STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

FOREIGN TRADE ZONE NO. 9

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB 04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

Sealed bids will be received up to and publicly opened at 12:00 P.M. (Noon)

on

February 6, 2004

In the Administrative Services Office/Contracts, Department of Business, Economic Development, and Tourism, No. 1 Capitol District, 250 South Hotel Street, 5th Floor,
Room 510D, Honolulu, Hawaii, 96813.

Questions relating to this bid solicitation may be directed to
Eileen Harada
Phone (808) 586-9312
Or
Questions may be submitted in writing to the above address no later than

January 14, 2004

TABLE OF CONTENTS

TITLE PAGE 1
TABLE OF CONTENTS .....1 - 3
NOTICE TO BIDDERS .....N.1 - N.2
INTRODUCTION, SIGNIFICANT DATES, OFFICIAL CONTACT PERSON I.1- I.2
DEFINITIONS and SPECIFICATIONS .....

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

SECTION 00700 General Conditions 1

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01019 General Specifications .....1 - 9
SECTION 01020 General Project Requirements .....1 - 19
SECTION 01140 Work Restrictions.....1 - 5
SECTION 01230 Description of Alternates.....1
SECTION 01330 Submittals.....1 - 8
SECTION 01400 Quality Requirements..... 1 - 6
SECTION 01575 Temporary Controls-Air Quality Requirements.....1 - 6
SECTION 01577 Pollution Control .....1 - 3
SECTION 01715 Existing Conditions-Asbestos / Lead / Hazard Material Surveys.....1 - 2

DIVISION 2 - SITE WORK

SECTION 02070 Selective Demolition .....1 - 6
SECTION 02100 Site Preparation and Earthwork .....1 - 6
SECTION 02260 Finish Grading 1
SECTION 02281 Soil Treatment for Termite Control .....1 - 3
SECTION 02362 Soil Treatment for Vegetation Control.....1 - 2
SECTION 02444 Chain Link Fences and Gates.....1 - 5
SECTION 02480 Landscaping.....1 - 10

DIVISION 3 - CONCRETE

SECTION 03100 Concrete Formwork .....1 - 5
SECTION 03200 Concrete Reinforcement .....1 - 3
SECTION 03300 Cast-in-place Concrete .....1 - 14

DIVISION 4 - MASONRY (Not in Use)

TABLE OF CONTENTS
Page 1

DIVISION 5 - METALS

SECTION 05120 Structural Steel ..... 1 - 6
SECTION 05300 Metal Decking ..... 1 - 3
SECTION 05500 Metal Fabrications ..... 1 - 6

DIVISION 6 - WOOD AND PLASTIC

SECTION 06100 Rough Carpentry ..... 1 - 6
SECTION 06200 Finish Carpentry 1 - 9
SECTION 06311 Treated Lumber 1 - 6

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07110 Membrane Waterproofing ..... 1 - 6
SECTION 07210 Building Insulation ..... 1 - 3
SECTION 07540 Fluid-Applied Roof Coating ..... 1 - 10
SECTION 07600 Flashing and Sheet Metal ..... 1 - 4
SECTION 07720 Roof Hatch ..... 1 - 3
SECTION 07920 Sealants ..... 1 - 7

DIVISION 8 - DOORS AND WINDOWS

SECTION 08110 Steel Doors and Frames ..... 1 - 9
SECTION 08211 Flush Wood Doors ..... 1 - 4
SECTION 08520 Aluminum Windows ..... 1 - 5
SECTION 08710 Finish Hardware ..... 1 - 10
SECTION 08800 Glazing ..... 1 - 9

DIVISION 9 - FINISHES

SECTION 09250 Gypsum Wallboard ..... 1 - 14
SECTION 09310 Ceramic Tile ..... 1 - 6
SECTION 09510 Acoustical Ceiling ..... 1 - 8
SECTION 09512 Resilient Tile Floor ..... 1 - 6
SECTION 09540 Exterior Finish System ..... 1 - 13
SECTION 09900 Painting ..... 1 - 17

DIVISION 10 - SPECIALTIES

SECTION 10161 Phenolic Plastic Toilet Partitions and Urinal Screens ..... 1 - 6
SECTION 10440 Signage ..... 1 - 6

SECTION 10522 Fire Extinguishers, Cabinets and Accessories .....1 - 4
SECTION 10800 Toilet and Bath Accessories .....1 - 5

TABLE OF CONTENTS

DIVISION 11 - EQUIPMENT (Not in Use)

DIVISION 12 - FURNISHING (Not in Use)

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13850 Fire Alarm Systems .....1 - 25

DIVISION 14 - CONVEYING SYSTEMS (Not in Use)

DIVISION 15 - MECHANICAL

SECTION 15300 Automatic Fire Sprinkler .....1 - 5
SECTION 15400 Plumbing .....1 - 11
SECTION 15800 Air Conditioning and Ventilation .....1 - 33

DIVISION 16 - ELECTRICAL

SECTION 16010 Electrical Work .....1 - 11

SPECIAL PROVISIONS .....SP.1 - SP.14

BID FORM.....B.1 - B.10

TAX CLEARANCE APPLICATION.....Exhibit A

MAP OF THE FOREIGN TRADE ZONE.....Exhibit B

GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS .....Exhibit C

NOTICE TO BIDDERS

SEALED BIDS will be received up to and publicly opened at **12:00 P.M. (noon), HST, Friday, February 6, 2004** in the Administrative Services Office/Contracts, Department of Business, Economic Development, and Tourism (DBEDT), STATE of Hawaii, No. 1 Capitol District, 250 South Hotel Street, 5th Floor, Room 510D Honolulu, Hawaii, 96813 for:

FOREIGN TRADE ZONE NO. 9
PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

Solicitation No.IFB-04-04-FTZ

The project requires supplying all labor, equipment, and materials for services related to but not limited to the construction of a mezzanine space addition for offices, utility room and toilet rooms, a warehouse space at ground level for work shops and cold storage, and a stairway; construction of new chiller units, equipment pad and chain link fence; installation of an air conditioning system; modification of existing air duct and water piping system; replacement of existing fan coil units; addition of new fan coil units and fire sprinkling system and incidental related works. All work shall be carried out on a site occupied by the Foreign-Trade Zone (FTZ) No. 9, Pier 2, State of Hawaii, Department of Business, Economic Development and Tourism, Honolulu, Oahu, Hawaii.

All prospective bidders may attend a non-mandatory pre-bid conference scheduled for 9:30 A.M. HST on January 9, 2004 at the FTZ No. 9 Conference Room, Room 202. A map of the area is attached as Exhibit B. Attendance is not mandatory, but potential bidders are encouraged to attend. Drawings and Plans shall be available at this conference. Costs relating to attendance at the meeting shall be the responsibility of the attendee and shall not be reimbursed by the STATE.

Bids shall be received up to 12:00 P.M. (noon), HST on Friday, February 6, 2004 in the Administrative Services Office/Contracts, DBEDT, State of Hawaii, No. 1 Capitol District, 5th Floor, Room 520-D, 250 South Hotel Street, Honolulu, Hawaii, 96813. Bid Documents may be obtained from said Office during the hours of 8:30 A.M. to 11:30 A.M. and 1:30 to 4:00 P.M., Monday through Friday, except for State Holidays. All interested partied must register with the Contracts Office. **ALL BIDS MUST CONTAIN AN ORIGINAL SIGNATURE IN BLUE INK.** All bids shall comply with the DBEDT General Terms and Condition for Construction dated April 1, 1996. Bidders are encouraged to carefully read the entire invitation for bid documents. Should a conflict arise between the General Conditions and Special Provisions, the Special Provisions shall prevail.

Eileen Harada for
Theodore E. Liu, Director
Department of Business, Economic Development, and Tourism
STATE of Hawaii

CAUTION!!!!!

1. **ALL BIDS MUST BE SUBMITTED ON DBEDT BID FORMS AND FOLLOW BID REQUIREMENTS, INCLUDING PROVIDING THE ORIGINAL SIGNED IN <u>BLUE</u> INK.**

2. **ALL INTERESTED PARTIES MUST REGISTER WITH THE DBEDT CONTRACTS OFFICE. REGISTRATION SHALL CONSIST OF CONTACTING THAT OFFICE TO REQUEST A COPY OF THIS SOLICITATION.**

3. **ALL WRITTEN QUESTIONS MUST BE SUBMITTED TO THE DBEDT/ADMINISTRATIVE SERVICES OFFICE/CONTRACTS BY 4:00 P.M. HAWAII STANDARD TIME (HST) ON JANUARY 14, 2OO4.**

4. **ALL BIDS MUST BE RECEIVED BY THE DBEDT CONTRACTS OFFICE BY 12:00 P.M., (NOON) HST, FRIDAY, FEBRUARY 6, 2004.**

5. **BIDDERS ARE CAUTIONED THAT FEDERAL EXPRESS AND UNITED PARCEL SERVICE DELIVERIES ARE GUARANTEED UP TO 5:00 P.M. OF THE DESIGNATED DELIVERY DATE. BIDDERS ARE CAUTIONED TO MAKE PRIOR ARRANGEMENTS TO ENSURE DELIVERY BY 12:00 P.M. OF THE BID DUE DATE.**

Bid and registration forms are available at the:

Department of Business, Economic
Development, and Tourism
Administrative Services Office / Contracts
No. 1 Capitol District
250 So. Hotel Street, 5th Floor, Room 510D
Honolulu, Hawaii 96813

Contact person: Eileen Harada
586-9312

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
FOREIGN TRADE ZONE NO. 9

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB-04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

INTRODUCTION, SIGNIFICANT DATES, OFFICIAL CONTACT PERSON

INTRODUCTION, SIGNIFICANT DATES, OFFICIAL CONTACT PERSON

A. INTRODUCTION

The objective of this solicitation is to provide services related to but not limited to the construction of a mezzanine space addition for offices, utility room and toilet rooms, a warehouse space at ground level for work shops and cold storage, and a stairway; construction of new chiller units, equipment pad and chain link fence; installation of an air conditioning system; modification of existing air duct and water piping system; replacement of existing fan coil units; addition of new fan coil units and fire sprinkling system and incidental related works. All work shall be carried out on a site occupied by the State of Hawaii, Department of Business, Economic Development and Tourism, FTZ No. 9, located at Pier 2, Honolulu, Oahu, Hawaii.

B. SIGNIFICANT DATES

Advertising of IFB	December 24, 2003
Issuance of IFB	December 24, 2003
Pre-bid Conferences/Site Visit	January 9, 2004
Deadline for Bidders Questions	January 14, 2004
Deadline for Addenda and Response to Written Questions	January 20, 2004
Sealed Bids Due NLT 12:00 P.M. (noon)	February 6, 2004

All prospective bidders may attend a non-mandatory pre-bid conference scheduled for 9:30 A.M. HST on January 9, 2004 at the FTZ No. 9 Conference Room, Room 202. A map of the area is attached as Exhibit A. Attendance is not mandatory, but potential bidders are encouraged to attend. Drawings and Plans shall be available at this conference. Costs relating to attendance at the meeting shall be the responsibility of the attendee and shall not be reimbursed by the STATE.

C. OFFICIAL CONTACT PERSON

The official contact person for all communication regarding this solicitation is:

Eileen Harada
Department of Business, Economic Development , and Tourism
One Capitol District
250 S. Hotel St.
Honolulu HI 96813
Telephone: (808)-586-9312

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
FOREIGN TRADE ZONE NO. 9

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB-04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

DEFINITIONS
and
SPECIFICATIONS

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

SECTION 00700 - GENERAL CONDITIONS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. The Department of Business Economic Development and Tourism INTERIM GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS, ("GENERAL CONDITIONS"), form part of the Agreement to be entered into between the CONTRACTOR and the STATE. In case of a conflict between the project specifications and the "General Conditions" the project specifications shall govern. In case of a conflict between the project specifications and the project drawings the project drawings shall govern.

B. The "GENERAL CONDITIONS" and SPECIAL PROVISIONS shall govern the Work specified in all DIVISIONS AND SECTIONS. In case of a conflict between the "General Conditions" and the Special Provisions, the Special Provisions shall govern.

END OF SECTION

SECTION 01577 - POLLUTION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Includes site and environmental control requirements.

1.02 TRASH, REFUSE DISPOSAL

A. Burning of debris and / or waste materials on the project site is prohibited.

B. Do not bury debris and / or waste material on the project site, unless specifically allowed elsewhere in these specifications as backfill material.

C. Haul unusable debris and waste material to an appropriate off-site dump area. During loading operations, water down or provide other measures to prevent dust or other airborne contaminants.

D. Vacuum, wet mop, or damp sweep when cleaning rubbish and fines which can become airborne from floors or other paved areas. Do not dry sweep.

E. Use enclosed chutes and / or containers to conveying debris from above the ground floor level.

F. Clean-up shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable materials, and removal as required. Frequency of clean-up shall coincide with rubbish producing events.

1.03 DUST

A. Prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 60 - Air Pollution Control.

B. The CONTRACTOR is responsible for and shall use water for dust control.

C. The CONTRACTOR is responsible for all damage claims that arise out of the CONTRACTOR's operations related to dust control.

1.04 NOISE

A. To reduce loud disruptive noise levels, ensure mufflers and other devises are provided on equipment, internal combustion engines and compressors. Maintain equipment to reduce noise to acceptable levels.

B. Starting-up of construction equipment meeting allowable noise limits shall not be done prior to 7:30 A.M. without prior approval of the Engineer. Equipment exceeding allowable noise levels shall not be started-up prior to 7:30 A.M. Allowable noise level shall be defined as noise within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 46 - Community Noise Control.

The CONTRACTOR is responsible to submit noise level reading from time to time during the entire course of construction and as requested by the Engineer.

1.05 OTHERS

A. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the CONTRACTOR shall prevent any material from being carried onto the pavement. Wastewater shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

B. Trucks hauling debris shall be covered as required by PUC Regulation. Trucks hauling fine materials shall be covered.

C. No dumping of waste concrete will be permitted at the job-site.

D. Concrete trucks shall not be cleaned on the job-site to include, but not be limited to, the rinsing of the hopper, delivery chute, and wheels.

E. Any vehicle fueling and/or maintenance shall be done by the CONTRACTOR on property other than Pier 2.

F. Any and all types of spray painting are not permitted for any work under this Agreement.

1.06 SUSPENSION OF WORK

A. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Specifications shall be cause for suspension of the work creating such violation.

B. If no corrective action is taken by the CONTRACTOR within 72 hours after ordered by the Engineer, the State reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by the State in taking such action from monies due the CONTRACTOR.

C. The Engineer may also suspend any operations which creates a pollution problem even if the problem does not violate the provisions of this Section.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not used)

END OF SECTION

SECTION 01575 - TEMPORARY CONTROLS - AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. This section describes the steps that the CONTRACTOR shall perform to control odors or dusts generated by the equipment, materials, or actions of the construction process that may affect the quality of air to non-CONTRACTOR personnel.

1.02 RELATED SECTIONS

A. Section 06100 – Rough Carpentry.

B. Section 06200 – Finish Carpentry.

C. Section 06311 – Treated Lumber.

D. Section 07920 – Sealants.

E. Section 08211 – Flush Wood Doors.

F. Section 09900 – Painting.

1.03 REFERENCES

A. "Indoor Air Quality" published by the Sheetmetal and Air Conditioning Contractor's National Association (SMACNA).

B. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) standards as follows: 62-1989; 55-1981; 52-76; and 1-1989.

C. "Indoor Air Quality in Public Buildings", Volumes I and II, by Sheldon L, Handy RW, Hartwell TD, et al:, 1988 (Public Access Buildings Study).

1.04 DEFINITIONS

A. "A/C" (Air Cond.) means any or all of the equipment used to air condition a building or space.

B. "Air changes per hour" shall mean a number calculated by the maximum work area length in feet times the maximum work area width in feet times the maximum work area height in feet divided by 60 times the cubic feet per minute of air movement (L x W x H)/(60 x CFM).

C. “Odor” means something that can be detected by a person's sense of smell whether objectionable or not to the person.

D. “Perceivable” means able to attain an awareness solely through the use of the human senses such as smell, sight, hearing, etc.

E. “VOC”means volatile organic compound, a compound containing a chemical constituent with a boiling point of less than 100 Deg C (volatile) and that contains carbon (organic).

F. “VOC emission rate” means the total amount of hydrocarbons emitted per area and unit of time as determined from the product and test method data supplied by the manufacturer or from data in the EPA Public Access Buildings Study, 1988.

1.05 SUBMITTALS

A. Submit a certification, which may be a copy of the product label or Material Safety Data Sheets (MSDS), of the VOC emission rate for all VOC containing products. (Note: MSDS sheets and labels are acceptable only if the VOC data is available and highlighted.)

PART 2 - MATERIALS

2.01 MATERIAL RESTRICTIONS

A. If used, materials that exceed the standards established by the National Particleboard Association (NPA) Standard for Formaldehyde Emission for Particleboard (NPA 6-84) shall only be used in conformance with the requirements of Section 3.01. All materials that use particleboard for any part of their construction shall be considered to exceed NPA 6-84 standard unless clearly labeled with an NPA certification that the standard is met.

B. Materials that exceed a VOC emission rate of 100 Fg/m²h shall only be used in conformance with the requirements of Section 3.01.

C. Materials that do not have a submitted VOC emission rate shall be considered to exceed 100 Fg/m²h.

D. If ALL of the project’s materials comply with the above restrictions, the requirements of Part 3 - Execution are not required.

2.02 OTHER MATERIALS

A. Provide the temporary equipment such as fans, blowers, etc. and / or products such as tape, ducts, temporary wall materials, etc. necessary to complete the requirements of this section.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Keep a copy of the certifications submitted under Sec. 1.05 readily available in an easy to modify format, such as a three ring binder, at the job site.

B. Insure the all work areas are isolated from those areas in which persons not employed by the CONTRACTOR will be present during construction, including those interconnected by air conditioning systems, adjacent buildings, and public areas.

1. Install isolation barriers so that odor(s) and dust(s) from the work areas are not perceivable in any surrounding occupied area, then remove the barriers before the final acceptance of the project; or

2. Provide local fresh and exhaust air that will be adequate to insure odor(s) and dust(s) from the work areas are not perceivable in any surrounding occupied area. Meet the following minimum criteria:

a. At least four air changes per hour continued from the start of any emission producing work until four hours after the conclusion of any emission producing work; and

b. Exhaust the ventilating air to the outside of the building, at least 25 feet downwind of any opening to the building, surrounding buildings, or similar occupied areas, and at least 100 feet downwind of any building air supply intakes.

C. Immediately stop all odor and dust producing tasks, then execute the requirements of subparagraph 3.01.B.2 within four hours after notification by the Engineer that occupants have complained of any perceivable odor or dust. Any cost resulting from work stoppage shall be borne by the CONTRACTOR.

1. Compliance with paragraph 3.01.B.1 shall not be considered to have provided sufficient isolation in this instance.

2. If the items in paragraph 3.01.B.2 have been previously implemented without satisfactory results, increase the air changes to eight (8) per hour.

3. The requirements in paragraph 3.01.D may be performed in lieu of the requirements stated in 3.01.C with prior permission from the Engineer or shall be performed if requested by the Engineer.

D. When the conditions described in paragraphs 3.01.B.1, 3.01.B.2, or 3.01.C, are unable to maintain an air quality acceptable to 80% of the surrounding occupants, perform the following at no extra cost to the State:

1. Immediately discontinue the use of the offending product(s) upon notification by the Engineer;

2. Perform the odor or dust generating task(s) during a non-occupied time such as evenings, weekends holidays, etc.;

3. Thoroughly clean any odor or dust affected area and equipment prior to occupancy; and

3.02 VENTILATION AFTER CONSTRUCTION

A. In all work areas of air-conditioned new buildings the CONTRACTOR shall perform a ventilation activity after construction has been completed but prior to occupancy according to the following:

1. Notify the Engineer prior to starting the work involved with these steps or immediately if any step cannot be successfully completed;

2. Perform the normal start up procedures for all ventilation equipment;

3. Inspect areas adjacent to air intakes for the existence of air containing odors and eliminate the cause of any odor(s) before proceeding;

4. Insure that the A/C outside make-up air dampers are operable, then set them to remain in the wide open position to provide for the maximum possible flow of outside air into the building;

5. Set the mechanical cooling equipment such as chill water or A/C compressors as appropriate to off so that the temperature will stay as high as possible;

6. Open windows and doors (interior) for maximum ventilation of the work area using caution regarding security, infiltration of dirt, debris, or dust, and impact on surrounding occupied areas. This requirement shall not relieve the CONTRACTOR of his responsibility for security, protection from the elements of weather, or site cleanliness;

7. Turn on all of the available lights and heat producing equipment;

8. Run all of the air handling units and ventilation fans continuously for 72 hours; and

9. When the Engineer determines that the ventilation has been sufficient, replace all A/C air filters, readjust the building's equipment to the design settings, and perform the start up steps required to be performed after such adjustments have been made.

B. In all work areas of non-air conditioned new buildings the CONTRACTOR shall perform a ventilation activity after construction has been completed but prior to occupancy according to the following:

1. Notify the Engineer prior to starting the work involved with these steps or immediately if any step cannot be successfully completed;

2. Inspect area adjacent to portable fans for the existence of air containing odors and eliminate the cause of any odor(s) before proceeding;

3. Open windows and doors (interior and exterior) for maximum ventilation of the work area using caution regarding security, infiltration of dirt, debris, or dust, and impact on surrounding occupied areas. This requirement shall not relieve the CONTRACTOR of his responsibility for security, protection from the elements of weather, or site cleanliness;

4. Turn on all of the available lights and heat producing equipment;

5. Ventilate the work area using portable supply and exhaust fans capable of providing one complete work area air change per hour for 72 hours; and

6. When the Engineer determines that the ventilation has been sufficient, remove the portable equipment.

C. In all work areas in an existing building the CONTRACTOR shall perform a ventilation activity after construction has been completed but prior to occupancy according to the following:

1. Use the steps in paragraph 3.02.A when the work area is air conditioned by air handling equipment that can be completely isolated from all A/C systems supplying occupied areas; otherwise

2. Use the steps in paragraph 3.02.B.

D. Ventilation activity shall be performed, completed and a written report shall be submitted before the project acceptance date.

END OF SECTION

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and for the CONTRACTOR's Quality Control responsibilities and duties. This section also includes a CONTRACTOR's Quality Control Program (CQC) to be implemented by the CONTRACTOR.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve the CONTRACTOR of responsibility for compliance with the Agreement Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit the CONTRACTOR's quality-control procedures that facilitate compliance with the Agreement Document requirements.

3. Requirements for CONTRACTOR to provide quality-control services required by the STATE, or authorities having jurisdiction are not limited by provisions of this Section.

1.02 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include Agreement enforcement activities performed by the STATE.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.03 SUBMITTALS

A. Qualification Data: For inspection and testing agencies, furnish evidence to demonstrate their capabilities and experience. Include proof of qualifications in

the form of certifications, license, and a recent report on the inspection of the testing agency by a recognized authority.

1. The STATE retains the right to disapprove any inspection or testing agency or individual employed by the agency when it is in the best interest of the STATE.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.

2. Project title and number.

3. Name, address, and telephone number of testing agency.

4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.

8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.

10. Ambient conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Agreement Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: Submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Professional Architect or Engineer Qualifications: A professional architect or engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing architect or engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

D. Inspection and Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1.05 QUALITY CONTROL

A. CONTRACTOR Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Engage qualified inspection or testing agencies to perform quality-control services, unless services are indicated as the STATE's responsibility.

2. Notify the STATE and the inspection or testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Submit certified written reports of each quality-control service.

4. Testing and inspecting requested by the CONTRACTOR and not required by the Agreement Documents are the CONTRACTOR's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

C. Retesting and Reinspecting: Regardless of whether original tests or inspections were CONTRACTOR's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Agreement Documents.

D. Testing Agency Responsibilities: Cooperate with the STATE and the CONTRACTOR in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify the STATE and the CONTRACTOR promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through the CONTRACTOR.

4. Do not release, revoke, alter, or increase requirements of the Agreement Documents or approve or accept any portion of the Work.

5. Do not perform any duties of the CONTRACTOR.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.

4. Facilities for storage and field-curing of test samples.

5. Preliminary design mix proposed for use for material mixes that require control by testing agency.

6. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.06 QUALITY CONTROL MANAGER

A. Duties: Provide a Quality Control (QC) Manager at the work site to implement and manage the QC Program. In addition to implementing and managing the QC Program, the QC Manager may perform the duties of the Project Superintendent. The QC Manager is required to; conduct the QC meetings, perform submittal review, ensure testing is performed and provide QC certifications and documentation required in this Agreement. The QC Manager is responsible for managing and coordinating Testing Laboratory personnel and any other inspection and testing personnel required by this Agreement.

B. Qualifications: An individual with a minimum of 10 years experience as a superintendent, inspector, QC Manager, project manager, or construction manager on similar size and type construction contracts which included the major trades that are part of this Agreement. The individual must have experience in the areas of hazard identification and safety compliance. It is desirable that the QC Manager completed the course "Construction Quality Management for Contractors" offered by the Navy or the Army Corps of Engineers or other similar course.

1.07 RECORD DRAWINGS

A. The QC Manager is required to ensure the record drawings and jobsite record set are kept current on a daily basis and marked to show deviations which have been made from the Agreement drawings. Ensure each deviation has been identified with the appropriate modifying documentation (such as Post Agreement Number, Modification Number, Request for Information Number, and others. The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the record drawings prior to submission to the STATE.

