be in accordance with the OSHA, American National Standard Institute (ANSI) and safety regulations promulgated by other governmental agencies.

(D) Contractor shall at all times conduct his work to assure the least possible obstruction to public traffic. The safety and convenience of the general public and the protection of persons and property is of utmost importance, and the Contractor shall provide appropriate traffic control and safety measures. The Contractor and its employees shall treat members of the public in a fair and polite manner. Workers shall present a professional appearance and conduct themselves in a professional manner at all times.

(E) All employees shall wear OSHA approved safety equipment, including but not limited to: vest, safety shoes, and other equipment as required. Vest shall be the appropriate safety apparel that meets current ANSI/ISEA 107 and the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices Section 6D.03.

(F) Contractor's employees on the job site shall wear a shirt or T-shirt with the company name. Contractor's employees shall present a neat and clean appearance at all times. Cost of employee's shirt or T-shirt and personal protective equipments shall be incidental to the project.

## 1.36 PHASING AND WORK SCHEDULE

(A) To minimize disruption to field office operations, Contractor shall provide access to all field trailers through the duration of the project.

(B) The Contractor shall coordinate his operations with the field office facility to establish allowable working times. The hours of operation of the field office facility are from 7:00 a.m. to 3:30 p.m. daily except Saturdays, Sundays and observed State and Federal holidays. The Contractor may contact Mr. Kelly Lee Sato at (808) 483-2569 for coordination of the work.

(C) All work is to be conducted in a professional manner that is not disruptive to the public or the workers at the field office facility.

(D) The Contractor shall submit an overall proposed construction schedule, detailing the type and the duration of work the Contractor plans to do for each day of the schedule. The

schedule shall be submitted prior to the start of any work, for approval by the State, and the State may request a revision at any time.

(E) The Contractor shall also submit a two (2) week schedule detailing the type and the duration of work the Contractor plans to do for each day of the schedule. The schedule shall be submitted one (1) week prior to the start of the work and the State may request a revision at any time. The Contractor shall maintain and revise the work schedule to be current at all times, on a weekly basis, and submit to the State one (1) week prior to the start of the work. Progress payments shall be withheld until such time as a satisfactory work schedule is received by the Engineer.

## 1.37 UTILITIES

(A) The Contractor shall notify the Hawaii One Call Center (811 or 866-423-7287) no less than five (5) working days prior to excavation, on each or all locations, for locating underground facilities pursuant to HRS Section 269E-4.

(B) The existence and location of underground utilities, manholes, monuments, guardrail and structures as shown on the plans are from the latest available data, but the accuracy is not guaranteed. The encountering of other obstacles during the course of work is possible. The Contractor shall be held liable for any damages incurred to the existing facilities and/or improvements as a result of his operations.

## 1.38 INSPECTION

Upon project completion, the Contractor shall demonstrate that the improvements have been properly installed at the correct locations, elevations, and dimensions in accordance with the contract documents. Any work deemed to be deficient by the Engineer shall be addressed at no cost to the State.

## 1.39 BASIS FOR PAYMENT

The Contractor's bid price shall be full compensation for furnishing all labor, materials, tools, equipments, vehicles, communication costs, taxes, insurance, overhead, travel, and incidental costs necessary for the work specified in the contract documents.

The work performed for the *Waimalu Field Office Improvements* will be paid by lump sum, based on the specifications and special provisions in the contract documents. Any related additional unforeseen work will be considered *Miscellaneous* and will be paid for by an agreed allowable amount, which shall not exceed $25,000.00.

The additional cost of $25,000.00 shall be added to the Lump Sum amount on the attached Bid Sheet of this solicitation. The Bid Sheet shall be completed and attached to the bid response. If the Bid Sheet is not attached to the bid response at closing of bid in HIePro, then it will be assumed that the additional cost of $25,000.00 is included in the Lump Sum amount.

The Contractor shall forward the original detailed invoice to the Department of Transportation, Highways Division, District Engineer, 727 Kakoi Street, Honolulu, Hawaii 96819.

The invoice shall include but not limited to the following information:

1. Contractor’s name, address, and phone number.
2. Contract number, project number, and project title.
3. Bid item number, unit price, amount, subtotal, and total.

Payment will be made by Purchase Order as soon as the work has been approved and an original detailed invoice and Hawaii Compliance Express document is submitted.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HONOLULU, HAWAII

# APPENDIX