1. The CONTRACTOR is liable for all errors in the record drawings submitted to the STATE.

2. The CONTRACTOR and each subcontractor shall certify each drawing attesting to the completeness and accuracy of the applicable drawing.

3. The STATE shall hold the CONTRACTOR liable for costs the STATE incurs as a result of the STATE's reliance on any inaccuracies presented in the CONTRACTOR's record drawings.

1.08 NOTIFICATION OF NON-COMPLIANCE

A. The CONTRACTOR shall be notified of any detected non-compliance items. Take immediate corrective action after receipt of such notice.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are the CONTRACTOR's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01330 - SUBMITTALS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submittal Schedule: Prior to the submission of any shop drawings or submittals, the CONTRACTOR shall submit to the Engineer for review, a submittal schedule. The schedule shall identify the subject matter of each submittal, the corresponding specification section number and the proposed date of submission. During the progress of work, the CONTRACTOR shall revise and resubmit the submittal schedule weekly and as directed by the Engineer. The submittal log shall identify:

1. Section Number.
2. Description of Section.
3. Subcontractor/Vendor.
4. Name of Preparer.
5. Date Sent.
6. Date Back from State.
7. Date Needed.
8. Estimated Arrival Date.
9. Comments.

B. The following listing of required submittals is provided for the CONTRACTOR's convenience. The CONTRACTOR shall review the technical sections of this specification, prepare and submit a comprehensive listing of required submittals.

Section No. - Title (List in numerical order of the Spec. Section No.)	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment, Applicator, etc.)	Mfr. Guaranty/Warranty(> 1 yr.)	Product Data, Mfr. Technical Lit., and Brochures	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment/Fixture Listing	Schedules (Project/Installation)	Maint. Service Contract	Field Posted As-Built Dwgs.	Others
01020 – General Project Requirements														X	X
01400 – Quality Requirements			X					X							X
01575-Temporary Controls-Air Quality Requirements			X												
02070-Selective Demolition												X			X
02100-Site Preparation and Earthwork								X							
02281-Soil Treatment for Termite Control					X	X									
02362-Soil Treatment for Vegetation Control					X	X									
02444-Chain Link Fences and Gate	X														
02480-Landscaping															X
03200-Concrete Reinforcement								X							
03300-Cast-in-place Concrete			X					X							
05300-Metal Decking	X														
05120-Structural	X		X												

Section No. - Title (List in numerical order of the Spec. Section No.)	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment, Applicator, etc.)	Mfr. Guaranty/Warranty(> 1 yr.)	Product Data, Mfr. Technical Lit., and Brochures	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment/Fixture Listing	Schedules (Project/Installation)	Maint. Service Contract	Field Posted As-Built Dwgs.	Others
Steel															
05500-Metal Fabrications	X				X										
06100-Rough Carpentry			X												
06200-Finish Carpentry	X	X													
06311- Treated Lumber			X	X	X										
07110-Membrane Waterproofing			X	X	X										
07210-Building Insulation					X										
07540-Fluid-Applied Roof Coating	X		X	X	X			X							X
07600-Flashing and Sheet Metal	X														
07720-Roof Hatch					X										
07920-Sealants		X			X										
08110-Steel Doors and Frames	X		X	X	X							X			X
08211-Flush Wood Doors	X				X							X			
08520-Aluminum Windows	X	X			X			X							X
08710-Finish Hardware		X			X							X			X
08800-Glazing	X	X	X		X							X			X
09250-Gypsum Wallboard					X										

Section No. - Title (List in numerical order of the Spec. Section No.)	Shop Drawings & Diagrams	Samples	Certificates (Material, Treatment, Applicator, etc.)	Mfr. Guaranty/Warranty(> 1 yr.)	Product Data, Mfr. Technical Lit., and Brochures	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment/Fixture Listing	Schedules (Project/Installation)	Maint. Service Contract	Field Posted As-Built Dwgs.	Others
09310-Ceramic Tile		X	X	X											
09510-Acoustical Ceiling	X	X	X		X										
09512-Resilient Tile Floor		X	X		X										
09900-Painting		X	X		X	X						X			X
10161-Phenolic Plastic Partitions and Urinal Screens	X	X	X		X										X
10440-Signage	X	X			X										
10522-Fire Extinguishers, Cabinets and Accessories		X			X										
10800-Toilet and Bath Accessories	X				X										
13850-Fire Alarm Systems	X			X	X				X	X	X			X	X
15300-Automatic Fire Sprinkler	X		X							X		X		X	
15400-Plumbing	X		X							X	X			X	
15800-Air Conditioning and Ventilation	X		X		X					X	X			X	X
16010-Electrical Work	X				X									X	

1.02 BIDDER'S SPECIAL RESPONSIBILITY FOR COORDINATING CONTRACTUAL WORK AND SUBMITTALS

A. The CONTRACTOR is responsible for the coordination of all contractual work and submittals.

B. The CONTRACTOR shall have a rubber stamp made up in the following format:

CONTRACTOR NAME

PROJECT: _____
_____
_____
_____

JOB NO: _____

THIS SUBMITTAL HAS BEEN CHECKED BY THIS CONTRACTOR. IT IS CERTIFIED CORRECT, COMPLETE, AND IN COMPLIANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS. ALL AFFECTED CONTRACTORS AND SUPPLIERS ARE AWARE OF, AND WILL INTEGRATE THIS SUBMITTAL INTO THEIR OWN WORK.

DATE RECEIVED _____SUBMITTAL NO._____
SPECIFICATION SECTION # _____
SPECIFICATION PARAGRAPH # _____
DRAWING NUMBER _____
SUBCONTRACTOR NAME _____
SUPPLIER NAME _____
MANUFACTURER NAME _____

NOTE: DEVIATIONS FROM THE CONTRACT DOCUMENTS ARE PROPOSED AS FOLLOWS (Indicate "NONE" if there are no deviations.):
_____
_____
_____

CERTIFIED BY: _____

C. This stamp, "filled in", should appear on the title sheet of each shop drawing, on a cover sheet of submittals in an 8-1/2" x 11" format, or on one face of a cardstock tag (min. 3" x 6") tied to each sample. The tag on the samples should state what the sample is, so that if the tag is accidentally separated from the sample, they can

be matched up again. The back of this tag will be used by the Engineer for his receipt, review, and log stamp and for any comments that relate to the sample.

D. All submittals for material, equipment, and shop drawings listed in the contract documents, including dimensioned plumbing shop drawings, shall be required and shall be reviewed by the Engineer, prior to any ordering of materials and equipment.

E. All shop drawings and as-built drawings shall be prepared by CONTRACTOR, his subcontractors and/or suppliers based on actual condition of the submitted materials and construction detail. Duplication, either totally or partially, from existing contract drawings shall not be acceptable.

1.03 SUBMITTAL FORMAT

Unless otherwise indicated in the applicable specification sections, the CONTRACTOR shall present the submittal items according to the following:

A. Certificate of Compliance: The original and two (2) copies of the signed manufacturer's certificate indicating compliance to the provisions of the specifications. The Certificate of Compliance shall be on an 8-1/2" x 11" sheet.

B. Product Data: Six (6) copies of product data, such as manufacturer's data, catalog cuts, that indicate conformance to the provisions of the specifications regarding materials, appearance and finishes. Product data shall conform to an 8-1/2" x 11" format.

C. Samples: Three (3) samples of each material as indicated in the applicable specification sections. Samples required by specification sections for color, texture, or finish selection and/or approval, shall be no smaller than 3" x 3" and of the actual material to be used. Catalog cuts, photographs, or otherwise "similar" representations are not acceptable submittals.

Each sample shall be properly labeled, cross-referencing the specification item; as well as planned location (i.e. New Weight Room; etc.).

D. Shop Drawings: Six (6) prints of drawings indicating how specific portions of the work are to be fabricated or installed by the CONTRACTOR, that are either confirmation of conditions detailed in the construction documents, clarification, planned conditions not readily indicated in the construction documents, that maintain the design intent. Shop drawings shall be cross referenced to corresponding items in construction documents. As much as possible, shop drawings should conform to an 8-1/2" x 11" format (i.e. capable of being folded to 8-1/2" x 11" for filing), but in no case shall exceed 24" x 36" size sheets.

E. Guarantee: The original and three (3) copies of a written guarantee, signed as directed in the applicable specification section, for the scope of work and duration indicated in the applicable specification section. Unless otherwise indicated in the applicable specification section, guarantee periods shall be for one (1) year and start at the time of acceptance by the State. Guarantees shall conform to an 8-1/2" x 11" format.

F. Test Reports: Six (6) copies of test reports for any material used in this contract shall be submitted when specified or required by the Engineer.

G. Maintenance Data and Operating Instructions: Six (6) copies of maintenance data and operating instructions shall be submitted at the conclusion of the equipment installation. The manual shall include instructions for operating, maintenance, repair, recommended inspection points and periods for inspection in a practical, complete, and comprehensive manner. The information shall be arranged in a logical, orderly sequence, including a general description of the equipment and significant technical characteristics. Tests, adjustment, and calibration information shall include illustrations, diagrams, and step-by-step procedures.

1.04 DETAILED CONSTRUCTION SCHEDULE

A. The CONTRACTOR shall submit a detailed construction schedule to the Engineer for review, no later than thirty (30) calendar days after award of the Contract. The detailed construction schedule shall be based on a detailed critical path analysis of construction activities and sequence of operations needed for the orderly performance and completion of any separable parts of any work and all work in accordance with the Contract. The schedule shall be Critical Path Method (CPM) type in the form of an arrow diagram and activity listing or comprehensive bar graph. The network diagram shall show in detail and in orderly sequence all activities on a time scale, their descriptions, durations and dependencies, necessary and required to complete all work and any separable parts thereof. The schedule shall show in detail the following information for each activity:

1. Identification by code numbers and description;
2. Duration;
3. Craft and Equipment;
4. Earliest start and finish dates;
5. Latest start and finish dates;
6. Total and free float time; and
7. Highlighted Critical Path

B. The construction schedule shall be complete in all respects, covering in addition to activities at the site of work, off-site activities such as design, fabrication, and procurement of equipment; the scheduled delivery dates of such equipment;

submittal and approval of shop drawings and samples; ordering and delivery of materials; inspections; and testing. The schedule shall also include a manpower forecast by crafts. The detailed construction schedule shall be supplemented by a three week schedule prepared by the CONTRACTOR and submitted to the Engineer on a bi-weekly basis. The CONTRACTOR shall promptly inform the Engineer of any proposed change in the schedule and shall furnish the Engineer with a revised schedule and cash flow diagram within fifteen (15) calendar days after approval of such change.

The schedule shall be kept up to date, taking into account the actual progress of work and shall be updated if necessary, every thirty (30) calendar days. The updated schedule shall, as determined by the Engineer, be sufficient to meet the requirements for the completion of the separable parts of work and the entire projects as set forth in the contract.

C. If at any time during the progress of the Work, the CONTRACTOR's actual progress appears to the Engineer to be inadequate to meet the requirements of the contract, the Engineer will notify the CONTRACTOR of such imminent or actual noncompliance with the contract. The CONTRACTOR shall thereupon take such steps as may be necessary to improve his progress and the Engineer may require an increase in the labor force, the number of shifts, and/or overtime operations, days of work and/or the amount of construction plants all without additional cost to the State. Neither such notice by the Engineer nor the Engineer's failure to issue such notice shall relieve the CONTRACTOR from his obligation to achieve the quality of work and rate of progress required by the contract.

END OF SECTION

SECTION 01230 – DESCRIPTION OF ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

A. The description of alternates is not intended to give a detailed description of all additional work required by the alternate item(s), as only the principal features of such additional work are listed.

B. Should any one or all of the alternates become a part of the contract, the cost of all additional work required by the alternate item(s), even though not specifically mentioned herein, are included in the lump sum bid price.

1.02 ALTERNATE NO. 1 (Additive)

A. Replace existing fan coil units and abate required asbestos containing materials in Zone 1 area in Drawings.

B. Replace existing fan coil units and abate required asbestos containing materials in Zone 2 area in Drawings.

C. Replace existing fan coil units and abate required asbestos containing materials in Zone 3 area in Drawings.

1.02 ALTERNATE NO. 2 (Additive)

A. Install 1/2-inch Dens-Deck and apply fluid-applied roofing material for the existing office building in the Zone 3 area.

END OF SECTION

SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.01 SUMMARY

Section includes work restriction on the CONTRACTOR's operations, and construction sequencing as required to maintain the facilities' operation during the construction period.

1.02 WORK SCHEDULE

A. Refer to Drawings for project phasing.

B. Driveway must be open to traffic at all times during construction. Normal working hours are between 7:30 A.M. to 4:00 P.M., Monday through Friday, exclusive of Holidays.

C. Disruptive construction activities (noisy, dusty and odorous) as determined by the STATE's designated representative may be scheduled during the non-office hours, and the holidays. Any additional costs that may be incurred are the responsibility of the CONTRACTOR.

1.03 FACILITIES' OPERATIONS AND REQUIREMENTS

A. Construction machinery and equipment shall be operated with discretion and with minimum interference to roads, driveways and walkways. Machinery and equipment shall not be left unattended on roads and driveways.

B. When any work is done on roads, driveways and walkways, the CONTRACTOR shall provide, erect and maintain lights, barriers, signs, etc. for the protection of pedestrians. Obey City and County of Honolulu traffic and safety regulations.

C. When necessary, provide traffic control personnel to monitor and direct vehicular traffic on designated access and roads in the vicinity of the job site.

D. The CONTRACTOR's construction equipment, machinery, equipment and supplies shall be located within the Agreement Zone Limits. If permitted by the Engineer, materials may be stored in designated areas outside of the Agreement limit zone.

E. Any designated access and roads used by the CONTRACTOR shall be kept free of all dirt and debris.

F. The CONTRACTOR shall be responsible for any damage to the roadways, driveway and paved areas at the project site and any other affected areas.

Damages shall be repaired to their original condition, prior to the end of the construction, and to the satisfaction of the Engineer.

G. All damaged property shall be repaired to the satisfaction of the Engineer.

1.04 CONSTRUCTION ACCESS AND STAGING AREA

Staging or storage area on site shall be designated by the Project Contact Person in consultation with the Engineer. Entrance into the staging or storage area shall be accessible and comply with the requirement of ADAAG Section 4.1.1.1(4) as per HRS, Chapter 103-50.

1.05 NOISE, DUST AND ODOR CONTROL

A. Noise, dust and odor resulting from construction operations are very detrimental to the conduct of normal activities in adjacent locations surrounding the project area. The CONTRACTOR shall monitor all construction activities and shall exercise precaution in the use of equipment and machinery to keep noise and dust levels to a minimum.

B. Equipment which could generate loud disruptive noise, such as internal combustion engines and compressors, shall be equipped with mufflers to reduce noise levels.

C. While working in the construction areas, the CONTRACTOR shall restrain his workmen from unnecessary noise, such as loud talking, radios, and so forth, and shall not allow food, drinks or smoking.

1.06 PARKING

A. Parking areas shall be as directed by the Engineer.

B. The CONTRACTOR shall find and pay for additional offsite parking as necessary.

C. The CONTRACTOR shall comply with any and all local Rules and Regulations governing parking and traffic circulation.

1.07 DISRUPTION OF UTILITY SERVICES

A. All disruptions of utility services shall be prearranged with the Engineer and all work related to the disconnection and/or connection of the utility system shall be accomplished as approved by the Engineer.

B. Notify the Engineer in writing at least seven (7) working days in advance of any proposed work affecting a utility system. Based upon a work schedule approved by the Engineer, the CONTRACTOR shall coordinate any connections and/or

disconnections with the respective utility companies and with the City and County of Honolulu.

C. Schedule all work in such manner as to minimize the outage time. Any work requiring a shut-down shall be scheduled on weekends, non-office hours and/or holidays. The cost of overtime work shall be the CONTRACTOR's responsibility.

D. Provide temporary utility service, if necessary for the facilities' operation at no additional cost to the State. The Engineer shall make the final determination.

1.08 BURNING AND DISPOSAL OF TRASH

A. The burning of debris on the premise is expressly forbidden.

B. Do not use the building dumpsters for the disposal of lumber, paper cartons, wires and other construction material waste.

C. The CONTRACTOR shall be responsible for the removal and disposal of all construction materials at its own expense.

1.09 BARRICADES, SIGNS, AND LIGHTING

A. Erect temporary barricades and post directional signs at construction limits; to prevent unauthorized individuals from entering the project area; and to provide safe access to the main and service entry doorways of adjacent occupied areas for the duration of the project. Provide separate building entrances, walkways for pedestrians, driveways for vehicles, and other barricades and construction aids to prevent unauthorized individuals from entering the construction area. The extent of the barricades and direction signs shall be adjusted as necessary for the protection and safety of individuals and as directed by the Engineer.

B. Exterior barricades shall be located as required, and in such a manner as to maintain all required fire exits or lanes from adjacent occupied areas.

C. The CONTRACTOR shall be responsible for the cost of the barricades, direction signs and temporary lighting.

D. If construction activities or operation reduce the current illumination in the areas adjacent to construction, provide temporary lighting to achieve existing illumination levels or required for safety and security. Maintain temporary lighting during construction. The Engineer shall make the final determination.

E. The CONTRACTOR shall plate over all open trenches during non-working hours. While open, the trenches shall be flagged out with stakes for visible identification. The CONTRACTOR shall provide any additional barriers necessary to protect the public from danger as directed by the Engineer at no additional cost to the State.

1.10 PROTECTION AND MAINTENANCE OF LAND RESOURCES

A. Preserve and maintain existing land resources (lawns, grassed areas and planting areas) within the designated project Agreement zone.

B. Except in areas marked on the drawings to be cleared and grubbed, do not deface, injure or destroy trees/ shrubs nor remove or cut them without obtaining prior approval from the Engineer. Exercise care while working adjacent to trees or shrubs and protect them from injury or damage. Repair or replace tree(s), shrub(s) or other landscape feature(s) scarred or damaged as the result of construction operations. The Engineer shall make the final determination to repair or replace damages items.

C. For areas exposed and adjacent to the public access, maintain the landscaping, and grassed areas within the project Agreement zone. Provide periodic watering, weeding and mowing during the construction period. Restore damaged areas.

1.11 PAVEMENT MARKING

Should the construction operations diminish the existing pavement marking of surrounding roads, parking and walkways, repair any damages and provide new pavement markings. The Engineer shall make the final determination to repair or replace damages items.

1.12 EXPLOSIVE BLASTING

No explosive blasting shall be allowed.

1.13 DISRUPTION OF AIR CONDITIONING SERVICES

Coordinate and arrange work related to the temporary disconnection of the air conditioning system with the Engineer. Any such disconnections shall require that the CONTRACTOR notify the STATE's designated representative in writing a minimum of ten (10) calendar days in advance. Keep disruptions to a minimum. If temporary power is required, provide services and pay the cost as part of the Agreement. Schedule any outage to the air conditioning system that affects the entire building, on weekends or during non-regular working hours of the building occupants. Pay for overtime cost as part of the Agreement.

1.14 LOADING ON EXISTING STRUCTURE

A. As a precautionary measure for the safety and protection of the building occupants as well as the entire building, no heavy construction machinery and motorized equipment such as loaders, lift trucks, fork trucks, etc., shall be permitted on any of the building floors.

B. The CONTRACTOR shall employ extreme care not to concentrate or impose loads onto the existing building structure, floor and roof with construction material or debris.

1.15 USE OF ELEVATOR

Use of any building elevator for other than normal use by personnel shall require the protection of all surfaces. Contact the STATE's designated representative for wall pads. Any damage to floor, walls, ceilings, or pads shall be restored as directed by the Engineer at no additional cost to the STATE.

1.16 WORK SCHEDULE RESTRICTIONS

A. Sequencing and timing construction work is critical to the facilities' ability to remain in operation throughout the renovation.

B. The facilities shall be occupied and remain operational during the entire construction period.

C. The CONTRACTOR shall schedule its work and operations in such a manner as to minimize disturbances and hazards. Any and all construction aids necessary to maintain normal operations of the facilities and to protect the public, and occupants, shall be the responsibility of the CONTRACTOR. Any and all disruptions of access, etc. shall be coordinated in writing with the STATE's designated representative and identified in the work schedule.

D. The CONTRACTOR shall confine all work, equipment, materials and personnel as much as possible within the Agreement zone limits so as not to interfere with the normal function of the facilities.

E. The CONTRACTOR shall provide dust barricade enclosures to confine the dust within the immediate area of construction.

F. As the facilities will remain operational for the duration of the project, on-site parking, etc. may be limited for the CONTRACTOR's workers. The CONTRACTOR will need to coordinate closely with the Engineer for the areas that are available for his construction activities.

G. Restricted and/or limited on-site areas may require the CONTRACTOR to provide off-site storage and parking.

H. Provide a schedule and floor plans to phase the renovation work as necessary to accommodate the facilities' occupancy requirements during the construction period. The floor plans shall also show the location of his barricades and tunnels with directional signs to define the access routes. The CONTRACTOR must follow the three general phases as described in T002 of the drawings but may provide its own phasing within each of the three (3) major phases.

END OF SECTION

SECTION 01020 - GENERAL PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 PERFORMANCE AND COORDINATION

A. The CONTRACTOR shall be in charge of the Work, as well as the directing and scheduling of all work. The CONTRACTOR shall include general supervision, management and control of the Work of this project, and in addition to other areas more specifically noted throughout the Specifications. Final responsibility for performance, interface, and completion of the Work and the Project shall be the CONTRACTOR's.

B. Jobsite Administration shall be the responsibility of the CONTRACTOR. Provide a competent superintendent on the job and provide an adequate staff to execute the Work. In addition, all workers shall dress neatly and conduct themselves properly at all times. Loud abusive behavior, sexual harassment and misconduct will not be tolerated. Workers found in violation of the above shall be removed from the job site as directed by the STATE's designated representative.

C. The STATE shall hold the CONTRACTOR liable for all the acts of subcontractors and shall deal only with the Prime CONTRACTOR in matters pertaining to other trades employed on the job.

D. Coordination: Provide project interface and coordination to properly and accurately bring together the several parts, components, systems, and assemblies as required to complete the Work pursuant to the Specifications and Drawings herein.

1. Provide interface and coordination of all trades, crafts and subcontracts. Ensure and make correct and accurate connections of abutting, adjoining, overlapping, and related work. Provide anchors, fasteners, accessories, appurtenances, and incidental items needed to complete the Work, fully, and correctly in accordance with the Agreement Documents.

2. Provide additional structural components, bracing, blocking, miscellaneous metal, backing, anchors, fasteners, and installation accessories required to properly anchor, fasten, or attach material, equipment, hardware, systems and assemblies to the structure.

3. Provide excavation, backfilling, trenching and drilling for trades to install their work.

4. Provide concrete foundations, pads, supports, bases, and grouting for trades as needed to install their work.

5. Provide caulking, sealing, and flashing as required to waterproof the building complete and as required to insulate the building thermally and acoustically. Include sealing, flashing, and related work as required to prevent moisture intrusion, air infiltration, and light leakage.

6. Equipment, appliances, fixtures, and systems requiring plumbing and mechanical services, rough-in, and connections, or other utilities and services shall be provided with such services, rough-in, and final connections.

7. Equipment, appliances, fixtures, hardware, and systems requiring electrical services shall be provided with such electrical services, including outlets, switches, overload protection, interlocks, panelboard space, disconnects, circuit breakers, and connections.

8. Materials, equipment, component parts, accessories, incidental items, connections, and services required to complete the Work which is not provided by subcontractors shall be provided by the CONTRACTOR.

9. All additional work, components, and accessories required to complete the project are considered incidental to various Agreement items and no additional payment shall be made therefor.

E. VALUE ENGINEERING INCENTIVE. On projects with Agreement amounts in excess of ONE HUNDRED THOUSAND AND NO/100 DOLLARS ($100,000.00), the following Value Engineering Incentive Clause shall apply to allow the CONTRACTOR to share in cost savings that ensue from cost reduction proposals, hereinafter referred to as Value Engineering Change Proposal (VECP), submitted by the CONTRACTOR.

To qualify as a VECP:

1. the CONTRACTOR shall develop and submit a proposal;

2. the proposal must involve changes in the Agreement; and

3. the proposal must result in an estimated net savings in project cost of at least FOUR THOUSAND AND NO/100 DOLLARS ($4,000.00). Net savings are those savings in project costs realized by the STATE as the result of a VECP after deducting the CONTRACTOR's share of the cost savings.

The CONTRACTOR shall apply the following to allow the CONTRACTOR to share in the cost savings ensuing from VECPs accepted by the STATE.

4. This VECP clause applies to VECPs developed and submitted by the CONTRACTOR and accepted by the STATE. This VECP applies only to a proposal qualifying as a VECP at the time of submission to the Engineer.

5. A VECP:

   a. must result in a quantifiable cost savings or identifiable benefits acceptable to the STATE and provide a system, structure, procedure or process equivalent or better than the design specified in the Agreement;

   b. shall not impair essential or desirable functions and characteristics of a system, structure, procedure or process, including durability, service life, reliability, economy of operation, ease of maintenance, desired appearance, design, safety standards and impacts due to construction; and

   c. shall require a modification to the Agreement or a change order.

6. The CONTRACTOR shall submit the following with each proposal:

   a. A statement identifying the proposal as a VECP and briefly describing the portion(s) of the project work involved or affected:

   b. A description of the differences between the existing Agreement requirements and the proposed VECP together with the comparative advantages and disadvantages of each including durability, service life, reliability, economy of operation, ease of maintenance, desired appearance, design, safety standards, impacts due to construction and other essential or desirable functions, and characteristics;

   c. Complete final agreement showing the proposed revisions similar to the original Agreement design and features, including submittal of:

      (1) design calculations;
      (2) the design criteria used; and
      (3) a detailed breakdown of costs and expenses to construct or implement such revisions.

      Before accepting the submission of final plans and specifications for a proposed VECP, the STATE may require submittal of conceptual and preliminary plans and specifications together with a preliminary estimate and breakdown of related costs and expenses;

   d. An itemization of Agreement changes required by the proposed VECP together with recommendations to implement or effect each such change;

e. A detailed breakdown of the total quantifiable cost savings to the STATE resulting from the proposed VECP, including the estimated reduction in the CONTRACTOR's performance costs and breakdown of the respective shares in such savings to be realized by the STATE and the CONTRACTOR. The calculation of such cost savings shall take into account the costs incurred by the CONTRACTOR to develop, design, construct and implement the proposed VECP, including costs attributable to subcontractors, and/or expected to be incurred by the STATE in reviewing and processing the proposed VECP;

f. An itemized cost analysis indicating the original Agreement costs and quantities to be revised and/or replaced by the proposed VECP, the new costs and quantities generated by or attributable to the proposed VECP and the cost impacts of the proposed VECP on operational, maintenance, and other considerations;

g. A detailed description of the time savings to be realized by using the proposed VECP, including identifying and quantifying the corresponding reduction in the Agreement completion time;

h. A statement identifying the time periods within which the proposed VECP must be implemented in order for the STATE to realize the maximum benefit in terms of quantifiable cost savings or identifiable benefits acceptable to the STATE. Implementation time for the proposed VECP must include sufficient time for the STATE to review the proposed VECP and finalize the appropriate Agreement modification or Agreement change order. Lack of sufficient review and processing time will constitute a basis for rejecting the proposed VECP;

i. A listing of previous submissions of proposed VECPs by the CONTRACTOR on other State or Federal projects and the conditions and results thereof including the project name, number, type, location and duration and the responses and actions by the State and/or the Federal government in connection therewith;

j. Sufficient data to substantiate and verify the accuracy of the proposed VECPs; and

k. Additional information requested by the STATE.

7. The Engineer is not required to consider VECP proposal for the following types of changes:

a. Basic design of a bridge or other elevated structure or facility; and

b. Type, size, elevation or structural requirements of footings or other types of foundations.

The STATE's determination with respect to a proposed VECP shall be at the STATE's sole discretion and its decision shall be final.

The STATE shall not be liable to the CONTRACTOR for costs or delays incurred by the CONTRACTOR in connection with or attributable to the STATE's determination with respect to a proposed VECP, including development costs, anticipated profits, and increased material or labor costs.

If a proposed VECP is similar to a change in the plans or specifications for the project under consideration by the Engineer before or at the time the proposed VECP is submitted to the STATE, the STATE will be under no obligation to accept such proposed VECP and the STATE may implement such changes to the plans and specifications without compensating the CONTRACTOR for such proposed VECP.

Unless and until the STATE grants final acceptance to a proposed VECP, the CONTRACTOR shall do the work according to the contract. The Engineer shall consider work done by the CONTRACTOR related to or as a part of a proposed VECP before such final approval of unauthorized work. The STATE shall be under no obligation to pay for such work and may require the CONTRACTOR to remove such work and repair and/or restore the area and/or facility at no cost to the STATE.

The Engineer may accept proposed VECP in whole or in part. Acceptance shall be by a Agreement change order or modifying the Agreement to identify and describe the proposed VECP.

8. If a proposed VECP is accepted by the STATE, the required changes will be incorporated into the Agreement as appropriate and according to the Agreement, including changing the quantities of unit bid items, incorporating new mutually acceptable prices or by using force account alternative. The STATE and the CONTRACTOR shall each share in the quantifiable cost savings resulting from the VECP equally according to the following formula:

$$S=\frac{(A-B-C)}{2}$$

where S=Share in quantifiable cost savings resulting from the VECP.
A=Cost of the original Agreement bid items which are being revised and/or replaced by the VECP.

B=The cost of the development, design and construction/implementation of the VECP accepted by the STATE.
C=The costs incurred by the STATE in reviewing and processing the proposed VECP.

9. Also, submittal of proposed VECPs or other reduction proposals submitted under contracts for other State projects may also be submitted under this Agreement.

10. The use of a VECP by the STATE may be subject to the following, which must be noted or marked on the relevant sheets of the VECP:

    "This data furnished pursuant to a value engineering incentive clause shall not be disclosed outside the State, or be duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate it in connection with a value engineering incentive proposal. This restriction does not limit the STATE's right to use this data, without limitation, if it is or has been obtained from another source or is otherwise available. Once the value engineering incentive proposal is approved and accepted by the STATE, the STATE shall have the right to use and disclose any data relating thereto in any manner and for any purpose whatsoever, including, without limitation, the right to permit others to use, duplicate and/or disclose such data"

    Agreement modifications and Agreement change orders implementing the VECP shall reference that such modifications and change orders are being made pursuant to this Agreement clause.

11. All proposed VECPs shall comply with and conform to all applicable Federal, State or County laws, statutes, ordinances, rules and regulations, whether currently in effect or in force hereafter.

12. The STATE may revoke its approval of the VECP if the work being performed pursuant thereto is unsatisfactory to the Engineer. Upon such revocation, the Engineer may order the CONTRACTOR to:

    a. Remove all such unsatisfactory work,
    b. Immediately stop the use of any such process or procedure being used in connection with such VECP, and/or
    c. Restore and/or repair the affected portions of the project to a condition from which the original Agreement requirements may be implemented at no cost to the STATE.

    Rejection of such unsatisfactory work and the revocation of VECP approval by the STATE in connection therewith shall not constitute the basis of any claim against the STATE, including, without limitation, any claims for delay.

13. If the STATE approves modifications to VECP previously approved by the STATE, whether due to field conditions or otherwise, the CONTRACTOR will be reimbursed or credited for the work performed pursuant to such modifications at the original Agreement bid prices, unless otherwise authorized by the STATE including, without limitation, payment by force account.

14. For VECPs involving the preparation of new plan sheets, the CONTRACTOR shall submit master tracings of such sheets in accordance with current or such other guidelines as the STATE may designate. The preparation and submission of the master tracings shall be coordinated with the Engineer or the Engineer's designated representative. The master tracings shall be submitted to the Engineer within two (2) months after full execution of the Agreement modification or Agreement change order implementing the VECP.

15. The CONTRACTOR shall provide to the STATE fifteen (15) copies of all documents submitted pursuant to a proposed VECP, including plans, specifications, calculations (including all working sketches and computer data), time schedules and cost estimates together with any supporting data.

16. The CONTRACTOR shall provide to the STATE:

    a. Thirty (30) copies of all full-sized plans, reduced-sized plans and specifications prepared in connection with the VECP and approved by the STATE, and

    b. Six (6) copies of all approved calculations (including all working sketches and computer data)."

F. FORCE ACCOUNT - Work performed in accordance with the requirements and provisions of this solicitation's specifications and drawings shall be paid for in accordance with Paragraph 1.09, "Compensation," of the General Requirements and Paragraph L. "Payments During Performance of Work," and Paragraph P., Invoicing and Payment," of the Special Provisions, herein, or, if on a force account basis, the CONTRACTOR shall be compensated in the following manner:

1. ALLOWANCES FOR OVERHEAD AND PROFIT

    a. In determining the cost or credit to the STATE resulting from a change, the allowances for all overhead, including extended overhead resulting from adjustments to Agreement time (including home office, branch office and field overhead, and related delay impact costs) and profit combined, shall not exceed the percentages set forth below:

(1) For the CONTRACTOR, for any work performed by its own labor forces, fifteen percent (15%) of the direct cost;

(2) For each subcontractor involved, for any work performed by its own forces, fifteen percent (15%) of the direct cost;

(3) For the CONTRACTOR or any subcontractor, for work performed by their subcontractors, seven percent (7%) of the amount due the performing subcontractor.

b. Not more than three markup allowance line item additions not exceeding the maximum percentage shown above will be allowed for profit and overhead, regardless of the number of tier subcontractors.

c. The allowance percentages will be applied to all credits and to the net increase of direct costs where work is added and deleted by the changes.

2. LABOR

For all hourly workers, the CONTRACTOR will receive the rate of wage including fringe benefits when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work, which shall be agreed upon in writing before beginning work for each and every hour that said labor is actually engaged in said work.

All markups for overhead and profit shall be added subject to limitations established in Paragraph F.1. "ALLOWANCES FOR OVERHEAD AND PROFIT," under the General Project Requirements.

No allowance for overtime compensation will be given without the written approval of the Engineer prior to performance of such work.

3. INSURANCE AND TAXES

The CONTRACTOR and subcontractor(s) will also receive the actual additional costs paid for property damage, liability, workers' compensation insurance premiums, State unemployment contributions, Federal unemployment taxes, social security and Medicare taxes to which a markup of up to six percent (6%) may be added.

4. MATERIALS

For materials accepted by the Engineer and used, the CONTRACTOR and subcontractor(s) shall receive the actual cost of such materials delivered and

incorporated into work, plus a markup allowed in Paragraph F.1. under the General Project Requirements "ALLOWANCES FOR OVERHEAD AND PROFIT," herein.

5. SUBCONTRACTORS

Subcontractor costs shall be the actual costs of the subcontractor marked up as defined in Paragraph F.2, "LABOR" under the General Project Requirements, herein plus a markup allowed under Paragraph F.1. "ALLOWANCES FOR OVERHEAD AND PROFIT," under the General Project Requirements, herein.

6. EQUIPMENT

a. For any machinery or special equipment (other than small tools as herein defined in paragraph 6) owned by the CONTRACTOR or a related entity, the use of which has been authorized by the Engineer, the CONTRACTOR will be paid at the per-hour rental rates based on the monthly rate established for said machinery or equipment in the then-current edition of the Rental Rate Blue Book for Construction Equipment including the estimated operating cost per hour and regional correction provided therein.

   If no rate is listed for a particular kind, type or size of machinery or equipment, then the monthly, hourly rates shall be as agreed upon in writing by the CONTRACTOR and the Engineer prior to the use of said machinery or equipment. If there is no agreement, the Engineer will set a rate. The CONTRACTOR may contest the rate pursuant to the "Disputes" section of the "General Conditions."

b. Rental rates which are higher than those specified in the aforesaid Rental Rate Blue Book publication may be allowed where such higher rates can be justified by job conditions such as work in water and work on lava, etc. Request for such higher rates shall be submitted in writing to the Engineer for approval prior to the use of the machinery or equipment in question.

c. The rental rate for trucks not owned by the CONTRACTOR shall be those as established under the Hawaii State Public Utilities Commission; which will be paid for as a material pursuant to Paragraph F.4, "MATERIALS," under the General Project Requirements, herein.

   Rental rates for the CONTRACTOR-owned trucks not listed in the Rental Rate Blue Book shall be agreed upon in writing by the CONTRACTOR and Engineer prior to the use of said trucks. If there

is no agreement, the Engineer shall set the rate. The CONTRACTOR may contest the rate pursuant to the "Disputes" section of the "General Conditions."

d. All rental rates for machinery and equipment shall include the cost of fuel, oil lubricants, supplies, small tools, necessary attachments, repairs, maintenance, tire wear, depreciation, storage, and all other incidentals.

e. All machinery and equipment shall be in good working condition and suitable for the purpose for which the machinery and equipment is to be used.

f. Individual pieces of equipment or tools having a replacement value of TWO THOUSAND AND NO/100 DOLLARS ($2,000.00) or less, whether or not consumed by use, shall be considered to be small tools and included in the allowed markup for overhead and profit and no separate payment will be made therefor.

g. The total of all force account rental charges accrued over the duration of the Agreement for a specific item of equipment shall not exceed the replacement cost of that equipment.

   The CONTRACTOR shall provide the cost of replacement to the Engineer prior to using the equipment. If the Engineer does not agree with the replacement cost, the Engineer shall set the replacement cost. The CONTRACTOR may contest the replacement cost pursuant to the "Disputes" section of the "General Conditions."

h. Should the item of equipment be rented from an unrelated entity, the rental cost will be treated as a material cost under pursuant to Paragraph F.4, "MATERIALS," under the General Project Requirements, herein.

i. The following provisions shall govern in determining the compensation to be paid to the CONTRACTOR for use of equipment or machinery on the force account method:

   (1) Transportation and/or Mobilization

   The location from which the equipment is to be moved or transported shall be approved by the Engineer.

   Where the equipment must be transported to the site of the force account work, the STATE will pay the reasonable cost of mobilizing and transporting the equipment, including its loading

and unloading, from its original location to the site of force account work. Upon completion of the work the STATE will pay the reasonable cost of mobilizing and transporting the equipment back to its original location, or to another location, whichever cost is less.

The cost of transporting the equipment shall not exceed the rates established by the Hawaii State Public Utilities Commission. If such rates are nonexistent, then the rates will be determined by the Engineer based upon the prevailing rate charged by established haulers within the locale.

Where the equipment is self-propelled, the STATE will pay the cost of moving the equipment by its own power from its original location to the site of the force account work. Upon completion of the work the STATE will pay the reasonable cost of moving of the Equipment back to its original location or to another location, whichever cost is less.

Payment for mobilizing and transportation above provided, will not be made if the equipment is used on the work in any other way than solely for extra work paid for on a force account basis.

At the discretion of the Engineer, when the CONTRACTOR desires to use such equipment for other than force account work, the costs of mobilization and transportation may be prorated between the force account and non-force account work.

(2) Rental

The rental period shall begin at the time equipment reaches the site of work, shall include each day that the machinery or equipment is at the site of the work and shall terminate at the end of the day on which the equipment is no longer needed. In the event the equipment must standby due to work being delayed or halted by reason of design, traffic, or other related problems uncontrollable by the CONTRACTOR, excluding Saturdays, Sundays and Legal Holidays, unless the equipment is used to perform work on such days, the rental shall be two hours per day until the equipment is no longer needed.

The rental time to be paid will be for the time actually used.

*Any hours of operation in excess of 8 hours in any one day must be approved by the Engineer prior to the performance of such work.

Rental time will not be allowed or credited for any day on which machinery or equipment is inoperative due to its breakdown. ON such days, the CONTRACTOR will be paid only for the actual hours, if any, that the machinery or equipment was in operation.

In the event the force account work is completed in less than 8 hours, equipment rental shall nevertheless be paid for a minimum eight (8) hours.

For the purpose of determining the rental period the continuous and consecutive days shall be the normal 8-hour shift work day, Monday through Friday excluding legal holidays. Any work day to be paid less than 8 hours shall not be considered as continuous, except for equipment removed from rental for fuel and lubrication.

No additional premium beyond the normal rates used, will be paid for equipment used over 8 hours per day or 40 hours per week.

(3) Pickup trucks, flatbed trucks, vans, storage trailers, unless specifically rented for the force account work, shall be considered incidental to the force account work and the costs therefore are included in the markup allowed under Paragraph F.1. "ALLOWANCES FOR OVERHEAD AND PROFIT," under the General Project Requirements, herein.

7. STATE EXCISE (GROSS INCOME) TAX AND BOND

A sum equal to the current percentage rate for the State excise (Gross Income) tax on the total sum determined in Paragraphs 2, 3, 4, 5, and 6 under the General Project Requirements, herein and any required bond premium shall be added as compensation to the CONTRACTOR. The actual bond premium not to exceed one percent (1%) shall be added to Paragraphs 2, 3, 4, 5, and 6 under the General Project Requirements, herein, when applicable.

The compensation as determined in Paragraphs 2, 3, 4, 5, and 6 under the General Project Requirements, herein, shall be deemed to be payment in full for work paid on a force account basis.

8. RECORDS

The CONTRACTOR and the Engineer shall compare records of the labor, materials and equipment rentals paid by the force account basis at the end of

each day. These daily records, if signed by both parties, shall thereafter be the basis for the quantities to be paid for by the force account method. The CONTRACTOR shall not be entitled to payment for force account records not signed by the Engineer.

9. STATEMENTS

No payment will be made for work on a force account basis until the CONTRACTOR has submitted to the Engineer duplicate, itemized statements of the cost of such force account work detailed as follows:

a. Laborers-Name, classification, date, daily hours, total hours, rate, and extension for each laborer and foreman and also the amount of fringe benefits payable if any.

b. Equipment-Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

c. Materials-

(1) Quantities of materials, prices and extensions

(2) Costs of transporting materials, if such cost is not reflected in the prices of the materials

(3) Statements shall be accompanied and supported by receipted invoices for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the CONTRACTOR's stock, then in lieu of the invoices the CONTRACTOR shall submit an affidavit certifying that such materials were taken from stock and that the amount claimed represents the actual cost to the CONTRACTOR.

5. Insurance-Cost of property damage, liability and workers' compensation insurance premiums, unemployment insurance contributions, and social security tax."

1.02 <u>POST BID PRICE INFORMATION SUBMITTALS</u>

A. Bid Analysis Cost Breakdown Submittal: Within five (5) consecutive working days from the date of the Bid Opening, the apparent low bid the CONTRACTOR shall submit a bid price cost breakdown based upon specification section numbers and/or subcontractor pricing to the STATE for review.

B. Detailed Cost Breakdown Submittal: The CONTRACTOR shall provide a detailed cost breakdown for monthly payment purposes.

C. Breakdown shall be segregated by trades and building systems such as foundations, foundation walls, concrete slabs, walls, etc. Provide the quantities and unit prices with material and labor breakdowns. Furthermore, the cost breakdown shall include general provision requirements itemizing mobilization, demobilization, cleanup, field and office administration costs. If the STATE and the CONTRACTOR cannot reach a mutually agreed upon payment agreement, the STATE shall make payments based on the STATE's cost estimates.

1.03 CONSTRUCTION SCHEDULE - CRITICAL PATH METHOD (CPM)

A. The CONTRACTOR shall prepare and submit six (6) sets of its Construction Schedule for review within fifteen (15) calendar days after the Award Letter is received or upon earlier written instructions from the STATE's designated representative.

B. The schedule shall be related to the entire project to the extent required by the Agreement Documents, and shall provide for expeditious and practicable execution of the work. If requested by the STATE's designated representative, the CONTRACTOR shall participate in a preliminary meeting to discuss the proposed schedule and requirements prior to submission of the schedule.

C. The Construction Schedule shall indicate the following:

1. Elements of the Project in detail time scaled by month or by week, and a project summary.

2. The order and interdependence of activities and the sequence in which the work is to be accomplished.

3. How the start of a given activity is dependent upon the completion of preceding activities and how its completion restricts the start of following activities.

4. The submittal and approval of shop drawings, samples, procurement of critical materials and equipment, receipt of materials with estimated costs of major items.

5. Activities of the STATE which have an effect on the progress schedule (e.g. required delivery dates for STATE furnished materials and equipment).

6. The description of the activity and the duration of time in calendar days.

a) For each activity indicate the early start, early finish, late start, late finish dates and total float time.

b) "Float" means the amount of time between the early start date and the late start date, or the early finish date and late finish date for any of the activities noted on the CPM Schedule. The STATE shall own any float time.

c) The "Critical Path" is made up of activities which control the total length of the project. It is by definition, the longest path through the schedule.

7. The party responsible for the accomplishment of the activity. As a minimum, indicate responsibility for each subcontractor.

8. Agreement-required dates for completion of all or parts of the Work.

9. Non-work days (e.g. Holidays, exclusionary non-work days).

D. Upon completion of the Engineer's review, the CONTRACTOR shall amend the schedule as necessary to reflect comments made by the STATE's designated representative and/or Engineer. If necessary, the CONTRACTOR shall participate in a meeting with the STATE's designated representative and/or Engineer to discuss the proposed schedule and changes required. Submit the revised schedule for review to the Engineer within seven (7) calendar days after receipt of the STATE's designated representative and/or Engineer's comments.

E. Use the reviewed schedule for planning, organizing and directing the work, for reporting progress, and for requesting payment for the work completed. Do not make changes to the reviewed schedule without written approval of the STATE's designated representative.

F. Should changes to the schedule be desired, submit a request in writing to the STATE's designated representative and indicate the reasons for the proposed change. Should the STATE's designated representative consider the change to be major, the STATE's designated representative may require the CONTRACTOR to revise and resubmit the schedule at no additional cost to the STATE. The CONTRACTOR shall mitigate the impact of all changes by readjusting the sequence of activities, duration of time, or resources utilizing available float.

1. A change shall be considered major if, in the opinion of the Engineer, the change may affect the substantial completion date or other contractual and milestone dates.

2. Minor changes are those that only affect activities with adequate float time.

G. Once the schedule has been reviewed by the STATE's designated representative and Engineer, the CONTRACTOR shall furnish to the STATE's designated representative three (3) copies of the schedule within fifteen (15) calendar days.

H. Throughout the duration of the project, the Engineer reserves the right to request more detailed breakdowns of activities, logic, and schedule submittals from the CONTRACTOR at no additional cost to the STATE.

I. Updated schedules shall be prepared and submitted to the STATE's designated representative at monthly intervals or as directed by the STATE's designated representative. The schedule shall reflect all changes occurring since the last update including the following:

   1. Activities started and completed during the previous period.

   2. The estimated duration to complete each activity which was started but not completed.

   3. Percentage of cost payable for each activity.

   4. Modifications and pending proposed changes.

   5. Narrative report describing current and anticipated problem areas and / or delaying factors with their impact together with an explanation of corrective actions taken or proposed.

J. Failure on the part of the CONTRACTOR to submit updated schedules may be grounds for the STATE's designated representative to withhold progress payments for items noted on the schedule.

K. The CONTRACTOR shall prosecute the work according to the CPM Schedule. The STATE's designated representative shall rely on the reviewed CONTRACTOR's CPM Schedule and regular updates for planning and coordination. The STATE's designated representative review of the CONTRACTOR's CPM Construction Schedule does not relieve the CONTRACTOR of its obligation to complete the work within the allotted Agreement time. Nor does the review grant, reject or in any other way act on the CONTRACTOR's request for adjustment(s)to complete remaining Agreement work, or for claims of additional compensation. Such requests shall be processed in accordance with other relevant provisions of the Agreement.

L. If the STATE issues a Field Order or Change Order or requires Force Account Work that affects the sequence or duration of work activities noted on the construction progress schedule, the CONTRACTOR shall promptly update the schedule. This shall be accomplished by adding, deleting or revising the work activities noted or changing the logic in the schedule to show the

CONTRACTOR's plan for incorporating the change into the flow of work. All Change Orders and Time Extension requests that affect the construction schedule shall be evaluated based on their impact on the approved Construction Schedule.

1.04 MEETINGS

A. The CONTRACTOR shall meet with the STATE's designated representative and/or Engineer, weekly or other interval as determined by the Engineer, to discuss the progress of the Work. The CONTRACTOR and / or the Engineer shall determine whose attendance shall be required. Meetings shall be held in the CONTRACTOR's field office on the same time and day weekly. Coordinate any changes to date and time and meeting location with the STATE's designated representative. The CONTRACTOR shall bring to said meeting its weekly schedule and the weekly updated submittal log.

B. For each meeting, the CONTRACTOR shall take meeting minutes and provide a list stating all items, work or material, which may cause a delay or have an impact on the project's contractual dates. The list shall be inclusive of items requiring action from all responsible parties such as outstanding submittal status, request for information (clarification), force account work, change order, and change proposals. The format of this list shall be at the CONTRACTOR's discretion, subject to the Engineer's approval. Submit the list to all parties for discussions as part of a meeting agenda. The CONTRACTOR shall provide a plan of corrective action for any item which is delayed or expected to be delayed, where that item impacts the contractual dates.

PART 2 - MATERIALS

2.01 QUALITY

Materials, items, equipment and fixtures specified in the various Divisions and Sections shall be new unless otherwise specified.

2.02 STORAGE AND HANDLING

A. The CONTRACTOR shall supervise jobsite delivery and handling, and assign storage space for materials, items, equipment and fixtures of all trades. The CONTRACTOR and installer are responsible for delivery, unloading, unpacking, handling, storage, distribution, installation and protection of its materials at the jobsite.

B. Except as otherwise required by these specifications or by the Engineer, determine and comply with manufacturer(s) recommendation(s) on product handling, storage and protection.

C. Deliver products to the jobsite in manufacturer's original containers, with labels intact and legible. Maintain packaged material with seals unbroken and labels intact until time of use. Promptly remove damaged materials and unusable items from the jobsite, and promptly replace with material meeting the specified requirements, at no additional cost to the STATE.

D. The STATE may reject as non-complying such material and products that do not bear identification satisfactory to the STATE as to manufacturer, grade, quality, and other pertinent information.

2.03 LONG-LEAD ITEMS

Special attention shall be given to long lead items, including but not limit to architectural finishes, specialties, air conditioning, plumbing fixtures, etc. Upon award of Agreement, The CONTRACTOR shall verify delivery times of all long lead items and coordinate with his work schedules to ensure project will be completed on time and according to schedules without any disruption. The CONTRACTOR shall promptly notify the Engineer should there be any change in availability of long lead items. The CONTRACTOR shall be solely responsible for any disruption, coordination, additional staff work due to his inability to bring in long lead items on schedule.

PART 3 - EXECUTION

3.01 EXAMINING THE SITE

A. The CONTRACTOR and Subcontractors are expected to visit the site and make due allowances for difficulties and contingencies to be encountered. Compare Agreement documents with work in place. Become familiar, with existing conditions, the conditions to be encountered in performing the Work, and the requirements of the drawings and specifications.

B. Verify construction lines, grades, dimensions and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer, and any change shall be made in accordance with the Engineer's instruction. The CONTRACTOR shall not be entitled to any payment if it fails to report the discrepancies before proceeding with any work whether within the area affected or not. Any extra work must be justified and approved by the Engineer and the STATE.

C. Obtain all field measurements required for the accurate fabrication and installation of the Work included in this Agreement. Exact measurements are the CONTRACTOR's responsibility.

D. Furnish or obtain templates, patterns, and setting instructions as required for the installation of all Work. All dimensions shall be verified in the field.

E. The CONTRACTOR shall accept the site and the existing buildings in the condition which exists at the time access is granted to begin the Work.

1. Verify existing conditions and dimensions shown and other dimensions not indicated but necessary to accomplish the Work.

2. Locate general reference points and take action to prevent their destruction. Lay out work and be responsible for lines, elevations and measurements and the work executed. Exercise precautions to verify figures and conditions shown on drawings before layout of work.

3. Before starting the Work, the CONTRACTOR and each subcontractor, shall verify governing dimensions and shall examine adjoining work on which the CONTRACTOR's work is in any way dependent. No additional compensation will be allowed on account of differences between actual measurements and dimensions shown. Submit differences discovered during the verification work to the Engineer for interpretations before proceeding with the associated work.

3.02 DOCUMENT EXISTING CONDITIONS

A. Prior to the start of jobsite work, the CONTRACTOR shall survey and document with photographs and measurements all of the existing conditions at the site. This survey will establish the baseline building and site condition.

1. Survey shall note but not limited to the followings:

a. Any pre-existing damage to the existing structures not otherwise noted on the drawings.

b. Any object scheduled to be salvaged and reinstalled which may be subject to damage during removal.

2. Survey shall include roads, driveways and walkways that will be used by the CONTRACTOR.

3. Survey shall be conducted prior to the start of on-site work. At the completion of construction, the CONTRACTOR shall again survey the site and the structure for comparison.

3.03 SITE UTILITIES AND TONING

A. Cooperate, coordinate and schedule the work to suit the owners of underground or overhead utility lines or other property in removing or altering such lines or providing new services in order for the work to progress according to the Agreement. Cooperation includes rearranging construction operations and work schedules in order to accommodate the operations and work of the utilities and/or other property in and around the work site.

B. The CONTRACTOR shall contact all the various utility companies before the start of the work to ascertain any existing utilities and to develop a full understanding of the utility requirements with respect to this project. Furnish the STATE's designated representative with evidence that the utility companies were contacted.

C. Should the CONTRACTOR discover the existence and location of utilities in the Agreement drawings are not correct, do not disturb the utilities and immediately notify the Engineer. The Engineer will advise the CONTRACTOR regarding actions to take.

D. Any utilities that the CONTRACTOR encounters during the progress of the work, such as telephone ducts, communication ducts, electric ducts, water lines, gas lines, sewer lines, electric lines and drainage pipes, whether shown or not on the Agreement drawings, shall not be disturbed or damaged unless otherwise instructed in the drawings and specifications or as directed by the Engineer. The CONTRACTOR shall repair and restore to pre-damaged condition any utilities or any other property the CONTRACTOR damaged.

E. The CONTRACTOR shall transfer to their "Field Posted As-Built" drawings the location(s) of new and existing utilities that differ from the Agreement Drawings.

F. Prior to the start of grading, excavation work or trenching, the CONTRACTOR shall verify and confirm the presence, location and depth of existing underground utility lines in the area affected by the project, by "toning" or other appropriate means acceptable to the Engineer. The intent of this advanced toning is to afford the STATE an opportunity to identify the utility lines that may or may not be shown on the drawings and issue a change order and / or directive which may be necessary to address their presence. If toning is not performed prior to the start of grading, excavation or trenching work, The CONTRACTOR shall repair or replace damaged utility lines at its cost.

G. Toning shall be performed using instruments specifically developed and designed for the detection of underground pipe and cable utilities. Use of instruments such as "divining" or "dowsing" rods are not considered "toning" and are not acceptable.

H. The CONTRACTOR shall give the Engineer a minimum of 24 hours advance notice of its proposed toning work and of the method of toning proposed to be used. Upon completion of the toning operation, The CONTRACTOR shall:

1. Inform the Engineer, in writing, where utility lines are found as indicated on the drawings and no new utility lines are found. Also, where utility lines indicated on the drawings are not shown in their approximate location or where new utility lines are found or pointed out to the CONTRACTOR in the field.

2. Submit a sketch to the Engineer indicating the location and approximate depth of the lines. The STATE will identify the type of utility lines found and provide the CONTRACTOR with directions on their disposition. Do not proceed with any excavation or trenching work until so directed by the Engineer.

I. After ascertaining the exact location and depth of utilities within the project area, mark such locations to warn workers or equipment operators of their existence and location. Also, be responsible to acquaint personnel working near utilities with the type, size location, depth of the utilities and the consequences that might result from disturbances. Do not start trenching or start similar operations until reasonable and appropriate precautions to protect the utilities are taken.

J. For new utilities that were not shown on the drawings but discovered during toning or pointed out in the field, the CONTRACTOR shall proceed with care in the excavation.

1. Where directed by the Engineer, excavation performed within 2 feet of the line shall be done manually to avoid damage.

3.04 ENVIRONMENTAL

General: The CONTRACTOR shall oversee that proper environmental conditions are met regarding temperature, humidity, lighting and ventilation.

3.05 PREPARATION AND PROTECTION

A. Protection of Property: Continually maintain adequate protection of the Work from damage and protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. Repair, replace or pay the expense to repair damages resulting from the CONTRACTOR's fault or negligence.

B. Before starting work to be applied to previously erected constructions, make a thorough and complete investigation of such recipient surfaces and determine their suitability to receive required additional construction and finishes. The

CONTRACTOR, at its expense, shall make whatever repairs and conditioning required to properly prepare such surfaces. The CONTRACTOR shall coordinate the work to provide a suitable surfaces to receive following work.

C. Commencement of work by any trade will be construed as acceptance of existing conditions and surfaces as being satisfactory for application of subsequent work, and full responsibility for finished results and assumption of warranty obligations under the Agreement.

D. Protect existing work in a manner to prevent damage including interior work from damage by vandals or the elements. Provide temporary protection. Use curtains, barricades, or other appropriate methods. Take positive measures to prevent breakage of glass and damage to plastic, aluminum and other finishes.

E. Repairs and Replacements: In event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the STATE. Additional time required to secure replacements and to make repairs will not be considered by the STATE to justify an extension in the Agreement Time or completion.

3.06 BARRICADE

A. Erect temporary construction barricade(s) to prevent unauthorized persons from entering the project area and to the extent required by the Engineer. At a minimum, construct barricades using industry standard 6 feet high chain link fencing with metal (or wood) post supports at 10 feet on center connected with a top and bottom 12 -gauge soft annealed galvanized tie wires securely connected to posts. Posts shall be capable of resisting a lateral load of 200 lbs measured at the top of the post. In addition, a dust barrier shall be anchored from the underside of the metal beams hanging from the roof to the warehouse floor. Dust barrier shall be hanged approximately twenty (20) feet high.

B. Maintain temporary construction barricade(s) throughout the duration of the Work. During the course of the project, the Engineer may require additional barricades be provided for the safety of the public. The CONTRACTOR shall erect the additional barricade(s) at its own expense.

C. Erect temporary construction barricade to ensure that construction activities are completely separated from the bonded warehouse activities. Said barricade shall to the best of the CONTRACTOR's ability keep dust, dirt, rubbish and other debris out of the STATE's bonded warehouse area. Any such debris that does intrude into the STATE's bonded warehouse area shall be cleaned up by the CONTRACTOR at no expense to the STATE.

3.07 INSTALLATION

Materials, items, fixtures required by the various Divisions and Sections of the Specifications shall be installed in accordance with Agreement Documents, by workers specially trained and skilled in performance of the particular type of work, to meet guarantee and regulatory agency requirements. Should the drawings or specifications be void of installation requirements, install the materials, items, fixtures in accordance with the manufacturer's current specifications, recommendations, instructions and directions.

3.08 CUTTING AND PATCHING

A. General: The CONTRACTOR shall oversee cutting and patching of concrete, masonry, structural members and other materials where indicated on drawings and as job conditions require. Unless noted elsewhere in the Drawings and Specifications, no cutting or patching of existing or new structural members will be permitted without previously notifying the Engineer.

B. Patch materials and workmanship shall be of equal quality to that indicated on the drawings or specified for new work.

3.09 CLEAN-UP

Rubbish and debris resulting from work of the various Divisions and Sections of the specifications shall be collected and disposed of by the CONTRACTOR at legal disposal areas away from the project site. Clean up and remove from premises all debris accumulated from operations from time to time and as directed by the Engineer. Permission to provide on-site trash containers shall be subject to the STATE's approval and shall be placed where directed by the Engineer.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01019 - GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

Work shall consist of furnishing all labor, tools, materials and equipment necessary and required to construct in place complete all work as indicated on the drawings and as specified herein.

1.02 GENERAL

A. Construction Lines, Levels and Grades: The CONTRACTOR shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Project Contact Person as defined in the section, "Definitions," and any change shall be made in accordance with his instruction. Whenever the term "Project Contact Person," is used hereinafter it shall be defined as in the section, "Definitions," of this solicitation. The CONTRACTOR shall not be entitled to any payment if CONTRACTOR fails to report the discrepancies before proceeding with any work whether within the area affected or not.

B. Examination of Premises: The CONTRACTOR shall contact the Project Contact Person and obtain permission before visiting the site.

C. Conditions at Site: Each bidder on this project is expected to visit the site and examine the conditions and satisfy himself as to the character and amount of the work to be performed as indicated on the drawings and called for by the specifications. No additional compensation will be granted because of the lack of knowledge of such conditions.

D. Disruption of Utility Services: All work related to the temporary outage of the electrical system, water system, and outages that would affect STATE operations shall be pre-arranged with the Project Contact Person so that any disruption of such services will be kept to a minimum. The CONTRACTOR shall provide in writing to the Project Contact Person a request for any temporary utility disconnection a minimum of five (5) working days in advance of said disconnection. In event temporary power hook-up is required, the CONTRACTOR shall provide the necessary services.

E. CONTRACTOR's Operations

1. The CONTRACTOR must employ, insofar as possible, such methods and means of carrying out his work so as not to cause any interruption or

interference to the facility's operations. Where the CONTRACTOR's operations would result in interruptions that would hamper the operations of the facilities, the CONTRACTOR shall rearrange his schedule of work accordingly.

2. The CONTRACTOR shall maintain safe passageway to and from the Foreign Trade Zone No. 9 facility and other tenant occupied spaces for Foreign Trade Zone No. 9 personnel, their tenants and the public at all times.

F. Utility Services

1. Telephone: No telephone service is available at the project site.

2. Water and Electricity

a. The CONTRACTOR shall be responsible for providing its own power source and paying all costs associated with its electrical consumption.

b. The CONTRACTOR may use the STATE's existing water source.

G. Parking Policy for CONTRACTOR:

1. The CONTRACTOR and his employees will not be allowed to park in zones assigned to facility personnel members.

2. Areas to be used by the CONTRACTOR shall be as designated by the Project Contact Person or as described in the SPECIAL CONDITIONS.

H. Toilet Accommodations: The CONTRACTOR may use the existing building toilet facilities but they have to maintain them in a sanitary condition at all times.

I. Protection of Property: The CONTRACTOR shall continually maintain adequate protection of all its work from damage and shall protect all property that may be affected by the CONTRACTOR's work, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. The CONTRACTOR shall repair, replace or pay the expense of repair of damages resulting from his fault or negligence.

J. Use of Power Driven Equipment: The CONTRACTOR is cautioned to take all necessary safety precautions to protect the facility personnel, tenants, and the public whenever power driven equipment is used.

K. Safety:

1. The Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, effective May 16, 1972, as amended, is applicable and made a part of the Agreement by reference.

2. The CONTRACTOR shall carefully read and strictly comply with its requirements.

L. Clean Up of Premises: The CONTRACTOR shall clean up and remove from premises all debris accumulated from the daily operations so as to be in compliance with federal, state, and county safety and health standards.

M. Responsibility:

1. The STATE shall hold the CONTRACTOR liable for all the acts of Subcontractors and shall deal only with the primary CONTRACTOR in matters pertaining to other subcontractors employed on the job. The CONTRACTOR shall be responsible for coordinating the work of all subcontractors on the job.

2. Should the CONTRACTOR discover any discrepancy in the plans of specifications, the CONTRACTOR shall immediately notify the Project Contact Person before proceeding any further with the work, otherwise, the CONTRACTOR shall be held responsible for any cost involved in correction of work placed due to such discrepancy.

N. Cooperation With Other Contractors: The STATE reserves the right at any time to contract for or otherwise perform other or additional work within the Agreement zone limits of this Agreement. The CONTRACTOR of this project shall to the extent ordered by the STATE, conduct his work so as not to interfere with or hinder the progress or completion of the work performed by other Contractors.

O. Division of the Work: The Divisions and Sections into which these Specifications are divided shall not be considered an accurate or complete segregation of work by subcontractors. This also applies to all work specified within each Section.

P. Plans and Specifications:

1. The CONTRACTOR shall not make alterations in the drawings and specifications. In the event the CONTRACTOR discovers any errors or discrepancies, the CONTRACTOR shall immediately notify the Project Contact Person. In case of a conflict between the project specifications and the "General Conditions" the project specifications shall govern. In case of a conflict between the project specifications and the project drawings the project drawings shall govern.

2. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.

3. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the CONTRACTOR shall", "as shown of the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

Q. Required Submittals:

1. Required submittals as specified in the Technical Sections of these specifications include one or more of the following: Shop drawings; color samples; material samples; technical data; schedules of materials; schedules of operations; guarantees; operating and maintenance manuals; and as-built drawings.

2. The CONTRACTOR shall make a comprehensive list of the required submittals, by Specification Section, and submit this list to the Project Contact Person within 15 calendar days after award of the Agreement.

3. As-Built Drawings: When as-built drawings are required for submittal, the following shall apply:

   a. As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required.

   b. To accomplish this, all authorizations given by the Project Contact Person to deviate from the plans shall be drawn onto the original tracings by the CONTRACTOR.

   c. Original tracings for this purpose shall be furnished to the CONTRACTOR by the STATE upon the written request of the former at any suitable time.

   d. All deviations from alignments, elevations and dimensions which are stipulated on the plan shall be recorded on the as-built drawings.

   e. The following procedure shall be followed:

      1. Immediately after these changes are constructed in place, the CONTRACTOR shall record them on the field office plans. This is to assure that changes are recorded before they are forgotten.

2. Within two weeks after final inspection of the project, the CONTRACTOR shall transfer the changes marked on the field office plans onto the original tracings using a red pencil. Any deletions shall be eradicated from the tracings and redrawn as necessary. The CONTRACTOR shall stamp or mark the tracings "AS-BUILT", and also sign and date each drawing so marked.

3. The CONTRACTOR shall submit the as-built drawings together with the marked-up field office plans to the Project Contact Person prior to closing.

4. Any as-built drawing which the Project Contact Person determines does not accurately record the deviation shall have the deviation corrected by the CONTRACTOR and the CONTRACTOR shall be charged for the services.

1.03 DESCRIPTION OF WORK

The work to be performed under this Agreement shall consist of, but not limited to, the construction of a mezzanine space addition for offices, utility room and toilet rooms, a warehouse space at ground level for work shops and wine storage, and a stairway; construction of new chiller units, equipment pad and chain link fence; installation of an air conditioning system; modification of existing air duct and water piping system; replacement of existing fan coil units; addition of new fan coil units and fire sprinkling system and incidental related works.

1.04 WORK CONDUCT

A. The CONTRACTOR shall perform all services in a safe and efficient manner. The CONTRACTOR shall employ the best methods to provide services as specified herein. The CONTRACTOR shall further assure that the performance of work specified herein shall be in complete compliance with any applicable rules and regulations of all federal, State and local governmental agencies. The CONTRACTOR shall

1. Accomplish all work in accordance with the City and County of Honolulu, Department of Public Works "Standard Specifications for Public Works Construction," dated September 1986, and "Standard Details for Public Works Construction," dated September 1984 and all supplements and amendments made thereto.

2. Proceed with the work described herein upon notification by the STATE.

3. Compare Agreement documents with work in place, keep informed of existing conditions, the conditions to be encountered in performing the work, and the requirements of any plans and specifications.

4. Allow for difficulties and contingencies to be encountered.

5. Employ, insofar as is reasonably possible, such methods and means of carrying out its work so as not to cause any interruption or interference to the STATE ‘s operations.

6. The STATE reserves the right at any time to contract for or otherwise perform other or additional work within the Agreement zone limits of this Agreement. The CONTRACTOR of this project shall to the extent ordered by the STATE, conduct CONTRACTOR’s work so as not to interfere with or hinder the progress or completion of the work performed by other CONTRACTORS.

1.05 WORK PERFORMANCE

A. The CONTRACTOR shall be solely responsible for the satisfactory completion and quality of all work performed as determined by STATE.

1. The STATE shall hold the CONTRACTOR liable for all the acts of its employees.

2. Should the CONTRACTOR discover any discrepancy in the specifications, the CONTRACTOR shall immediately notify the STATE Project Contact Person before proceeding any further with the work, otherwise, the the CONTRACTOR shall be held responsible for any cost involved in correction of work placed due to such discrepancy.

3. Specifications may be prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as “the CONTRACTOR shall”, “as shown on the drawings”, “a”, “an”, and “the” are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

1.06 SAFE PERFORMANCE OF WORK

A. The CONTRACTOR shall exercise care and shall provide all necessary protection to prevent injury and/or damage.

B. The CONTRACTOR shall be required to protect the occupants, the general public STATE workers, FTZ No. 9 tenants, and the Engineer from any unsafe conditions during the performance of services and/or as a result of the services.

C. The Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, effective May 16, 1972, as amended, is applicable and is incorporated herein by reference. The CONTRACTOR shall carefully read and strictly comply with its requirements.

D. The CONTRACTOR shall provide all traffic control and shall supply all signs, cones, barricades and other devices necessary to secure and maintain the safety of the site in conformance with the "Manual on Uniform Traffic Control Devices for Streets and Highways," and to the satisfaction of the STATE.

1.07 QUALITY CONTROL AND INSPECTIONS

A. QUALITY OF WORK

The CONTRACTOR shall perform all services in a safe and efficient manner. The CONTRACTOR shall employ the best methods to provide services as specified herein. The CONTRACTOR shall further assure that the performance of work specified herein shall be in complete compliance with any applicable rules and regulations of all federal, state, and local government agencies. The CONTRACTOR shall be solely responsible for the satisfactory completion of all work performed as determined by STATE.

B. STATE'S INSPECTIONS

The STATE's designated representative or Officer-In-Charge (OIC) reserves the right to inspect CONTRACTOR's job performance at any time. The STATE's designated representative may require CONTRACTOR to accompany him or her in conducting inspections.

C. APPROVALS

Any and all approvals granted by the STATE's designated representative and/or the Engineer shall not be construed to relieve the CONTRACTOR of its responsibility for the work performed in accordance with the Agreement between the CONTRACTOR and the STATE.

1.08 TIME SCHEDULE

A. TERM OF AGREEMENT

The Agreement shall commence on or about March 1, 2004 and shall be completed within four hundred thirty (430) calendar days.

B. TIME SCHEDULE

All work specified in this solicitation shall be completed within the period of time described herein.

C. NON-PERFORMANCE OF WORK OR LATE DELIVERIES

In the event the CONTRACTOR fails, refuses or neglects to perform the services in accordance with the requirements of this solicitation, the STATE reserves the right to purchase in the open market, a corresponding quality of the services specified herein and to deduct from any moneys due or that may thereafter become due to the CONTRACTOR, the difference between the prices named in the Agreement and the actual cost thereof to the STATE. In case any money due the CONTRACTOR is insufficient for said purpose, the CONTRACTOR shall pay the difference upon demand by the STATE. The STATE may also utilize all other remedies provided by law.

1.09 COMPENSATION

A. Award shall be made to the responsive and responsible bidder submitting the lowest price within ninety (90) calendar days of said award.

B. The CONTRACTOR shall not proceed until receipt of written Notice to Proceed. Notice to Proceed shall be issued by the STATE no later than thirty (30) days after the full execution of the Agreement. Payments shall be made on a monthly basis upon the CONTRACTOR's submittal of an original invoice with details on the work performed as specified herein and STATE approval of said invoice. The CONTRACTOR shall submit said invoice at the beginning of the month for work satisfactorily completed the previous month.

C. Payments shall be made on a monthly basis upon the CONTRACTOR's submittal of an original invoice with details on the work performed as specified herein and STATE approval of said invoice. The CONTRACTOR shall submit said invoice at the beginning of the month for work satisfactorily completed the previous month. Five percent (5%) shall be withheld from each invoice as retainage for the payment of the initial fifty percent (50%) of the total Agreement amount. Retainage shall not be released until all closing documents, including a tax clearance is approved by the STATE.

D. CONTRACTOR shall be responsible for payment of all fees including, but not limited to, permit fees, coordination of meetings; including regulatory meetings, inspections, and surveys.

E. The Awardee shall be required to obtain a current tax clearance from the State of Hawaii Department of Taxation and the Internal Revenue Service prior to entering into a Agreement with the STATE and again to receive final payment.

F. If any work is not in full compliance with these specifications, the CONTRACTOR shall make all necessary corrections to the full satisfaction of the STATE and at no additional cost to the STATE. The CONTRACTOR shall perform corrective work within the period allowed by the STATE's designated representative or OIC.

END OF SECTION

SECTION 01715 - EXISTING CONDITIONS - ASBESTOS / LEAD / HAZARD MATERIAL SURVEY

PART 1 - GENERAL

1.01 SUMMARY

A. The STATE's most recent survey report for asbestos materials may be viewed at the STATE's office at Pier 2. The survey report is by no means inclusive and is for general information only and the STATE is not responsible for any of the information provided, the CONTRACTOR is responsible to perform further survey to confirm the presence of hazardous materials.

B. The hazardous material survey, abatement design, abatement work, air monitoring of the hazardous materials, and obtaining review and approval by the State Department of Health shall be performed by the CONTRACTOR. These works shall be broken down in accordance with the base work and alternate additive work areas Zone 1, Zone 2 and Zone 3.

1.02 ASBESTOS

A. The structure or structures to be renovated or modified under this contract were surveyed for the presence of asbestos containing building materials (ACBM), using AHERA requirements. The CONTRACTOR may obtain a copy of the most recent survey report, as well as any subsequent supplemental survey report(s) if performed, from the STATE.

1. The report(s) are made available for the CONTRACTOR's information only. Review the report(s) for the basis on which the negative ACBM finding was made. The CONTRACTOR shall perform further surveys at his own expense, if ACBM not shown in the report(s) is suspected in the areas of the building(s) in which work will be performed. If ACBM is found, the CONTRACTOR shall notify the Engineer immediately.

2. ACBM found in areas other than those areas which require abatement shall not be disturbed in any way.

B. Notify employees, subcontractors and all other persons engaged on the project of the presence of asbestos in the existing buildings in accordance with the requirements of Chapter 110, Article 12-110-2 (f) (1) (B) of the Occupational Safety and Health Standards, State of Hawaii.

1.03 LEAD CONTAINING MATERIALS

A. Inform employees, subcontractors and all other persons engaged in the project that lead containing materials may be present in the existing building(s) and at the

job site. CONTRACTOR shall perform further surveys at his own expense. Follow the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 148 (Lead Exposure in Construction), Hawaii Administrative Rules.

1.04 POLYCHLORINATED BIPHENYLS (PCB's), MERCURY, TERMITICIDES, CHLORDANE, DIELDRIN

A. Inform employees, subcontractors and all other persons engaged in the project that PCBs, mercury, termiticides, chlordane, dieldrin etc. may be present in the existing building(s) and at the job site and PCBs and mercury may have contaminated the lighting fixtures in the Building. The CONTRACTOR shall perform further surveys at his own expense. Perform all work which disturbs the contaminated materials follow the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Hawaii Administrative Rules for such substances.

PART 2 - MATERIALS (Not Used)

PART 3 – EXECUTION

3.01 SURVEY REPORT

A. Asbestos-containing materials survey report prepared by Muranaka Environmental Consultants, Inc. dated January, 2003 is available for viewing at the STATE's office at Pier 2.

END OF SECTION

DIVISION 2 – SITE WORK

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Selective demolition includes, but is not limited to selective removal and subsequent disposal of all materials indicated to be removed.

B. The extent of selective demolition is indicated on Drawings.

C. Related Sections include the following:

1. Section 01019 - GENERAL SPECIFICATIONS.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the State's property, demolished materials shall become the CONTRACTOR's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Proposed Dust-Control Measures: Submit to the Engineer a statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate. All submittals are subject to the STATE's approval.

B. Schedule of Selective Demolition Activities: Submit for STATE approval a schedule with the following items:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

2. Interruption of utility services.

3. Coordination for shutoff, capping, and continuation of utility services.

C. Landfill Records: Provide the STATE with copies of all documents required to design, abate, remove and dispose of all hazardous materials. Said design,

abatement, removal, and disposal of said hazardous materials shall be accomplished in accordance with all applicable environmental federal, state, and county laws, rules and ordinances and Contractor shall obtain the approval from the State Department of Health..

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Obtain all necessary documents required from the State Department of Health (DOH) to ensure compliance with governing Environmental Protection Agency (EPA) notification regulations before beginning selective demolition. Provide the STATE with copies of all documents. Comply with hauling and disposal regulations of authorities having jurisdiction to include federal, State and County agencies.

B. Standards: Comply with ANSI Al0.6 and NFPA 241.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.

3.02 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by the STATE's Designated Representative. Provide temporary services during interruptions to existing utilities, as acceptable to the Engineer and to authorities having jurisdiction.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

1. The CONTRACTOR shall notify the Engineer a minimum of five (5) working days prior to shutting off the utilities to areas to be selectively demolished.

2. Upon the STATE's written approval the CONTRACTOR shall proceed to shut off the utilities to areas to be selectively demolished.

3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.

4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

D. Utility Requirements: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without written permission from the STATE's Designated Representative. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by STATE's Designated Representative.

3. Protect existing site improvements, appurtenances, and landscaping to remain.

4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent bonded warehouse and

facilities to remain. In addition, the CONTRACTOR shall refer to Section 01020 – General Project Requirements – provision 3.06, "Barricade." The CONTRACTOR shall:

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Temporary facilities shall be accessible as required per HRS §103-50 with emphasis addressing ADAAG's Section 4.3.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, as required by engineered shoring sequence.

2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly.

10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Removed and Salvaged Item: Carefully remove and salvage roll-up coiling door, frame and operator indicated to be salvaged in the Drawings. Deliver to location as directed by the Engineer.

C. Existing Items to Remain: Protect construction indicated to remain against

damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

D. Concrete, demolish in small sections: Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

E. Concrete, demolish in sections: Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

F. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

G. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.06 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Where damage has occurred to finished concrete or stucco finishes designated to remain, repair to paint ready condition with finishes to match existing.

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off the property and legally dispose of them.

END OF SECTION

SECTION 02444 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish materials, labor and equipment necessary to install all chain link fences and gates to the limits shown and as detailed on the plan and as specified herein.

1.03 SUBMITTALS

A. Shop Drawings: Submit for fabrication and installation of chain link fences and gates. Include details of each fence type, elevations of gate design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Chain Link Fence Fabric shall be 2-inch mesh unless otherwise shown or specified, be galvanized and conform to ASTM A392, Class 1. The hot-dipped galvanized fabric shall contain not less than 1.2 ounces per sq. ft. of uncoated wire surface as determined by stripping test ASTM A90 and under the PREECE Test (ASTM A239), shall withstand 6 or more 1-minute dips before reaching the end point. All fabric shall be free from barbs, icicles or other hazardous projections resulting from galvanizing. Aluminum clad fabric shall be an acceptable alternate to the hot-dipped galvanized fabric provided it is of the same gauge as the latter.

B. Tie Wire shall be 12-gauge (9 gauge for gates) soft annealed galvanized steel wire as called for on plans.

C. Tension Bar shall be 1/4" thick by 3/4" wide mild steel bar for attachment of a fabric to a terminal post.

D. Brace Band shall be formed from steel bands at least 1/8" thick by 3/4" wide.

E. Tension Band shall be formed from steel bands at least 12 gauge thick by 3/4" wide.

F. Tension Rod shall be a 3/8" dia. mild steel rod threaded at one end and hooked 180 degrees at the other.

G. Fittings:

1. Post Cap and Eye Top shall be of one-piece cast iron construction and shall attach securely onto their respective posts.

2. Coupling for top rails shall be outside sleeve type, at least 6 inches long and crimped at center.

3. Rail Ends shall be snug, one-piece fittings for top and brace rails with holes to receive 5/16" bolts for securing to rail end bands.

4. Double Rail End shall be similar to rail and except for an additional 1/2" hole to receive the hooked end of a tension rod.

H. Composition and Finish of Metal Parts: All metal parts and fittings, including tracks, gate hardware and frames, shall be of steel, malleable iron or wrought iron and shall be galvanized by the hot-dip process, after fabrication, in conformance with ASTM A153. The coating on all parts shall be continuous and smooth; that is, free from barbs, icicles or other projections. Bolts may be stainless steel.

I. Gate Hardware:

1. Hinges shall be heavy duty offset type permitting 180-degree swing using double clamping method of attachment and manufactured or forged malleable iron. All hinges shall be of appropriate size and capacity for the particular gate being supported and/or operated.

2. Unless otherwise shown or specified, padlocking provisions for walk gate shall be a fork latch assembly, and that for a drive gate shall be an industrial drop rod guide and latch assembly as detailed in the plans.

3. Padlock shall be 5-pin cylinder type with brass case and a 5/16" dia. hardened steel shackle. Padlocks shall receive cylinders by Saltz Locksmith and shall be keyed differently but masterkeyed to the building masterkeying system. Two (2) keys per lock shall be provided by the CONTRACTOR.

J. Posts, Rails and Braces shall be of either standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A120 or hot-dipped galvanized pipes with chromate conversion and polyurethane coatings ("Tuf 40" by American Tube Co., Inc. or approved equal). Posts of the latter type of pipes shall be sized in accordance with and have the minimum properties shown in the table below. Additionally, Tuf 40 type pipes shall not be used where welded pipe frames are called for.

Dimensions and Weights of Tuf 40 Steel Pipe Posts

Post Type/Fence Ht. (*/ft.)	Nom.Dim. (in.)	O.D. (in.)	I.D. (in.)	Weight (lbs/ft)
Rails only	1-5/8	1.660	1.440	1.82
L/4	1-7/8	1.900	1.660	2.28
L/6-8; T/4	2-3/8	2.375	2.115	3.12
L/10,12; T/6-8	2-7/8	2.875	2.555	4.64

*L - Line posts; T - Terminal posts

K. Tension Wire shall be of 7-gauge coiled spring or 6-gauge plain galvanized wire.

L. Concrete for post footings shall be Class 2500 as specified in Section 03300.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. General:

1. Metal fencing and gates of the various types called for shall be erected in strict conformance with the plans and these specifications. The gates and hardware shall provide intended freedom of operation. Posts shall be plumb and in line. Welding shall be done in accordance with latest AWS standards. However, no splicing of posts, rails or braces shall be accepted. Where changes in line occur with an angle of deflection of 30 degrees or more, the change point will be considered a corner and a corner post shall be installed thereat. End, corner, and gate posts for fences with 5-foot and wider fabric shall be braced to the nearest line post with horizontal braces and tension rods. The horizontal braces shall be spaced midway between top rail and ground and securely fastened to posts as shown on plans. Where fencing is placed along a curve with radius of 50 feet, or

less, horizontal braces (and tension rods) shall be installed between all posts in like manner. Pull posts, at maximum intervals of 300 feet, shall be braced and trusses in both directions as specified above.

2. Field Touch-Ups: Field welds shall be cleaned of flux and spatter and all damaged galvanizing removed, all hazardous projections ground off, properly prepared, and then heavily coated with self-curing inorganic zinc coating. Manufactured coatings shall be applied in strict accordance with manufacturer's printed specifications. Damage to existing painted surfaces shall be touched up.

B. Fence Posts, except as otherwise indicated or specified, shall be spaced not more than 10 feet apart. In curved fence sections having a radius of 50 feet or less, the posts shall be spaced as shown on the plans. Line posts shall be set so that top of the eye tops shall be at the same height as the fence fabric.

C. Top Rails shall pass through and bear firmly on base of eye tops, form a continuous brace from end to end of each stretch of fence, and be securely fastened to terminal posts with rail ends and brace bands. Couplings for the top rails shall be installed at intervals of 24 feet maximum.

D. Chain Link Fabric shall be fastened on the side of the posts as designated and shall be mounted on the posts so that the bottom of the fabric will be no more above the finished grade than called for on the plans. High points of the ground shall be excavated as necessary. The fabric shall be stretched taut and securely fastened to the posts. Ends of wire ties shall be bent back so as not to be a hazard. Between posts the top edge of the fabric shall be fastened to the top rail and the lower edge to the tension wire with tie wire of size and at spacing as called for on the plans. Tension wire shall be stretched tight and shall be installed in a straight line between posts. Tension bars extending the full height of the fence and tension bar bands shall be used for fastening fabric to end, corner, pull and gate posts. Bolted tension bar bands shall be placed at top and bottom of tension bars and spaced at 12-inch intervals. Fastenings to line posts shall be made with tie wire of size and at spacing as called for on the plans.

E. Gates shall be of size specified in plans. The corners of gate frames shall be fastened together and reinforced with malleable iron fittings or by welding as approved. Welds shall all be ground smooth. Where sizes permit, frames shall be galvanized after fabrication, otherwise all welds shall be finished as specified for touching up abrasions and field welds. All drive gate frames for fences 4 feet and higher and walk gate frames for 6-foot high fences shall be cross-trussed with tension rods welded to frame at hooked end. Fabric specified for the fence shall be attached to the sides of the gate frame with full-height tension bars and tension bar bands at top, bottom and 12 inches ±o.c. along tension bars with 9-gauge tie wires shall be placed along the top and bottom

of the gate at corners and 6 inches ±o.c. in between. The gates shall be hung by at least two hinges. For the drive gates, latches of the crop rod type shall be provided and shall be of the full gate height, arranged to engage the gate catch. For walk gates, a forked latch may be provided. Catch for the drop rod shall be galvanized pipe and set in concrete. Gate hold-backs shall be positioned to secure and support the free end of the gate in full open position and/or as shall be accessible from both sides of the gates.

3.02 FINAL CLEAN-UP

A. All exposed metal surfaces shall be clean and free of cement. All surplus earth resulting from metal fencing work that is not used in the grading work shall be cleaned up and disposed of off-site. All debris resulting from work of this section shall be removed from the site.

END OF SECTION

SECTION 02362 - SOIL TREATMENT FOR VEGETATION CONTROL

PART I - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. This work shall consist of spraying weed killer on the prepared subgrade prior to the installation of the base course.

1.03 SUBMITTALS

A. Prior to the start of work, the CONTRACTOR shall submit to the Engineer the material product data and Material Safety Data Sheets for the material proposed for use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Weed Killer shall be "Casoron 4G", "Norosac 4G", or an approved equal for under asphalt application on new or rebuilt pavement, and shall be "Hyvar X", "Roundup" or approved equal for application to existing weeds for resurfacing jobs.

PART 3 - EXECUTION

3.01 APPLICATION

A. The under asphalt weed killer shall be mixed and uniformly spread using calibrated application equipment at the maximum rates permitted for “under asphalt” use and in strict accordance with the manufacturer’s label. Base course material shall be installed as soon as possible after applying the weed killer to preclude loss of germination inhibiting action.

B. In treatment of existing growth on resurfacing jobs, the weed killer shall be mixed and uniformly sprayed in strict accordance with the manufacturer’s label.

C. Nut grass shall be retreated two (2) days after initial application and again if growth still exists.

D. The CONTRACTOR shall notify the Engineer a minimum of forty-eight (48) hours before application of weed killer.

END OF SECTION

SECTION 02281 - SOIL TREATMENT FOR TERMITE CONTROL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Soil directly under concrete slabs and footings shall be treated against subterranean termites by a pest control operator licensed by the Hawaii State Pest Control Board in Branch #3 and certified as a commercial applicator under the Hawaii Pesticide Law by the Hawaii State Department of Agriculture in category 7b.

B. The CONTRACTOR shall notify the Engineer a minimum of two (2) work days before application of chemicals.

C. A totalizing meter shall be provided to determine application rates and to indicate the total volume of pesticide applied in U.S. gallons. The meter shall be no more than five feet from the applicator at all times.

D. Pumping equipment shall be a type normally used and be capable of pumping the working solution in a manner accepted and practiced by the pest control industry.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit to the Engineer for approval six (6) copies of the label for the chemical he proposes to use.

1.04 GUARANTEE

A. The CONTRACTOR shall furnish a written warranty in three (3) copies to the STATE stating that:

1. The chemical concentration, rates and method of application complied with these specifications;

2. The effectiveness of the treatment is guaranteed for a period of not less than two (2) years from the date of final application of the treatment;

3. All necessary repairs of damages resulting from subterranean termite infestation within a period of one (1) year from the date of project acceptance will be made at the CONTRACTOR's own expense up to a total cost of $5,000.00 as verified through cost breakdown in accordance with Section 1020, Paragraph 1.01, F. "Force Account Work" of the General Project Requirements. and submitted to the Engineer; and

4. If subterranean termite infestation should occur through the treated area within the two (2) year guarantee period, the soil shall be re-treated to exterminate all infestation without cost to the STATE as stipulated below. The application rates shall be as given by the label of the chemical being used. All corrective treatments shall be performed to at least 10 feet around each visible subterranean termite activity including cost for ACM abatement work for existing asphalt pavement below the slab.

   a. Working pressure while applying treating solution shall be held to that which is applicable to and safe under the conditions at the site being treated.

   b. Drill one hole per block along one course above adjacent grade of hollow tile walls which extend below grade, and treat at a rate consistent with the pesticide label.

   c. Remove carpets from areas being treated.

   d. Drill and treat through all interior concrete floors, along both sides of all partitions and walls, and all cracks and expansion joints according to label directions. Drill holes through concrete slab shall be 1/2" or 9/16" dia. and spaced not more than 18 inches apart.

   e. Drill one hole at each plumbing or utility penetration through ground floor slab and treat according to label instructions.

   f. Patch drill holes with cement/concrete to full depth of slab thickness and refinish walls/floors as necessary to prevent any backflow and to restore original appearance.

   g. Re-install carpets as applicable/necessary. Installation shall be done by a competent commercial carpet installer.

   h. Replace any finish/finish materials which are contaminated by spilled chemicals.

5. The above-ground areas infested with subterranean termites shall be treated as appropriate with aproven, effective insecticide to eliminate those termites.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Chemicals shall be aqueous solutions of Type I repellant termiticides such as Prelude, Dragnet SFR, Demon TC or Prevail FT or the Type II non-repellant termiticide Premise 75. The chemicals shall be used in accordance with the labels and provisions related to the use of those pesticides as adopted by the Hawaii Pesticide Law, Chapter 149A, HRS, and the Federal Insecticide, Fungicide and Rodenticide Act.

B. The Type II non-repellant termiticides Durban TC shall not be used.

PART 3 - EXECUTION

3.01 APPLICATION AND RATES

A. The solution shall be applied uniformly and at the maximum rates permitted on the label for the chemical being used.

B. Treatment shall include the provision of vertical barriers as stated on the product label. Treatment shall extend down to the top of the footing.

C. Whenever possible, the solution shall be applied not more than 24 hours before the pouring of concrete over the affected area.

Where a treated area that is not scheduled to be covered with a moisture barrier in the finished construction (e.g. lanai area) cannot be covered with a poured concrete slab the same day, the area shall be protected with a waterproof covering such as polythelene sheeting.

D. The solution under slabs shall be applied after backfill has been completed and rough plumbing and other utility lines have been installed. The treatment shall be applied to dry material whenever possible, but in any case shall not be applied under conditions during which the soil does not readily absorb the solution.

END OF SECTION

SECTION 02260 - FINISH GRADING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish all labor, materials, tools and equipment necessary for completing finish grading work as indicated on the Drawings and as specified herein.

PART 2 - PRODUCTS

2.01 SURFACE MATERIAL

A. Surface material from grading operation shall be removed and disposed offsite.

PART 3 - EXECUTION

3.01 FINISH GRADING

A. Existing outdoor landscaping areas around the equipment pad shall be graded to finish grades and contours with allowance for depth of top soil in the landscaping areas.

B. Top soil fill overlayment shall not be installed until buildings, walks, and other site work are substantially completed. Rake and spread to finish grade which shall blend continuously with surrounding land and be carefully sloped to drain away from building. Re-plant ground cover immediately after topsoil is installed.

END OF SECTION

SECTION 02100 - SITE PREPARATION AND EARTHWORK

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish all labor, materials, tools and equipment necessary for excavation, filling, backfilling, rough and finish grading, trench excavation and backfill for utility lines, and related items necessary to complete all work shown on the Drawings and/or specified herein.

B. The CONTRACTOR shall be responsible for protection of all existing structures, service and utility lines, air conditioning ducting and equipment. The CONTRACTOR shall install all bracings, supports, shoring and underpinning as necessary to avoid any damages done to the adjacent and adjoining properties. Modify existing structure, utilities, fire sprinkling pipe on the way of construction. Cost for all supporting, modifications and connections shall be borne by the CONTRACTOR.

C. The CONTRACTOR shall be responsible to perform and pay for all compaction tests required by this Section.

D. During the excavation, the CONTRACTOR shall at his own expense retain the services of a geotechnical engineer licensed in the State of Hawaii to observe the soil condition, and confirm the allowable bearing capacity of the soil beneath the footings and for test for compactions of each lift. Should the compaction test not meeting the requirement of at least 95% of its maximum dry density established by ASTM Test Method D-1557 (Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort), CONTRACTOR shall re-compact the footing foundation until re-compaction satisfied the requirement. Should the subsurface conditions are inconsistent with the findings of the soil and foundation investigation by Geolabs-Hawaii dated February 14, 1979, and/or load capacity of soil beneath the footings is found to be less than the design load bearing capacity of 2,000 pound per square foot, the CONTRACTOR shall notify the Engineer in writing for any inconsistency and under capacity of soil bearing test, the CONTRACTOR shall submit proposal for any redesign work to remedy the inconsistency to the Engineer for review and approval.

1.03 COORDINATION WITH OTHER SECTIONS

A. Demolition and removal and clearing and grubbing are specified in Section 02070 - SELECTIVE DEMOLITION.

B. Soil treatment for termite control is specified in Section 02281 - SOIL TREATMENT FOR TERMITE CONTROL.

C. Soil treatment for vegetation control is specified in Section 02362 - SOIL TREATMENT FOR VEGETATION CONTROL.

D. Concrete work, electrical work and mechanical work are specified in their respective sections.

1.04 ORDINANCES AND PERMITS

A. The CONTRACTOR shall comply with all applicable ordinances and regulations and obtain the required permits.

1.05 EXISTING UTILITY LINES

A. The existence of active and abandoned underground utility lines and location of existing footing within the construction is not definitely known, the CONTRACTOR shall survey the area for above surface elements and tone the area for underground utilities elements prior to all excavation and trenching.

B. Should any unknown utilities line be encountered during excavation, the CONTRACTOR shall immediately notify the Engineer of such discovery. Any line damaged by the CONTRACTOR that can be observed or found by toning shall be repaired by the CONTRACTOR at no cost to the STATE. The Engineer shall investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Engineer only as he deems necessary.

1.06 IRRIGATION LINES AND SPRINKLING HEADS

A. Existing irrigation lines and sprinkler heads are not definitely known other than those existing above grade sprinkling heads, the CONTRACTOR shall excavate, cap, remove and relocate existing irrigation lines and sprinkler heads away from new construction. All irrigation work should be conformed to the City and County of Honolulu, Department of Parks and Recreation Standard Details.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Yard Fill: Fill and backfill for equipment pad shall be imported material and shall be non-expansive, free from debris, perishable or combustible materials, sod, stones not larger than 2-inches in maximum dimension, with no less than 15% passing the No. 200 sieve.

B. Structural Fill: New structural fill shall be select imported borrow material, meeting the requirements of Select Borrow for Subbase Course in Section 30 of the DPW Standard Specifications.

C. Base course under concrete slabs and ramp on grade where existing asphalt concrete is removed shall consist of a six (6) inch layer of aggregate base course in accordance to the DPW Standard Specifications Section 31 - Aggregate Base Course and compacted in one lift to not less than 95% of its maximum density.

D. Topsoil: Imported topsoil for planting area around equipment pad shall be fertile, friable soil of loamy character, free from subsoil, debris and stones. Topsoil excavated in connection with the construction of the project may be used in lieu thereof.

PART 3 - EXECUTION

3.01 LAYING OUT

A. Should any discrepancies be discovered in the dimensions given in the plans, the CONTRACTOR shall immediately notify the Engineer before proceeding any further with the work, otherwise, he will be held responsible for any costs involved in correction of construction placed due to such discrepancies.

3.02 SITE PREPARATION

A. Prior to the start of the grading operations, the areas designated for new construction shall be cleared and grubbed of all aboveground vegetation, debris and other deleterious materials, which shall be removed for disposal off-site. This material shall not be used in engineered fills. Any soft or loose spots encountered during stripping operations shall be removed and the resulting depression shall be backfilled in accordance with these recommendations.

B. Wherever the footings and slabs stand on other than undisturbed asphalt concrete pavement footing area shall be excavated to a depth of 2 feet below the bottoms of footings. All building slabs shall be protected by a plastic moisture barrier with minimum lapping joints placed over the existing asphalt concrete pavement or cushion material. The minimum lapping shall be 6-inch. Excavations shall extend at least 2 feet horizontally beyond the edges of footings. Excavations may encounter cobbles and boulders which should be removed at the CONTRACTOR's expenses.

C. Soils in bottoms of equipment pad excavations and in areas to receive fill should be proof-rolled with at least six passes of a roller having a static weight of at least 10 tons traveling no faster than 100 feet per minute. Soft or loose soils that do not readily compact should be removed and replaced with compacted backfill. Exposed soils should be kept continually moist and not be allowed to dry out and crack.

D. Caution must be exercised by the CONTRACTOR during the proof-rolling operation to minimize disturbances to the existing adjacent structure.

E. The proof rolled sub-grade should be compacted to provide a smooth, unyielding surface. Soft or loose soils that do not readily compact should be removed and replaced with compacted structural fill.

F. Backfill under footing should be placed in lifts less than six (6) inches in loose thickness, moisture-conditioned and compacted. Well graded granular material shall be compacted to at least 95 percent of its maximum dry density for every lift as established by ASTM D1557. Non-vibratory footed rollers should be used to compact cohesive soils. The maximum particle size should be 2 inches.

G. Minimum Base Course Design. For concrete slabs outside of the building, the minimum slab thickness shall be six (6) inches, the minimum depth of compacted base course shall be six (6) inches and the minimum depth of compacted granular fill shall be six (6) inches if not on coral rubblestone layer. For concrete slab inside of the building, the minimum slab thickness shall be four (4) inches.

3.03 GRADING

A. The CONTRACTOR shall at all times control the grading around concrete equipment pad so that the ground is adequately sloped to preclude the ponding of water adjacent to and beneath the structures and their foundations. Surface water shall also be directed away from slopes.

B. Grading work shall be monitored by the CONTRACTOR and periodic density tests performed to verify the adequate compaction is consistently achieved by the grading subcontractor.

C. The CONTRACTOR shall at all time monitor the finish grade of existing asphalt concrete around the building. Adjust the length of concrete ramp to provide 2% slope at ramp landing and 5% slope at ramp to the space.

3.04 EXCAVATION

A. Foundation excavations shall be inspected and tested by a geotechnical engineer licensed in the State of Hawaii retained and paid for by the CONTRACTOR prior to the placement of the concrete and steel to verify that the anticipated bearing materials and bearing capacity have been encountered. Any soft spots or boulders encountered during the foundation excavation shall be removed and backfilled in accordance with the grading recommendations by the geotechnical engineer retained by the CONTRACTOR.

B. Blasting as a means of excavation shall not be permitted.

C. Excavated material shall be disposed:

1. Excavated materials shall become the property of the CONTRACTOR and shall be disposed of at a suitable offsite disposal site.

3.05 FILL AND BACKFILL

A. Areas designated to receive fill shall be scarified, to a depth of at least 6-inches, moisture-conditioned to or wet of the optimum moisture content, and uniformly compacted to a minimum of 90 percent relative compaction as determined by ASTM D 1557-91 for a depth of at least six inches.

Fill shall be laid in loose lifts six (6) inches in thickness, and moisture conditioned to or wet of optimum. Fine and coarse-grained soils shall be compacted to at least 95 percent of maximum dry density.

B. In general, fill and backfill operations shall be carried out as follows:

1. Footings, ramps inside building areas, equipment pad, removed tree area outside building area.

2. Trenching backfills including plumbing and air conditioning work shall be placed and compacted in accordance with the grading recommendations by the geotechnical engineer retained by the CONTRACTOR utilizing the appropriate mechanical compactor around and above the pipes. Jetting and ponding of the backfill shall not be allowed.

C. The subgrade below the slabs other than asphalt pavement shall be maintained in a moist condition prior to slab placement to minimize any potential swelling or the subgrade soils.

3.06 INSUFFICIENT EARTH MATERIALS

A. The CONTRACTOR shall import necessary granular base course and structural fill materials without any additional cost to the STATE for structural fill or yard fill in accordance to DPW Specifications to complete grading work.

END OF SECTION

SECTION 02480 - LANDSCAPING

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 WORK INCLUDED

A. Work includes all labor, materials, equipment and incidentals required to complete the landscaping by a licensed landscape contractor as shown on the plans and as herein specified. Grass restoration for existing landscaping areas, removed tree spot and trenches (12" or less in width) for sewers, drains, culverts, electrical ducts, potable water lines, irrigation lines and related appurtenances shall not be required to be done by a licensed landscape contractor.

1.03 EXPLANATION AND, PRECEDENCE OF DRAWINGS

A. For purposes of clarity or legibility, drawings are essentially diagrammatic and although the locations and areas of plant material are drawn to scale, the CONTRACTOR shall make use of all data in all contract documents and shall verify this information at the site.

B. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications.

PART 2 – PRODUCTS

2.01 SOIL PREPARATION (For grass and ground cover planting)

A. General:

1. These specifications shall supersede Sections 50 and 51 "Standard Specifications for Public Works Construction," September 1986, City and County of Honolulu.

2. Soil Testing: Complete soil testing and soil analysis shall be done on all existing on-site soil and/or imported screened soil to be used for landscaping on the site. Soil testing shall be done by the University of Hawaii Cooperative Extension Service or an independent soil engineering laboratory. Soil samples shall be tested for PH and "available" phosphorous, potassium, calcium and magnesium. A test for salinity may be requested upon inspection by the Engineer. The CONTRACTOR shall bear all cost of soil testing.

B. Materials:

1. Commercial fertilizer shall be of the analysis 10-30-10.

2. Lime (Calcium Carbonate) shall be agricultural type acceptable to Engineer.

3. Gypsum (calcium sulfate) shall be agricultural type acceptable to Engineer.

4. Organic Nutrient soil conditioner (humus) shall be Ferto (6-4-2) or Gro-Power Plus (5-3-1) or equal acceptable to Engineer.

5. Organic non-nutrient-soil conditioner shall be Burnt Bagasse Mix or Big "R" Redwood soil conditioner or equal acceptable to Engineer.

C. Soil Amending Application Rates:

1. Organic nutrient soil conditioner shall be applied at the rate of 150 lbs. per 1000 square feet.

2. Organic non-nutrient-soil conditioner shall be applied as recommended by the manufacturer.

3. Addition of Amendments: Addition of commercial fertilizer and amendments shall be in strict accordance to specifications and as determined by the Engineer after submission of soil test report.

4. The CONTRACTOR shall submit copies of all purchase and delivery receipts to the Engineer for all amendments ordered and used on this project.

D. Soil Preparation Procedure:

1. After site grading operations have been completed, shape and fine grade to a smooth fine surface the entire site.

2. Spread amendments on ground in even layers at rates specified in Paragraph 2.01.C, 1, and 2 and incorporate to a depth of 4 inches by rotary hoe method, working over all areas in alternate directions. This soil amending and acceptance procedure shall not be deleted, substituted nor amended in any manner.

3. Drag all areas by mechanical means to break up clods. Remove debris and rocks over 1 inch in diameter by use of a spring tooth harrow with debris screen container. Fine grade to a smooth continuous surface and roll with a lightweight disc roller prior to planting.

2.02 LANDSCAPE PLANTING - TREES, SHRUBS, GROUND COVERS AND GRASS

A. General:

Plant trees, shrubs, ground covers and grass where indicated on the drawings and specified herein.

B. Materials:

1. Imported screened soil: Shall be screened, (1/2-inch screen), natural, fertile, friable soil free of stones, noxious seeds, roots, sticks, weeds, (especially nutgrass), subsoil in any quantity. Red Humic latosol soils or types known as "Palolo Clay" or "Lualualei Clay" are unacceptable. Soil should have satisfactory loam characteristics, and it shall not be screened subsoil.

2. Commercial Fertilizer: Shall be slow release Agriform (20-10-5) tablets or Osmocote (18-6-1 2) polymeric capsules.

3. Organic nutrient-soil conditioner (humus): shall be Ferto (6-4-2) or Gro-Power Plus (5-3-1) or equal acceptable to Engineer.

4. Organic non-nutrient-soil conditioner: shall be Burnt Bagasse Mix or Big "R" Redwood soil conditioner or equal acceptable to Engineer.

5. Stakes for container stock trees shall be 2” x 2” x 8'-0” rough construction grade redwood or treated Douglas Fir; stakes for field grown trees shall be #5 reinforcing bars, 3 feet long minimum or as detailed on drawings.

6. Tree Ties shall be new or used reinforced rubber or plastic hose inserted with #12 gauge pliable galvanized iron wire or commercial ties acceptable to Engineer.

C. Plant Materials:

1. Nomenclature: The names of plants required shall conform to "Gardens of Hawaii" by Marie C. Neal. Names of plants not included therein shall conform to names generally accepted in the local nursery trade. The Engineer shall be the final arbiter in decisions regarding plant identification and nomenclature.

2. Quality and Size: All plant materials shall be uniform and have a habit of growth that is normal for the species and shall be sound, healthy, vigorous and free from insect pests, plant disease and injuries. Trees and shrubs in containers of the size specified shall have sufficient roots to hold earth together intact after removal from containers without being rootbound.

Trees will be straight of uniform shape without damaged, crooked or multiple leader, unless otherwise specified. Trees shall be free of bark abrasions, sunscalds, disfiguring knots or fresh cuts of limbs over 3/4 inch which have not completely calloused.

All materials shall equal or exceed the measurements specified in the drawings which are minimum acceptable sizes. Caliper measurements for trees shall be taken at a point 6 inches above natural ground line for trees up to 4 inches in caliper and at a point 12 inches above natural ground line for trees over 4 inches in caliper. Materials shall be measured before pruning with branches in normal condition.

D. Trees, Shrubs and Ground Cover Procedure:

1. Planting Pits: Reasonable care shall be exercised to have tree and shrub pits dug and soil prepared prior to moving plants to their respective locations for planting to ensure that they will not be unnecessarily exposed to drying elements or to physical damage. The diameter of all plant pits shall be at least twice the diameter of the container. The depth of pits for trees and shrubs shall be sufficient to accommodate the rootball depths when the plant is set plus at least 12 inches clearance for trees and 6 inches clearance for shrubs for prepared soil at the bottom of the pit.

2. Setting Trees: All trees shall be set at such a level that after settlement, the top of rootball shall be approximately 4-6 inches below the finished grade of the surrounding ground. Each shall be set upright and faced to provide the best appearance possible.

3. Planting: Trees shall be planted in the specified backfill which shall be thoroughly settled by watering and tamping. Backfill mix for all trees shall consist of organic non-nutrient-soil conditioner, organic nutrient-soil (humus) and screened soil. MagAmp (7-40-6) shall be mixed in bottom of pits. All soil amendments and screened top soil shall be thoroughly mixed together before being placed in the plant pit. If the on-site soil available from the excavation of planting pits, as herein specified, is insufficient in quantity or of poor quality for backfill, the CONTRACTOR shall provide the necessary additional imported screened top soil. Backfill shall not be packed.

   After backfilling, 6” below the rootcrown, soak pit with water and place the required number of Agriform tablets or amount of Osmocote fertilizer evenly around the rootball, approximately 2 inches from root tips. Slow release fertilizer shall be applied to trees and shrubs at rates as recommended by manufacturer.

Backfill rest of hole with specified backfill mixture. Firm down backfill, but do not pack. Immediately after planting, thoroughly soak planting pit with water.

4. Staking: Trees shall be supported immediately after planting. Container-grown trees shall be secured with stakes.

5. Pruning: Pruning of trees shall be limited to the minimum necessary to remove injured twigs and branches and to compensate for the loss of roots during transplanting but never to exceed one-half of the branching structure.

6. Ground Cover Planting: Plant ground cover in prepared soil only, refer to Paragraph 2.01 Soil Preparation. Plants shall be spaced equally and uniformly at the distance indicated on the plan. Spacings shown on the drawings are triangular, unless noted otherwise. Finish grade shall be smooth and uniform, and drainage patterns and tree water basins shall not be altered. Water and soak ground immediately after planting.

E. Grass Planting:

1. General:

a. The work covered under this section shall include the furnishing of all labor, equipment, materials and incidentals necessary for grass planting or grass restoration, complete in place, in strict accordance with this section of the specifications and applicable drawings.

b. Grass planting shall commence immediately after the soil preparation has been completed and accepted by Engineer.

c. The CONTRACTOR may elect to plant grass by either seeding, stolonizing or hydromulching.

2. Materials:

a. Grass shall be common Bermuda, Cynodon dactylon.

b. Grass seed shall be fresh hulled and meet the following requirements:

Pure Seed	95.0% minimum
Crop Seed	1.0% maximum
Weed	0.5% maximum
Inert Material	5.0% maximum
Germination	85.0% minimum

Grass seeds shall be delivered to the site in unopened, sealed container, labeled with brand name and percent purity. Labeling shall indicate that the seeds passed a certified germination test no more than 12 months prior to use.

c. Grass stolons shall be healthy, living runners 2 inches to 4 inches long with a well developed root system. They shall be freshly cut and free from weeds. Immediately following harvesting, the stolons shall be thoroughly watered then covered and kept moist during storage and transportation until planted.

3. Procedure:

a. Preparation of Planting Area: Refer to 2.01. Soil Preparation.

b. Planting by Seed: Ground surface shall be raked to a smooth even plane, broadcast seeds uniformly by mechanical sower at a minimum rate of 5 lbs. per 1000 square feet. Sow one-half the seeds in one direction and the remainder at right angles to the first direction. The seeds shall be incorporated into the top 1/4 inch to 1/2 inch of soil. After sowing, the seeded area shall be compacted by hand or a cultipacker or mechanical roller weighing 60 to 90 pounds per lineal foot of roller. The area shall be thoroughly and gently watered and kept moist during the germination period.

c. Planting by Stolons: After ground surfaces have been raked to a smooth and even plane, broadcast stolons uniformly by hand at a minimum rate of 6 bushels per 1000 square feet. The stolons shall be incorporated into the top 1/4 inch to 1/2 inch of soil. After broadcasting, the planted area shall then be disked and rolled by a mechanical roller weighing 60 to 90 lbs. per lineal foot of roller to insure close contact of the soil and stolons. Do not roll on wet soil.

d. Planting by Hydromulching:

1. Description: This work shall consist of furnishing and applying by hydromulching, seeds or stolons, and mulch to areas ordered by the Engineer and shall include continuous care and maintenance in accordance with these specifications. Such areas shall include those damaged or made barren by construction operations or equipment. All steep banks 3 to 1 slope or more shall be hydromulched for erosion control.

2. Materials

a. Seeds: Seeds shall be hulled common Bermuda (Cynodon dactylon), certified, meeting the following requirements:

Pure Seed	95.0%	minimum
Crop Seed	1.0%	maximum
Weed	0.5%	maximum
Inert Material	5.0%	maximum
Germination	85.0%	minimum

The seeds shall be applied at the rate of 50 pounds per acre (minimum) and within 12 months of the date of the certified germination test.

b. Stolons: Shall be healthy, living, well developed runners, 1 inch to 2-1/2 inches in length, freshly dug up and free from weeds. Immediately following harvesting, the stolons shall be thoroughly watered then kept moist during storage and transportation until planted. Stolons shall be applied at the rate of 8 bushels per 1 000 square feet (minimum).

c. Mulch: Mulch shall be specifically processed fiber containing no growth or germination inhibiting factors. It shall be such that after addition and agitation in the hydraulic equipment with seeds, fertilizer, water and other additives not detrimental to plant growth, the fibers will form a homogeneous slurry. When hydraulically sprayed on the soil, the fibers shall form a blotter-like ground cover which readily absorbs water and allows infiltration to the underlying soil. In every application, complete coverage of the soil shall be attained. Mulch shall be applied at the minimum rate of 1700 pounds per acre.

3. Procedures:

a. The CONTRACTOR shall notify the Engineer not less than 24 hours in advance of any hydromulching operation and shall not begin work until area for hydromulching has been prepared and accepted by Engineer Acceptance shall include inspection of fine grading to provide for the collection and disposal of surface and subsurface water to protect planting areas against unnecessary erosion. Acceptance shall not relieve the CONTRACTOR of his responsibility to restore any damage to the grade until the planted areas are accepted. Following the Engineer's acceptance, hydromulching of the approved planting areas shall begin promptly.

The hydromulch equipment shall be capable of mixing all the necessary ingredients to a uniform mixture and to apply the slurry to provide uniform coverage. Seeds, fertilizer and mulch mix shall be applied in one operation by approved hydraulic equipment. The equipment shall have a built-in agitation system with an operating capacity sufficient to keep the mix in uniform distribution until pumped from the tank. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with hydraulic discharge spray nozzles which provide a uniform distribution of the slurry. Areas inaccessible to hydromulching application shall be stolonized or seeded by hand broadcast method acceptable to Engineer and fertilized.

Water shall be applied immediately following mulching in such quantities as to moisten the soil and mulch. Watering shall be continued in such manner, quantity and frequency to insure proper germination and growth and shall be done in a way that will prevent erosion. Watering equipment shall be of a type that will not cause erosion or runoff. If method is deemed unacceptable by the Engineer, it shall be corrected by the CONTRACTOR. Should the slope erode or silt be transported to pose as potential pollutants, it shall be immediately removed and prevented from entering into water channels. All eroded areas shall be restored to the original grade as soon as possible.

PART 3 – EXECUTION

3.01 PLANTING MAINTENANCE, INSPECTION AND ACCEPTANCE

A. General:

This item of work shall consist of the maintenance of all plants and planted areas in optimum growing condition and appearance and the inspection and acceptance of landscape planting.

B. Pre-Maintenance Inspection:

1. A pre-maintenance inspection shall be held at the completion of all planting operations and /or to the beginning of the formal maintenance period.

2. All deficiencies shall be corrected and all plantings accepted by the Engineer before the issuance of a commencement date of the formal maintenance period.

C. Period of Maintenance:

1. Maintenance shall begin immediately after completion and acceptance of all planting and shall continue for 30 calendar days thereafter. The care of plants prior to completion of all planting shall not be considered as part of the maintenance period but only as an incidental to landscape work.

2. Maintenance shall include watering, weeding, fertilizing, topdressing with amended imported screened soil acceptable to Engineer, mowing, pruning, repairing stakes, guys and ties, spraying for diseases and insects, replanting and any other work necessary to maintain all plants in a healthy growing condition. The CONTRACTOR shall be responsible for the protection of all plants and planting areas during the maintenance period and shall pay for all water required during the maintenance period unless otherwise specified. All dead plant materials shall be replaced immediately. During the last week of the maintenance period, the CONTRACTOR shall fertilize the entire planting areas as follows:

   a. Organic nutrient-soil conditioner (humus) at the rate of 25 lbs. per 1000 square feet. Ferto (6-4-2) or Gro-Power Plus (5-3-1) shall be applied in the presence of the Engineer.

D. Final Inspection and Acceptance:

1. At the completion of all planting operations and the maintenance period, an inspection shall be performed.

2. The CONTRACTOR shall request the inspection in writing to the Engineer 7 calendar days prior to the completion of the maintenance period in order that a mutually agreeable time for inspection may be arranged.

3. The CONTRACTOR and the Engineer, or their representatives, shall be present at the inspection.

4. Any plant material found not to be in healthy growing condition shall be immediately replaced by the CONTRACTOR.

5. Acceptance of the grass planting after the maintenance period shall be contingent upon the following:

   a. 95% coverage of the overall area shall be required for grass planting.

b. All germinated areas shall be healthy and living at the end of maintenance period.

c. Weeds shall not exceed an area greater than 10% of the overall grass area.

d. Grass shall be mowed and not taller than 1 inch in height. All clippings shall be removed.

e. All depressions shall be filled to proper grade and area regressed as required.

6. Acceptance of the ground cover planting after the maintenance period shall be contingent upon an 80% coverage.

7. If at the final inspection, the Engineer is of the opinion that all or certain portions of the work is not acceptable as to the intent of the drawings and specifications, an additional 30 days maintenance period shall be extended at no cost to the State. During this period, the CONTRACTOR shall meet all requirements and correct all deficiencies, including any additional mowing and fertilizing.

8. If all plant materials are accepted at this inspection by the Engineer, the CONTRACTOR shall be relieved of further maintenance.

9. All trees and palms shall be guaranteed for one year. If any tree or palm fails to survive by the end of one year, it shall be replaced with the same size and species by the CONTRACTOR at no cost to the State. The CONTRACTOR shall not be held liable for any loss due to lack of proper maintenance, vandalism or accident.

END OF SECTION

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plywood shall be commercial-standard Douglas Fir, moisture resistant concrete form plywood not less than 5-ply and at least 5/8" thick.

B. Metal forms may be used if they will produce surfaces equal to those specified for wood forms.

C. Forms of other materials shall not be used unless approved by the Engineer.

D. Metal clamps and ties shall be used. Form ties for exposed concrete shall be removable either completely or to a minimum depth of 1" from the face of the concrete.

PART 3 - EXECUTION

3.01 TOLERANCES

A. Forms shall be constructed so that the concrete surfaces do not deviate from established lines, grades and dimensions in excess of the tolerances listed below:

1. Variations from plumb:

a. In the lines and surfaces of columns, piers, and walls:

In any 10 ft. of length	1/4"
Maximum for the entire height of structure:	1"

b. For exposed corner columns, control-joint grooves, and other conspicuous lines:

In any 20 ft. of length	1/4"
Max. for the entire length	1/2"

2. Variation from the level or from the grades specified in the contract documents:

a. In slab soffits, ceilings, and beam soffits, measured before removal

of supporting shores:

In any 10 ft. of length	1/4"
In any bay or in any 20 ft. length	3/8"
Max. for the entire length	3/4"

b. In exposed lintels, sills, horizontal grooves, and other conspicuous lines:

In any bay or in 20 ft. length	1/4"
Max. for the entire length	1/2"

3. Variation of the linear building lines from established position in plan and related position of columns, walls and partitions:

In any bay	1/2"
In any 20 ft. of length	1/2"
Max. for the entire length	1"

4. Variation in the sizes and location of sleeves, floor openings, and wall openings: ?1/4

5. Variation in cross-sectional dimensions of columns and beams and in thickness of slabs and walls:

Minus	1/4"
Plus	1/2"

6. Footings: Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items:

a. Variations in dimensions in plan:

Minus	1/2"
Plus	2"

b. Misplacement or eccentricity:

2% of the footing width in the direction of misplacement but not more than 2"

c. Thickness:

Decrease in specified thickness	5%
Increase in specified thickness	No Limit

7. Variation in steps:

a. The largest tread run within any flight of stairs shall not exceed the smallest by more than 3/8".

b. The greatest riser height shall not exceed the smallest by more than 3/8".

3.02 INSERTS, FASTENING DEVICES AND CONDUITS

A. Install inserts, reglet strips, hangers, metal ties, anchors, bolts, nailing strips, blocking, grounds and other fastening devices as required for attachment of other work. Properly locate all embedded items in cooperation with other trades and secure in position before concrete is placed.

B. All electrical and mechanical conduits and fittings shall be located such that they do not impair the strength of the concrete member and shall be subject to acceptance by the Engineer. Conduits referred to in the items below include pipes, ducts, and electrical conduits. Conduits and fittings shall conform to the following, unless shown on structural drawings:

1. Concrete Walls (Cast-In-Place):

   a. Conduits larger than 1-inch outside diameter shall not be embedded vertically in any wall. Conduits shall be spaced a minimum of 10 times outside diameter and shall be placed in the middle of the wall thickness.

   b. No conduits shall be embedded horizontally in any wall, lengthwise.

   c. Conduits passing through walls shall not impair the strength of the wall and shall be provided with Schedule 40 galvanized steel pipe (ASTM A 53) sleeve.

2. Concrete Beams:

   a. Conduits larger than 1-1/2 inches outside diameter shall not be embedded vertically in any beam. Conduits embedded vertically shall be spaced a minimum of 10 times outside diameter and shall be placed in the middle third of the beam thickness.

   b. No conduits shall be embedded horizontally in any beam lengthwise.

   c. Conduits passing through beams shall not impair the strength of the beam and shall be provided with Schedule 40 galvanized steel pipe (ASTM A 53) sleeve.

3. Suspended Concrete Slabs and Toppings:

   a. Conduits larger than 1 inch outside diameter shall not be embedded in any concrete slab or topping. Conduits shall be spaced a minimum of 10 times outside diameter. Conduit crossings shall be avoided.

   b. Conduits passing through slabs shall be provided with Schedule 40 galvanized steel pipe (ASTM A 53) sleeve.

4. Concrete Slabs on Grade:

   a. Conduits shall not be embedded within the thickness of any concrete slab on grade.

   b. Conduits may be placed in the subgrade below the bottom surface

of slabs on grade, but not within the thickness of the basaltic termite barrier.

3.03 CONSTRUCTION OF FORMS

A. All concrete forms shall be placed with metal clamps and ties level and plumb in horizontal rows and vertical tiers.

B. Where soil conditions will permit excavation to accurate sizes without bracing, side forms for footings may be omitted only if approved by the Engineer.

C. Temporary access openings to forms for cleaning prior to depositing of concrete shall be provided.

D. Unless otherwise called for on the plans, all exposed concrete surfaces designated as "Architectural Concrete" on the plans shall be formed with plywood. Arrangement of the plywood sheets shall be orderly and symmetrical and shall be of 4' x 8' size wherever practical.

Only new or unmarred plywood shall be used. A 3/4" by 3/4" chamfer shall be provided at external corners of exposed concrete beams, girders, columns and pilasters unless otherwise indicated on the plans. Metal forms may be used if they will produce surfaces equal to those specified for wood forms.

E. Rough concrete finish may be used for all unexposed concrete surfaces as indicated in Section 03300 or on the plans. Rough concrete finish shall be obtained by using clean, straight lumber or metal forms.

F. Forms for architectural concrete surfaces or on exposed surfaces which are to receive a finishing material shall be either wetted thoroughly immediately before placing concrete or coated with a bond-breaking material compatible with the finishing material and/or its adhesive prior to the placement of reinforcing steel. Forms for unexposed surfaces may be coated with form oil. However, any surplus oil on the form surfaces and any oil on the reinforcing steel shall be removed by wiping with dry rags.

G. Forms which cannot be removed shall be of material other than wood and must be approved by the Engineer.

H. All forms other than the non-removable form described under the preceding subparagraph shall be constructed so that they can be removed without hammering or prying against the concrete.

I. Forms shall not be removed before the expiration of the minimum lapsed time from concrete pour shown below unless information and/or data justifying a request for a shorter period is submitted to and approved by the Engineer. Even with such approval, however, the CONTRACTOR shall be fully responsible to repair any damages which may result from the early removal.

Bottom forms of beams and girders	14 days
Walls, columns and side forms of beams	3 days
Footing side forms	24 hours
Bottom forms of slabs	14 days

No construction loads exceeding the structural design live loads shall be

supported upon any unshored portion of the structure under construction. No construction load shall be supported upon, nor any shoring removed from any part of the structure under construction until the portion of the structure has attained sufficient strength to support safely its weight and the loads placed thereon. This strength may be demonstrated by job-cured test specimens and by a structural analysis considering the proposed loads in relation to this test strength. Such analysis and test data shall be furnished by the CONTRACTOR to the Engineer.

J. To maintain the tolerances specified in Paragraph 3.01, the formwork shall be cambered to compensate for anticipated deflections in the formwork prior to hardening of the concrete.

K. Screeds for slabs:

1. Edge forms and intermediate screed strips shall be set accurately to produce the designated elevations and contours of the finished surface, and shall be sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment.

   The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or approved compacting type screeds. Screeds shall be set adjacent to all walls and in parallel rows to exceed 8 feet o.c. Penetrations of the moisture barrier shall be held to a minimum.

2. At walks, screeds shall be set at the sides to serve as forms and additional screeds, if required, shall be spaced not exceeding 8 feet o.c.

END OF SECTION

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 SUBMITTALS

Submit certified mill test results or laboratory test results for all reinforcing steel indicating the following: bar size; yield strength; ultimate tensile strength; elongation and; bend test. Rebar chemical composition shall be provided for rebars which are to be welded.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing steel shall be deformed bars conforming to ASTM A615, grade as shown on plans.

B. Welded wire fabric for concrete reinforcement shall conform to ASTM A185 and shall be galvanized.

C. Metal accessories such as spacers, chairs, ties, and other devices necessary for properly placing, supporting and fastening reinforcement in place shall be provided. Chairs shall be galvanized. Annealed steel wire of not less than 16-gauge shall be used to secure reinforcement.

D. Reinforcing steel to be welded shall be deformed bars conforming to ASTM A 706, Grade 60. Welding of reinforcing steel shall be permitted only with the approval of the Engineer.

E. Smooth dowels shall conform to ASTM A615 Grade 60.

PART 3 - EXECUTION

3.01 TOLERANCES

A. Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

Sheared length:	? inch
Depth of truss bars:	+0, -1/2 inch
Overall dimensions of stirrups, ties, and spirals:	?/2 inch
All other bends:	? inch

B. Bars shall be accurately placed and adequately supported before the concrete is placed and shall be secured against displacement within the following tolerances:

Clear distance to formed soffits

(exposed underside of beams and slabs): -1/4"

Minimum distance between bars: -1/4"

Where d is less than or equal to 8":
Tolerance on d: 3/8"
Tolerance on the minimum concrete cover: -3/8"
Note: The tolerance for cover shall not exceed minus one third the minimum concrete cover required under Section 3.02 H.

Where d is greater than 8":
Tolerance on d: ?1/2"
Tolerance on the minimum concrete cover shall not exceed minus one third the minimum concrete cover required under Section 3.02 H.

d = Distance from the extreme compression fiber to the centroid of tension reinforcement.

Longitudinal location of bends and ends of reinforcement: ? 2" except at discontinuous ends of members where tolerance shall be ?1/2".

Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to approval by the Engineer.

3.02 REINFORCEMENT

A. Reinforcing steel bars, wire and wire fabric shall be provided in the sizes, lengths and configurations as indicated on plans and shall be thoroughly cleaned, before placing, of loose mill scale, loose flaky rust, oil, and all coatings that will destroy or reduce bond. If necessary, they shall be cleaned again before placing of concrete. All items shall be fabricated, positioned and secured in place as indicated in the plans and as herein specified. Annealed steel wire shall be used to secure reinforcement. Reinforcement shall be placed in specified positions not exceeding the tolerances listed in Sub-section 3.01. Unless otherwise noted, cleaning, bending and placing of reinforcement shall be done in accordance with the standard practice of the Concrete Reinforcing Steel Institute.

B. Concrete or metal support and spacers shall be used to secure the proper spacing of reinforcement over formwork. Stirrups shall be accurately and securely wired to the bars at both top and bottom. At slabs, footings and beams in contact with earth, pre-cast concrete blocks (not bricks or hollow tile) or chairs shall be used to hold reinforcement at a proper distance above earth.

C. Bars shall be tied at all intersections, and distances from forms shall be maintained by means of pre-cast concrete blocks, ties, hangers, chairs or other approved supports.

D. Bars shall be bent cold to the shapes shown on the plans. Bends shall be made around a pin having a diameter not less than 6 times the bar diameter except that for bars of larger than 1 inch diameter the pin diameter shall be 8 times the bar diameter. If required, bars may be bent in the field using a "hickey" bar.

E. All reinforcing steel bars shall be furnished in the lengths indicated on the plans. Splicing of bars, except where shown, will not be permitted without the approval of the Engineer. Splices where permitted shall be staggered 36 inch minimum or as far as possible, wired together in such a manner as to maintain the clear depth of the member and the minimum clear distance to the surface of concrete. Unless otherwise shown on the plans, splices shall be lapped in lengths as follows:

#11 bars and smaller 48d or 24 inches, whichever is larger

Welded splices only shall be used when bar size exceeds #11.

Welding shall conform to AWS D1.4, Structural Welding Code - Reinforcing Steel. The CONTRACTOR shall notify the Engineer 48 hours prior to making any welded splices.

F. Vertical bars in columns shall be offset at least one bar diameter at splices.

G. Unless permitted by the Engineer, reinforcement shall not be bent after being partially embedded in hardened concrete. Improperly and/or excessively bent bars shall be replaced.

H. Minimum concrete protective covering for reinforcement, except for extremely corrosive atmosphere, other severe exposures, or fire protective covering shall be as follows:

Concrete deposited against the ground: 3 inches (except where deposited below water table).

Formed surfaces exposed to weather or in contact with the ground: 2 inches for reinforcing bars #6 or larger; 1-1/2" for reinforcing bars less than #6; except not less than 1-1/2 times maximum size of aggregate for column spirals or ties.

Interior surfaces: 1-1/2" for beams, girders, and columns; 3/4" for slabs, walls and joists with #11 bars or smaller, and 1-1/2" with #14 and #18 bars.

I. Dowels (minimum #3 @ 24 inches o.c. unless otherwise shown in the plans) shall be installed in all concrete to which masonry walls abut.

J. All reinforcement shall be inspected and approved by the Engineer prior to the closing of forms. This approval, however, shall not be construed to relieve the CONTRACTOR of his responsibility to place all reinforcement in accordance with the plans.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 STORAGE OF MATERIALS

Cement and aggregates shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete and shall be promptly removed from the site.

1.03 TESTS

A. Slump: Standard slump tests as described in ASTM C143 (Modification: Sampling of concrete for slump test shall be taken after at least 1/4 cubic yard of concrete has been discharged) will be made periodically during the placement of concrete by the Engineer to ensure that the slump for which the concrete has been designed is met. Any concrete batch tested and showing slumps exceeding the specified tolerance shall be rejected. Any concrete placed prior to slump testing shall be the sole responsibility of the CONTRACTOR and shall be rejected should the subsequent slump test of the batch in question indicate that the slump tolerance is being exceeded. All rejected concrete shall be promptly removed and properly replaced. All costs resulting therefrom shall be borne by the CONTRACTOR.

B. Compressive Strength: During the progress of the work compressive strength tests of concrete shall be made in accordance with ASTM C39. 6-inch x 12-inch cylinders shall be taken from each major pour by the CONTRACTOR at the rate of 3 cylinders for each 100 cubic yards. Notwithstanding this established rate, however, the Engineer shall take concrete cylinders in whatever quantity he deems fit and/or necessary from any concrete pour. For pours of less than 25 cubic yards, the Engineer may omit the taking of cylinders.

1. The CONTRACTOR will make and identify all test cylinders. The CONTRACTOR shall provide the equipment, such as a shovel and a wheelbarrow for to make and move the cylinders, and shall also provide the labor and equipment to deliver the cylinders to the testing laboratory as directed by the Inspector.

2. Cost of testing will be borne by the CONTRACTOR.

3. The standard age for testing the cylinders shall be 28 days. However, 7-day tests may be made for indication of final 28-day strengths.

4. All cylinders shall be made and cured in accordance with ASTM C31.

5. In all cases where the strength of any group of cylinders falls below the minimum compressive strength specified, the Engineer shall have the right to require that test specimens be cut from the structure. Specimens shall be selected by the Engineer from the location in the structure represented by the test specimen or specimens which failed. Specimens shall be secured,

prepared, and tested in accordance with ASTM C42 within a period of 60 days after placing the concrete. The testing shall be done by a laboratory approved by the Engineer. Concrete in the area represented by the core tests will be considered structurally adequate if the average strength of 3 cores is no less than 85% and the strength of a single core is no less than 75% of the 28-days strength specified. Should laboratory analysis indicate however, that the proper concrete mix has not been used by the CONTRACTOR, all such concrete placed using the improper mix shall be subject to rejection. The cost of cutting specimens from the structure, patching the resulting holes, and making the analysis, including laboratory and consultation costs, shall be borne by the CONTRACTOR.

The holes from which the cored samples are taken shall be packed solid with no-slump concrete proportioned in accordance with the ACI 211.3 "Standard Practice for Selecting Proportions of No-Slump Concrete". The patching concrete shall have an "extremely dry" consistency and the same design strength as the specified concrete.

6. If the strength of the specimens cut from the structure falls below the requirements stipulated above, the Engineer shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the CONTRACTOR.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement shall conform to the requirements of ASTM C150, Type I, for all concrete work.

B. Concrete Aggregates:

1. Fine Aggregates shall be calcareous or basalt sands, or a combination thereof. They shall meet the grading requirements of ASTM C33 unless the concrete producer can provide past data that shows that a proposed non-conforming gradation will produce concrete with the required strength and suitable workability.

   If manufactured sands are used in the concrete mix, the CONTRACTOR may select and use a water-reducing and/or an air-entraining admixture as specified hereinafter to provide satisfactory workability in the concrete. The cement content of a mix shall be as specified hereinafter, and the use of an admixture shall in no way result in the reduction of the cement factor.

2. Coarse Aggregates shall be crushed close-grained, blue lava rock meeting the grading requirements of sizes 57 or 67 (ASTM D448) or both. The maximum size of aggregate shall not be larger than 1/5 of the narrowest dimensions between sides of the forms of the member for which the concrete is to be used nor larger than 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.

C. Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to concrete or reinforcement. Non-potable water shall not be used.

D. Expansion Joint Filler: A pre-molded material of 1/2" thickness, unless otherwise noted, composed of fiberboard impregnated with asphalt conforming to ASTM D 1751.

E. Joint Sealing Compound shall be a polysulfide or urethane compound conforming to ASTM C 920 or other approved equal, compatible with the floor finish to be applied. Color to be selected by the Engineer.

F. Bond-Break Filler: Mineral-surfaced roofing cap sheet or coated asphalt felt.

G. Non-Slip Grit shall be an abrasive aggregate of silicon carbide or aluminum oxide.

H. Admixture, if used, shall conform to ASTM C494 or ASTM C260 and shall be mixed in proper amount in accordance with directions of manufacturer. Admixture shall be free of calcium chloride.

I. Curing Compound shall be compatible with the finish to be applied. Unless otherwise required, the compound shall conform to the requirements of ASTM C 309.

J. Pervious Sheeting shall be burlap or other acceptable absorbent material, free of substances that will harm the concrete or cause discoloration.

K. Vapor Barrier shall be of Polyethylene film, minimum 0.010" thick.

L. Backer Rod shall be round, continuous length, compressible open-cell polyurethane foam and sized larger than expansion joint for moisture tightness.

M. Non-Shrink Grout shall be non-metallic, non-corrosive and shall conform to ASTM C-827. Color shall be selected by the Engineer.

N. Cementitious Coatings shall be cement based polymer modified cement finishing materials ("Pro-Finish" by Bonded Materials Company, "Polycoat" by Tremcrete Systems Incorporated, "Durus" by Durus High Tech Cement, or approved equal).

O. Grease used to prevent bonding of rebars/dowels into concrete shall be compatible to concrete and dowels.

PART 3 - EXECUTION

3.01 DESIGN OF CONCRETE MIXES

A. Ingredients for concrete shall be Portland cement, fine and coarse aggregates and water.

B. Normal weight concrete shall meet the requirements outlined in Subsection C, D and E below.

C. Concrete shall be designed so that the concrete materials will not segregate nor cause excessive bleeding. Slump shall be 4 inches maximum.

For concrete used in ramps or other sloping construction, the slump tolerance shall be waived.

D. For each class of concrete up to Class 6,000, the test results for 28-day compressive strength shall meet the following requirements:

28-Day-Compressive-Strength-Test-Results

Class	Min. Average for 3 Cylinders, psi	Min. Average for 2 Cylinders, psi
4,000	4,000	3,750

The maximum water-cement-ratio for slabs on grade and elevated structural slabs are noted on the drawings. Entrained air shall be added to concrete mix at the rate of 4% ?1½%.

E. For concrete designed for specified strengths in excess of 4,000 psi and/or containing admixtures other than those used exclusively for the purpose of entraining air, mixture proportions to provide the desired characteristics shall be developed in accordance with Sections 5.2, 5.3 and 5.4 of ACI 318-89.

F. The CONTRACTOR shall submit mix design for approval to the Engineer, the mixes he intends to use at least 14 days before the actual concrete placing operations.

G. The CONTRACTOR shall use only approved mixes.

H. Unless otherwise noted, Class 4,000 concrete shall be used for interior ground floor slab, all non-prestressed structural slabs, beams, piers, columns, stairs, walls, foundation and suspended slabs.

J. Addition of water to the mix design at the job site shall be permitted provided the quantity of added water does not increase the water-cement ratio and has the Engineer's approval. Addition of water shall not exceed one gallon per cubic yard.

3.02 JOINTS

A. Construction joints shall be provided as detailed at locations indicated on the plans. Construction joints not shown on the plans shall be so made as to least impair the strength of the structure and shall be approved by the Engineer. In general, they shall be located near the middle of the spans of slabs, beams and girders unless a beam intersects a girder at this point, in which case the construction joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in columns and walls shall be at the underside of floors, slabs, beams or girders and at the top of footings or floor slabs. Beams, girders, brackets, column capitals, haunches and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

B. All reinforcing steel shall be continuous across construction joints. Keys and/or inclined dowels shall be provided as required. Longitudinal keys at least 1-1/2" deep shall be provided in all joints in walls and between walls and slabs or footings. Unless otherwise indicated, joints shall be sealed with joint sealing compound.

C. Expansion joints shall be provided as detailed at locations indicated on the plans. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors or walls bonded on only one side of joint) shall not be permitted to extend continuously through any expansion joint. Joints shall be sealed with expansion joint filler and sealing compound at least 3/8" deep.

D. Contraction/control joints shall be provided where shown on the plans and shall be 1/4 the depth of the slab or a minimum of 1" deep. Unless otherwise indicated on the plans, joints may either be tooled, formed-in-place or saw-cut. When saw-cut joints are provided, cutting shall be timed properly with the set of the concrete so that it is firm enough not to be torn or damaged by the cutting blade and before random shrinkage cracking can form in the slab. In any case, cutting shall be completed not later than 12 hours after the concrete is placed and finished. Unless otherwise indicated on the plans, joints shall be sealed with joint sealing compound.

E. Construction joints in nonstructural slabs on grade shall be provided where shown on the plans and shall be formed-in-place. Provide keys and dowels as required. Allow five (5) days to elapse between successive slab pours at each side of construction joint.

3.03 MIXING CONCRETE

A. All concrete throughout shall be either job or plant mixture in an approved type of power operated mixer that will ensure uniformity and homogeneity of the concrete produced. The CONTRACTOR shall provide a sufficient number of mixers to continuously carry on the work.

B. Ready Mixed and Mixed-In-Transit Concrete shall be mixed to conform to the provisions of ASTM C94 and as follows:

1. The plant shall have sufficient capacity and transportation equipment to deliver concrete at the rate desired. The interval between batches for a pour shall not exceed 30 minutes.

2. The time elapsed between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates, and the placing of concrete in its final position shall not exceed 90 minutes.

3. In hot weather (more than 90 degrees Fahrenheit ambient temperature) or under conditions contributing to quick stiffening of the concrete, the elapsed time in 2. shall not exceed 60 minutes, if no retarding admixture is used. If an ASTM C494 Type B or D admixture is added to the concrete, the elapsed time in 2. shall remain at 90 minutes.

C. Concrete shall be mixed only in such quantity as is required for immediate use.

No retempering will be permitted and concrete that has started to harden shall be discarded and promptly removed from the job.

D. Admixtures conforming to Paragraph 2.01 may be used in the concrete as recommended by the supplier and approved by the Engineer.

E. Hand mixing of concrete will not be permitted except to make up shortages for

fence post footings, sidewalks, thresholds, flag pole foundations, curbs and gutters, and thrust blocks.

3.04 PLACING CONCRETE

A. No concrete shall be placed in the absence of the Engineer or his representative who shall be given one day advance notice of starting time of concrete pour. Place no concrete until foundation, forms, reinforcing steel, pipes, conduits, sleeves, hangers, anchors, inserts, waterproofing, termite treatment and/or basaltic termite barrier and other work required to be built into or placed ahead of concrete placing have been inspected and approved by the Engineer. Concrete placed without such notice and approval shall be rejected.

B. Preparation

1. All sawdust, chips and other construction debris and extraneous matter shall be removed from interior of forms. Struts, stays, bracing, or blocking serving temporarily to hold forms in correct shape or alignment shall be removed when the concrete placing has reached an elevation rendering their services unnecessary.

2. Concrete shall be placed upon clean, damp surfaces with no free water, or upon properly compacted fills but never upon soft mud or dry, porous earth. Before pouring footings or foundations, bottoms of excavations shall be properly leveled off and tamped.

3. Before depositing new concrete on or against concrete which has set, all accumulations of mortar splashed upon reinforcing steel and the surfaces of forms shall be removed and the forms shall be retightened. The surfaces of previously set concrete shall be thoroughly roughened and cleaned of all foreign matter and laitance, saturated with water and slushed with a coat of cement grout. New concrete shall be placed before the grout has attained its initial set.

C. Conveying

1. Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods that will prevent segregation.

2. Concrete shall be deposited as nearly as practicable in its final position. Extensive spading as a means of transportation shall be avoided and in no case shall vibrators be used to transport concrete inside the forms.

3. Open troughs and chutes shall have a slope not to exceed 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 ft. long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

4. The concrete shall not be allowed to drop freely more than 6 feet except where specifically authorized by the Engineer. When placing operations would involve the dropping of concrete from a height of more than 6 feet, it shall be conveyed through pipes or flexible drop chutes.

5. If any appreciable segregation occurs through the conveying methods employed, their use shall be ordered discontinued by the Engineer and

some other satisfactory method of placing concrete shall be used.

6. All chutes, troughs, pipes and other means of conveyances shall be kept clean and free from coatings of hardened cement or concrete by thoroughly cleaning with water and chipping after each pour. Water used for flushing shall be discharged away from the vicinity of the concrete or forms already in place.

D. Depositing

1. Unless adequate protection is provided, concrete shall not be placed during rain. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish. Fresh concrete that has been deposited but has not attained its initial set shall be protected in the event of rain.

2. Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcing. As nearly as practicable, the concrete shall be dropped vertically without hitting reinforcement, sleeves or forms into its final position in order to avoid separation of coarse aggregates from concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the projecting reinforcing.

3. Formed concrete shall be deposited in horizontal layers not deeper than 2 feet avoiding inclined layers and inclined construction joints. The depth of layers shall be shallow enough so that the succeeding layer will be placed before the previous layer has attained its initial set.

   Concrete shall not be allowed nor shall it be caused to flow horizontally or on slopes in the form. Concrete placing on a slope shall begin at the lower end of the slope and progress upward.

4. Construction joints shall be made only where located on the plans unless approved otherwise by the Engineer. Pours shall be planned to provide for the continuous placing of concrete from one construction joint to another. The face edges of all joints that are exposed to view shall be carefully finished true to line and elevation.

5. In slab construction, placing of the concrete shall be started at the far end of the work so that each batch will be dumped against previously placed concrete, not away from it. The concrete shall not be dumped in separate piles and the piles then leveled and worked together. For floor slabs on earth, additional requirements in Paragraph 3.05 shall apply.

6. Beams and girders shall not be placed at the same time as the supporting columns or walls. At least 2 hours must elapse after columns or walls are placed before placing beams and girders supported thereon.

7. Columns shall be placed in approximately 4-foot sections, with each section being vibrated and compacted as placed.

8. In placing a deck of slabs and beams, the beams shall be placed first up to the height of the bottom of the floor slab. This placement shall extend in bay modules and end at the midspan, midpoint between columns. The length of this placement shall be determined by the time it takes to return to the slab and the top layer of the beams before the top of the first pour

has started to harden and form a cold joint.

9. If depositing of concrete must be stopped short of a full placement, it shall be leveled to a horizontal plane or stopped against a vertical bulkhead. Such bulkhead or horizontal plane shall be located only as approved by the Engineer.

E. Compaction

1. All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. All compaction shall be done by use of high frequency internal vibrators. Where the vibrator cannot be inserted into the concrete, compaction shall be done by spading, rodding or forking.

2. Frequency of vibrator shall be not less than 7,000 inpulses per minute. The CONTRACTOR shall provide a sufficient number of vibrators to properly consolidate all concrete immediately after placing. At least one standby vibrator shall be on hand at all times during placement of the concrete.

3. Vibration shall not be applied through contact with reinforcement of forms. Vibration shall penetrate previously deposited concrete sufficiently to prevent pockets or voids or construction joints from occurring between pours, but must not be applied to concrete which has set up sufficiently to cease to be plastic under vibration.

3.05 FLOOR SLABS ON EARTH

A. All earth-supported slabs with the exception of sidewalks, shall be reinforced with Grade 60 #3 steel reinforcing bars at 10" o.c. each way unless otherwise shown or called for on the plans. Plain bar dowels shall be provided as detailed for construction and expansion joints. Such dowels shall be wrapped or greased on one side of the joints to prevent bonding.

B. Care shall be taken in handling and placing the reinforcement. Reinforcement shall be positively set to the level required within the slab(s) as indicated on the plans.

C. Floor slabs shall be placed in alternate panels, long strip pattern, following construction or expansion joints. Narrow contraction/ control joints shall be provided transverse to the length of the cast strips. There shall be an interval of at least 2 days between the placing of the initial panels and that of the adjacent ones. As an option, slabs may be placed in alternate panel checkerboard pattern. Where slabs are placed in a checkerboard pattern, no panel shall be placed in excess of 500 square feet in area nor exceed 32 feet in its longest dimension. Location of control/construction joints shall be in accordance with ACI 302.1

D. A bond-break filler shall be provided where edge of slab abuts any vertical surface and where indicated on plans. Width of filler strips shall equal depth of floor slab.

E. Small mounds of concrete shall be placed at random rebar intersections during the

pour to provide support in addition to the chairs or blocks. Reinforcing bars shall be lifted as necessary to ensure proper placement within the slab.

3.06 FINISHING OF SLABS

A. Finish A - Scratched Finish. After the concrete has been placed, struck off, consolidated and leveled, the surfaces shall be roughened with stiff brushes or rakes (cross-scratched) before final set.

B. Finish B - Light Troweled Finish. After the concrete has been placed, struck off, consolidated and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared and/or when the mix has stiffened sufficiently to permit the proper operation of a power-driven float. The surface shall then be consolidated with power-drive floats of the impact type except in thin sections. Hand floating with wood or cork-faced floats shall be used in locations inaccessible to the power-driven machine. The slab shall then be steel troweled to a uniform, smooth texture.

C. Finish C - Troweled Finish. The surface shall be finished first with impact power floats, as specified above for Finish B, then with power trowels and finally with steel hand trowels. The first troweling after power floating shall be done by a power trowel and shall produce a smooth surface which is relatively free of defects but which may still contain some trowel marks.

Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done to a point when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of any trowel marks and shall be uniform in texture and appearance. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.

D. Finish D - Broom Finish. The concrete slab shall be given a coarse transverse scored texture by drawing a broom across the surface. The operation shall follow immediately after steel-troweling performed under Finish B above.

E. Finish E - Non-Slip Finish. The surface shall be given a dust-on application of abrasive aggregates. Finish with steel trowel but avoid over-troweling. The rate of application of abrasive aggregates shall be not less than 25 pounds per 100 square feet or application shall be in strict accordance with the manufacturer's recommendations.

F. Finishing Tolerances for slabs shall be in accordance with the following:

1. Floor slabs on earth, structural fill or grade:

a. Measure for deviation from specified tolerances for floors within 24 hours after the slab installation and before floor, columns/walls are formed. Floor surface shall be debris free. Report to the Engineer within 72 hours after placement.

b. Finish tolerances for slabs shall be in accordance with the following:

Finish shall be true planes within 3/16" in 10 ft., as determined by a 10 ft. straightedge placed anywhere on the slab in any direction.

True plane shall be defined as the finish floor elevations on the drawing, for each floor. Unless otherwise shown on the plans, all slabs shall meet this tolerance. The tolerances will be checked prior to removing of forms or shores.

c. Correct the slab surface immediately before continuing work if the measured deviation for the floor installation measures greater than the specified.

d. Correct defects by filling, grinding or removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process. Areas requiring filling shall be corrected according to the manufacturer's recommendations.

2. Suspended slabs and topping:

a. Measure for deviation from specified tolerances for floors within 24 hours after the slab or topping installation and before floor columns/walls are formed. Floor surface shall be debris free. Do not remove shores or forms during the measuring operation. Report to the Engineer within 2 hours after placement.

b. Finish tolerances for slabs shall be in accordance with the following:

Finish shall be true planes within 3/16" in 10 ft., as determined by a 10 ft. straightedge placed anywhere on the slab in any direction. True plane shall be defined as the finish floor elevations on the drawing, for each floor. Unless otherwise shown on the plans, all slabs shall meet this tolerance. The tolerances will be checked prior to removing of forms or shores.

c. Correct the slab surface immediately before continuing work if the measured deviation for the floor installation measures greater than the specified. Methods of correction shall be submitted to the Engineer for approval.

d. Correct defects by filling, grinding or removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process. Areas requiring filling shall be corrected according to the manufacturer's recommendations.

3.07 SELECTION OF FLOOR FINISHES

A. Unless otherwise indicated on the plans, the following floor finishes shall be used:

1. Finish A - Scratched Finish. For surfaces intended to receive bonded applied cementitious applications (such as setting beds for ceramic tile or quarry tile on the first floor, where no membrane is called for).

2. Finish B - Light Troweled Finish. For surfaces intended to receive waterproofing and membrane (such as setting beds on membranes, second floor and above).

3. Finish C - Troweled Finish. For interior floors intended to receive floor coverings.

4. Finish D - Broom Finish. For first floor and chiller pad.

5. Finish F - Non-Slip Finish. For platforms, interior and exterior steps, landings and ramps.

3.08 REPAIR OF DEFECTS

A. After forms have been removed, any concrete which is not constructed as shown on the plans or is out of alignment or level beyond required tolerances or which shows a defective surface which in the opinion of the Engineer cannot be properly repaired or patched shall be removed.

B. Where cast-in-place concrete which is exposed to view or designated architectural requires repairing or patching, the texture of the surface of such repair or patch shall closely match that of the surrounding surface. If the concrete is to remain unpainted, the surface color shall also be closely matched to that of the surrounding surface.

C. All tie holes and all repairable defective areas shall be patched immediately after form removal as follows:

1. All honeycombed concrete shall be chipped out to sound concrete but in no case to a depth of less than 1 inch. If possible, edges of the chipped-out areas shall be undercut.

2. Rock pockets, form tie holes, deep holes not too large in area, other holes with relatively high ratio of depth to area, and similarly confined areas shall be dry packed.
After the area to be patched has been thoroughly cleaned and dampened, mortar, which shall consist of 1 part cement, 2-1/2 parts sand passing a #16 screen, and only enough water to produce a mortar that will stick together upon being molded into a ball by slight pressure of the hands, shall be placed in the holes in layers having a compacted thickness of about 3/8". Each such layer shall be solidly rammed over its entire surface using a hardwood stick and a hammer.

3. Shallow depressions where lateral restraint cannot be obtained, voids behind reinforcement, and holes extending through concrete sections shall be patched using a commercially prepared bonding agent, a stiff mortar mix of 1 part cement and not more than 2-1/2 parts sand.

For filling holes in exterior surfaces, an epoxy bonding agent shall be used. Application of the bonding agent shall be in strict conformance with the manufacturer's instructions.

4. An epoxy-and-sand mixture may be used in lieu of the mortar-and-bonding agent mixture for any of the patching above. The preparation of the surface to receive the patch, as well as the mixture proportions of the epoxy-and-sand, shall be in strict conformance with the manufacturer's instructions.

D. Except for concrete required to be removed under Paragraph 3.09A, any concrete which is not constructed as shown on the plans or is out of alignment and/or level beyond allowable tolerances may be patched using an epoxy-and-sand mixture.

The proportions of the mix and the preparation of the surface to receive the patch shall be in strict conformance with the manufacturer's instructions except as or unless otherwise specified herein. The minimum thickness of the patch shall be 1/4". No "feathering" to a lesser thickness will be permitted.

Misalignment which requires correction more than 1 inch thickness shall be repaired in the following manner:

1. The surface of the affected area shall be chipped, etched, or otherwise cleaned and roughened to provide a sound surface for bonding;

2. Concrete nails or other fasteners which can provide positive mechanical bonding of the patch shall be set into the surface at about 18 inches o.c. in all directions with a minimum of 2 rows;

3. Wire mesh reinforcement as approved by the Engineer shall be installed in those portions of the patch which exceed 2-inch thickness;

4. A bonding agent suitable for use in the repair location (epoxy required for exterior use) shall be applied over the entire surface to be patched;

5. Form work to the true lines called for shall be installed over the area requiring the patch; and

6. Concrete or grout with aggregate sized appropriately for the cavity and which will provide strength equivalent to that of the base surface shall be placed in the form, properly compacted and suitably cured.

3.09 WALL SURFACE FINISHES

A. Rough Concrete Finish. Rough concrete finish surfaces shall be reasonably true to line and plane with no specific requirements for selected facing materials. Tie holes, honeycombing and defects shall be patched in accordance with Paragraph 3.08C herein except that the patches for concealed surfaces need not be matched in color and texture with adjacent surfaces. Fins exceeding 1/4" in height shall be removed. Otherwise, surfaces shall be left with the texture imparted by the forms.

B. Plywood Finish. Finish of all exposed surfaces cast against forms constructed of plywood or lined with "Plyform" shall be true to line and plane within the tolerances in Section 03100, Paragraph 3.01.

1. Joint marks and fins shall be removed and surfaces left smooth, dense and free from prominent grain markings.

2. The surface shall be scrubbed to remove any laitance or loose particles and to expose any defects.

3. Tie holes, honeycombing and defects shall be repaired in accordance with Paragraph 3.08C herein.

4. The surface shall be thoroughly wetted. Then, as the concrete approaches

surface dryness, a mortar consisting of 1 part Portland cement, 2 parts well-graded sand passing a No. 30 sieve, and enough water to provide the consistency of thick paint shall be vigorously and thoroughly rubbed over the area with clean burlap pads so as to fill all voids.

5. While the mortar is still plastic but partially set so that it cannot be easily pulled from the voids, the surface shall be rubbed again with a dry (no water) mortar mix of the same proportions as above. Burlap pads, stretched tightly around a board to prevent dishing the mortar in the voids, shall be used for this operation. There shall be no discernible thickness of mortar on the surface, except in the voids, when this operation is concluded.

6. Immediately following the rubbing treatment, the surface shall be continuously moist-cured for 72 hours.

7. In lieu of the rubbing treatment noted above, a cementitious coating in accordance with Subsection 2.01 N. may be used. Surface preparation, mixing, application and curing of the coating material shall be in strict accordance with the manufacturer's instructions and recommendations.

3.10 CURING AND PROTECTION

A. Unless otherwise specified, all concrete shall be cured for a period of not less than 14 days by one of the methods listed below. During this curing period, the concrete shall be maintained with minimal moisture loss at a relatively constant temperature. Fresh concrete shall be protected from heavy rains, flowing water, mechanical injury, and injurious action of the sun. Curing method selected must be compatible with the finish to be applied to the concrete.

Curing shall immediately follow the finishing operation.

B. Water Curing - If cured with water, concrete shall be kept wet by mechanical sprinklers, by ponding, or by any other method which will keep the surfaces continuously wet.

C. Saturated Sand Curing - Surfaces cured with sand shall be covered with a minimum of 1-inch thickness of sand which shall be kept uniformly distributed and continuously saturated during the entire curing period.

D. Pervious Sheeting - Overlap sheeting edges approximately 6 inches and keep sheets continuously wet throughout the curing period.

E. Curing Compounds - Curing compounds used on concrete surfaces that are to receive paint finish or acid stain shall be as recommended by the manufacturer to be compatible with the applied finish.

Curing compounds shall not be applied onto floor surfaces scheduled to receive resili

The CONTRACTOR shall submit to the Engineer a letter certifying that the curing compound is compatible with the applied finish. Application shall be in accordance with the manufacturer's recommendations. If curing, sealing or other compounds are used which are incompatible with applied finish, such compound shall be thoroughly removed by grinding with a terrazzo grinder.

F. Waterproof Paper - Waterproof paper or opaque polyethylene film conforming to ASTM C171 may be used. The paper or film shall be anchored securely and all edges sealed or applied in such a manner as to prevent moisture escaping from the concrete. Waterproof paper shall not be used on floors that will be exposed when finished.

3.11 CLEAN UP

The CONTRACTOR shall clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work and upon completion of the entire concrete and related work.

END OF SECTION

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. The extent of structural steel work is shown on the drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel required.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the following except as otherwise indicated:

1. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the "Commentary" and Supplements thereto as issued.

2. AWS D1.1 "Structural Welding Code".

B. Qualifications Welding Work:

1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

2. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months. If recertification of welders is required, retesting will be the CONTRACTOR's responsibility.

C. Source Quality Control:

1. Materials and fabrication procedures are subject to inspection and tests in the mill, shop, and field conducted by a qualified inspection agency. Such inspections and tests will not relieve the CONTRACTOR of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

2. Promptly remove and replace materials or fabricated components which do not comply.

D. Design of Members and Connections: All details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at the site whenever possible without causing delay in the work.

E. Inspection: The CONTRACTOR is responsible for coordination with an independent certified welding inspector and a testing agency retained by owner to perform, document and prepare reports of welding and bolt connection inspection as required by the City Building Department.

1.04 SUBMITTALS

A. Shop Drawings, Structural Steel:

1. Submit shop drawings including complete details and schedules for fabrication and

shop assembly of members, and submit details, schedules, procedures and diagrams showing the sequence of erection.

2. Engineer's review of shop drawings will be for general conformance to the design only. Compliance with requirements for materials fabrication and erection of structural steel is the CONTRACTOR's responsibility. Review of shop drawings will not relieve the CONTRACTOR of his responsibility to provide structural steel work in accordance with the contract drawings and specifications.

   a. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.

   b. Provide setting drawings, templates, and directions for the installation of anchor bolts and other anchorages to be installed by others.

B. The CONTRACTOR shall submit a copy of welding inspector's certificate and testing agency's certificate to the Engineer for approval. Cost to provide welding inspection and testing services shall be at CONTRACTOR's expense.

C. The CONTRACTOR shall submit a copy of structural steel mill certificates, test reports and certificate of compliance.

1.05 DELIVER, STORAGE AND HANDLING

A. Deliver materials to the site at such intervals to insure uninterrupted progress of the work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Rolled Steel Plates, Shapes and Bars: ASTM A 36, except where other type steel is shown.

B. Steel Pipe: ASTM A 53 and shall be galvanized.

C. Structural Steel Tubing: ASTM A 500, Grade B, and shall be galvanized.

D. Cold Form Section: Shall be high tensile steel having a yield strength of 50 KSI conforming to ASTM A607, Grade 50, galvanized.

E. Anchor bolts, Machine Bolts, and Nuts and Washers shall conform to ASTM A307, galvanized.

F. Electrodes for Welding: Comply with AWS Code. Use E70XX electrodes.

G. Structural Steel Primer Paint: Manufacturer's or fabricator's standard, fast-curing, lead-free, "universal" primer; selected for good resistance to normal atmospheric corrosion, for compatibility within finish paint systems indicated and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

H. Galvanizing: Provide hot-dip galvanize coating for items specified to be galvanized, as follows:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanized rolled, pressed and forged steel plates, bars and strip 1/8" thick and heavier.

J. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with ASTM A-780. Application shall have a minimum dry film thickness of 2.0 mil.

K. Non-Shrink Grout: Shall conform to ASTM C-827.

L. High Strength Bolts: ASTM A325, Type I, galvanized.

2.02 FABRICATION

A. Shop Fabrication and Assembly:

1. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as in accordance with AISC Specifications and as indicated on the final shop drawings.

2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

3. The CONTRACTOR shall be responsible for all errors of detailing, fabrications, and for correct fitting of all structural members.

B. Welding shall be done by approved certified welders who have been previously qualified by tests, Welding shall be in accordance with AWS D1.1. Any welds which are found to be defective must be cut out and replaced. "Code for Arc and Gas Welding in Building Construction," latest edition, Sections II, III, and IV, formulated by American Welding Society, shall be followed in design and execution of structural welding.

1. All welding shall be done by electric-arc process with coated rods, not fluxed, so as to produce shelled arc, and shall comply with requirements of above specified manual.

2. Surfaces, seams, or joints to be welded shall be free from rust, scale, grease, and any other foreign material.

3. All welds shall be free of craters, occlusions, cracks, and porosity and shall develop physical and chemical characteristics equal to or better than those of materials being welded. Minimum weld shall be 1/4-inch unless otherwise noted on drawings.

4. All welds shall be ground and dressed smooth and all weld flux, slab, and spatter shall be completely removed.

5. All welds exposed to weather shall be full weld.

C. Connections

1. Weld shop connections, as indicted.

2. Bolt field connections, except where welded connections or other connections are indicated. Provide unfinished threaded fasteners.

3. Connections not indicated shall be designed and provided by the CONTRACTOR and shall be made to conform with AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings. Develop full strength of members in all connections. One sided connections will not be permitted.

2.03 SHOP PAINTING

A. General: Shop paint all structural steel members, except those members or portion of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on the exposed portions and the initial 2 inches of embedded areas only.

1. Do not paint surfaces which are to be welded.

2. Do not paint surfaces, which are scheduled to receive spray-on fireproofing.

3. Apply 2 coats of paint to surfaces which will be inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

B. SHOP PAINTING: Remove all mill scale, rust, dirt and other deleterious materials. Clean all surfaces in accordance with Steel Structures Painting Council, SSPC No. 6 Commercial Blast Cleaning. As soon as possible after cleaning and before any rust has formed, shop paint with primer. The application shall be made to a uniform dried film thickness of not less than 2.0 mil. Damaged areas shall be promptly repaired with primer.

C. Field Painting: After erection, entire work shall be in neat, clean, and acceptable condition, ready to receive finish coats of paints or to provide complete uninterrupted protection of exposed metal if finish painting is not required.

1. Field welds and any abrasions in shop coat shall be cleaned and primed with same paint as that used for shop coat.

2. All bolts, washers, and nuts used in connecting structural members shall be cleaned of all rust, oil or grease and given one coat of primer.

2.04 GALVANIZING

Items specified herein and/or indicated on drawings as "galvanized" shall be galvanized after fabrication in accordance with ASTM A 123. "Fabrication" shall include all operations such as shearing, punching, bending, forming, welding, smooth and free from projections, barbs and icicles resulting from galvanizing process. Repair damaged areas of galvanized surfaces with zinc galvanizing repair paint. Prime galvanized surfaces with zinc dust oxide.

PART 3 - EXECUTION

3.01 INSPECTION

Examine the areas and conditions under which structural steel work is to be installed, and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Inspector.

3.02 ERECTION

A. General: Erect steel in accordance with the AISC Specifications and as herein specified. Provide all necessary equipment to include but not limited to safety belts, lines, platforms, nets, etc. for safety of workmen. Work shall be erected plumb, square and true to line and level.

B. Surveys: Check lines and elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices before steel erection proceeds. Discrepancies should be reported immediately to the Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to the structural steel work have been agreed upon with the Engineer.

C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members as required with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of the structures as erection proceeds.

D. Anchor Bolts: Install anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

Furnish templates and other devices as necessary to presetting bolts and other anchors to accurate locations.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.

1. Set loose and attach base plates and bearing plates for structural members on wedges or other adjusting devices.

2. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with non-shrink grout.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.

F. Field Assembly: Set structural frames accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of the structure within specified AISC tolerances.

2. Splice members only where shown or specified.

G. Erection Bolts: On exposed welded construction, remove erection bolts; fill holes with plug welds; grind smooth at exposed surfaces. Where removal is not required, tighten bolts securely and leave in place.

H. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and the removal of paint on surfaces adjacent to field welds. Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing

members. Ream holes that must be enlarged to admit bolts.

I. Gas Cutting: Do not use gas cutting torches in the field for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members which are not under stress. Finish gas-cut sections equal to a sheared appearance when permitted.

3.03 FIELD QUALITY CONTROL

Correct deficiencies in structural steel work which inspections have indicated to be not in compliance with requirements. Perform additional tests at the CONTRACTOR's expense, as may be necessary to reconfirm any non-compliance of the original work, and as may be necessary to show compliance of corrected work.

3.04 CLEANING

Upon completion of work, all surplus materials, rubbish and debris, shall be removed from premises, leaving same in clean and satisfactory condition.

END OF SECTION

SECTION 05300 - METAL DECKING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Work:

Metal decking required for this work is indicated on the Drawings and, in general, is limited to furnishing and installing the floor and roof decking.

B. Related Work:

1. Refer to Section 05120, STRUCTURAL STEEL

1.03 QUALITY ASSURANCE

Codes and Standards: Comply with provisions of the following except as otherwise indicated.

1. "Code for Welding in Building Construction" of the American Welding Society.

1.04 SUBMITTALS

Shop Drawings

1. Before any metal decking is delivered to the job site, submit Shop Drawings, certificate of material compliance and test reports to the engineer for approval in accordance with contract requirements. Engineer's review is for general conformance to the design only.

2. Show all sizes, locations, and marking of decking units, the sizes of holes to be cut in the shop, types of end closures and fittings, and all methods of securing, anchoring, and attaching to structural members.

3. Show all welds as shown on the drawings or as specified herein.

1.05 PRODUCT HANDLING

A. Protection: Use all means necessary to protect metal decking before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost.

PART 2 - PRODUCTS

2.01 MATERIAL

General: All metal decking shall be manufactured from flat rolled carbon steel sheets with steel conforming to ASTM A 446, Grade A, G60 hot-dip galvanized, with minimum yield stress of 33 ksi. Before being formed, the steel shall have received a metal protective zinc coating conforming to ASTM A 525.

2.02 METAL DECKING

A. General: Metal decking shall be wide rib deck type with ribs, 2-1/2 inch maximum at top and 1-3/4 inch minimum at bottom, spaced approximately at 6 inches o.c. Depth of decking shall be 1-1/2 inches and in 36 inches width.

Floor decking shall be provided with side lugs or other means necessary to be composite with the concrete topping. Minimum gage of steel shall be 20 gage with minimum moment of inertia = 0.216 in^4 and section modulus = 0.248 in^3.

B. Overlaps: Decking sheets shall be formed at sides in such manner that they will overlap and/or interlock, abutting decking sheets with minimum 2 inch wide pressure sensitive cloth tape to prevent dripping of concrete through the joint.

C. Sheet Sizes: Decking sheets shall be in lengths necessary to span minimum of 3 spans. End joints shall occur over bearings only.

D. Accessories: Closure strips, closure plates, deck fillers, plates, and other accessories shall be formed of same material as that used for metal decking, and shall be provided as required. Accessories shall be fastened in place by means of electric welding. Closures made of rubber or other approved material shall be provided in voids between ribs of decking at tops of walls or partitions as indicated on drawings.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. Handling: Special care shall be exercised so as not to damage or overload decking during construction period. After installation, concentrated construction loads will not be permitted unless adequate shoring below is provided.

B. Installation: Metal decking shall be installed complete, including all shaping, fitting, drilling, welding, and all other accessories and miscellaneous items necessary for proper installation.

C. Cutting and Fitting: Opening for stacks, pipes, drains, and any other penetrations through deck, shall be cut and fitted neatly and shall be reinforced as necessary for rigidity and load carrying capacity.

D. Welding:

1. Decking sheets shall be welded to supporting structural members by electric arc welding, conforming to AWS Welding Code D1.1. All welds shall be minimum 3/4 inch puddle welds and shall be made from top side through bottom of rib, penetrating all thicknesses of metal and securely attaching deck to supporting member. All welders shall be certified welders and shall follow closely behind workmen placing deck. Under no conditions shall placed sheets be left unattached.

2. Decking sheets shall be welded to structural supports at every structural support. At end supports, weld decking sheets at 6 inches o.c. at each bearing. At intermediate supports, weld decking sheets at 12 inches o.c. maximum spacing. At longitudinal side supports, weld to supporting structural members at 24 inches o.c. maximum. Each sheet of decking in row shall be laid and welded in place immediately before succeeding sheet in same row is laid. All welds shall be cleaned by chipping or wire brushing and shall be coated with approved zinc paint being covered.

3. Longitudinal side laps of adjacent decking sheets shall be fastened together by tack welding or button punching at spacing not more than 30 inches o.c.

4. After completion of all decking sheets, entire surface shall be carefully checked. Any welds that have been torn loose due to insufficient welds or construction loads shall be immediately rewelded. The CONTRACTOR shall be responsible for protecting all metal decking work from damage by other trades prior to completion of work.

E. Field Painting: All scuffs and abrasions and all field welds shall be painted using a zinc coating.

3.03 CLEAN-UP

Upon completion of work, all surplus material, rubbish and debris shall be removed from premises, leaving same in clean and satisfactory condition.

END OF SECTION

SECTION 05500 – METAL FABRICATIONS

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Provide all metal fabrication work, including, but not limited to, the following:

1. Steel pipe guardrails and handrails.

2. Expansion joint covers.

3. Furnish miscellaneous steel attachments, anchors, plates, angles, etc., to be set in concrete.

4. Include all anchors, angles, bolts, expansion shields for items only in this section, and other accessories shown in details and/or required for the complete installation of all work.

1.03 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's product data for all manufactured products.

B. Shop Drawings: Submit complete shop drawings of all miscellaneous metal work to the Engineer for review and approval before fabrication. Detail all members and connections not specifically shown but which are required to complete the work.

C. Certificates of Compliance: Submit certificates of conformance for the following:

1. Steel

2. Bolts, nuts, and washers

3. Shop painting materials

4. Welding electrodes and rods

5. Galvanizing

1.05 SYSTEM PERFORMANCES

A. Structural Performances: Provide assemblies which, when installed, comply with the following minimum requirements for structural performance, unless otherwise indicated.

1. Handrails and Toprails: Capable of withstanding the following loads applied as indicated when tested per ASTM E 935: Concentrated loads of 200 lbs. applied at any point in any direction.

2. Guardrails: Intermediate horizontal rails capable of withstanding a uniform load of 25 lbs. per sq. ft. of gross area of guard, including any open areas, of which they are a part.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Structural Steel Shapes, Plates, and Bars: Conforming to ASTM A 36, hot-dipped galvanized.

B. Steel Pipe: ASTM A 53, Type E or S, Grade B, galvanized.

C. Steel Tube: ASTM A 500 or ASTM A 501, galvanized finish G90.

D. Anchors and Fasteners: Where exposed, shall be of the same material, color, and finish as the metal to which applied.

1. Expansion shields: CID A-A-1924, Group II, Type 4, Class 1, pre-drilled expansion shields, hot-dip galvanized, sized to match threaded rods or bolts to be installed. Provide shields recessed not less than 2-1/2 inches into concrete or masonry, unless as directed by the manufacturer.

2. Lag Screws and Bolts: ANSI B18.2.1, type and grade best suited for the purpose, hot-dip galvanized.

3. Bolts: ASTM A 307, hot-dip galvanized.

4. Nuts: ASTM A 563, Grade A, hex style, hot-dip galvanized.

5. Washers: ASTM F 844, hot-dip galvanized.

E. Shop Paint:

1. Metal Primer Paint: Fabricator's standard fast-curing, "universal" primer free from asbestos, lead, mercury, chromate, and cadmium, and compatible with finish paint systems, and complying with SSPC – Paint 5.

2. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900 – PAINTING.

F. Galvanizing Repair Paint: High zinc dust content paint complying with ASTM A-780.

G. Nonshrink Nonferrous Grout: non-metallic grout, premixed, specially manufactured for this purpose, with mix and setting characteristics as recommended by the manufacturer for the purpose intended. Conform to ASTM C-827. Use as fill for embedment of railing posts in floor sockets and for similar uses. Mix and place in strict accordance with manufacturer's instructions.

H. Expansion Joint Covers:

1. Floor Covers: GFS-100 floor covers by C/S Group or approved equal.

2. Floor to Wall Covers: GFRW floor to wall covers by C/S Group or approved equal.

3. Wall Covers: FWF-300/400 wall covers by C/S Group or approved equal.

4. Ceiling Covers: FCF ceiling covers by C/S Group or approved equal.

2.02 FABRICATION

A. Workmanship:

1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32-inch unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

3. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

4. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

5. All sharp edges, corners and parts shall be grind smooth to the satisfaction of the Engineer.

B. Galvanizing: All items shall be hot-dip galvanized. Provide a zinc coating as follows:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strip 1/8-inch think and heavier; and for assembled steel products.

3. Provide minimum G90 coating designation.

C. Shop Painting:

1. Shop paint miscellaneous steel metal work, except galvanized surfaces and surfaces to be embedded into concrete, unless otherwise specified.

2. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports as required to complete work.

2. Fabricate miscellaneous units to sizes, shapes, and profiles shown or, if not shown, of required dimensions to receive other adjacent work to be retained by framing. Except as otherwise shown, fabricate from structural steel

shapes and plates and steel bars. Cut, drill, and tap units to receive to receive hardware and similar items.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment, elevation, plumb, and level, true and free of rack, measured from established lines and levels.

C. Install expansion joint covers as recommended by manufacturer.

3.02 MISCELLANEOUS METAL FABRICATIONS

A. The following fabricated assemblies are described in brief outline to indicate, in addition to the drawings, the general design and details desired. Standard products of manufacturers specializing in similar work will be considered insofar as they fulfill the requirements and do not violate governing codes for building and standards of good construction work.

1. Handrail and Guardrail General: To maximize extent practicable, railing shall be shop fabricated. Rigid joints shall be flush-finished welded assembly. Joints shall be reinforced with tight-fitting interior sleeves and shall be assembled by welding rails and posts to flush-type fittings, or by mitering and welding adjoining rails to posts. Expansion joints shall be located at lengths of rails as recommended by the manufacturer. Expansion joints shall be the inner-sleeved ship joint type with one end of the sleeve secured to the railing. Expansion joints and splices shall be located near the intersection of rails and posts. Bends in railing shall be smooth and made in a manner that will not crush or deform the railing. All welds shall be ground smooth and railings shall be free of burrs and sharp corners and edges.

2. Metal Pipe Stair Railing and Guardrails: Railing and guardrail shall consist of Schedule 40, galvanized steel pipe and tube in sizes as indicated, with joints butt-welded, or welded with internal connectors, and all welds dressed smooth. Plug open ends and return to walls. Provide wall brackets and

floor attachment of design shown, and securely fasten in place to conform to system performance.

3. Metal Tube Handrails: Shall consist of Schedule 40, 1-1/2 inch O.D. galvanized steel pipe unless indicated otherwise with wall brackets fabricated as detailed on drawings.

4. Guardrail: Guardrail shall consist of galvanized steel tube and bars in sizes and arrangement as indicated with joints butt-welded and all welds dressed smooth. Fasten in place as indicated to conform to system performance.

3.03 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean bolted connection and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

DIVISION 6 - WOOD AND PLASTICS

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Work Included: Provide all rough carpentry, complete, including, but not limited to, roof sheathing, rough bucks, blocking, furring strips, and rough hardware.

B. Related Work Described Elsewhere:

1. Occupancy, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS-AIR QUALITY REQUIREMENTS.

2. Finish carpentry is under Section 06200 - FINISH CARPENTRY.

3. Wood treatment is under Section 06311 - TREATED LUMBER.

1.03 QUALITY ASSURANCE

A. Grading Marks: Factory mark each piece of lumber with type, grade, mill, and grading agency identification. Certificate of inspection and grading by a recognized agency may be submitted with each shipment in lieu of factory marking, at the CONTRACTOR's option. A recognized agency is one who is certified to inspect and grade lumber in accordance with the latest applicable West Coast Lumber Inspection Bureau or Western Wood Products Association. "Standard Grading Rules" and its revisions. Wording will be added to specs.

B. Wood Treatment: For non-fire-retardant treated lumber, wood treatment shall be in accordance with Section 06311.

C. Fire Retarded Treated Wood: Fire retardant treated lumber and plywood shall be pressure-treated with Dricon fire retardant chemicals with follow-up inspection provided by Underwriters Laboratories, Inc.. Each piece shall bear the UL label or imprint certifying a Class A/Class I flamespread rating, an interior Type A product

and kiln dried after treatment (KDAT). Each piece shall carry a National Evaluation Services report number.

1.04 SUBMITTALS

A. Certificates: Provide a certificate of treatment showing compliance with the specifications, and a certificate of dryness for all wood specified to be dried after treatment.

1.05 PRODUCT HANDLING

A. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and provide air circulation within stacks.

1.06 JOB CONDITIONS

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, rough bucks, blocking, and similar supports to allow proper attachment of other work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber, General:

Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2. Provide seasoned lumber with 15% maximum moisture content at time of dressing.

B. Framing Lumber:

1. Light framing lumber: 2 inches through 4 inches thick, less than 6 inches wide, such as studs, plates, blocking, rough bucks, furring, etc., provide Construction grade, Douglas Fir/Larch, or Hem/Fir.

2. For structural framing 2 inches through 4 inches thick, 6 inches and wider, provide No. 1 grade, Douglas Fir, (WCLB or WWPA).

3. For exposed members, provide Douglas Fir Select Grade, vertical grain, resawn.

C. Concealed lumber such as studs, plates and blockings shall be Douglas Fir, Coastal Region construction Grade, S4S.

D. Plywood:

1. Plywood Roof Sheathing: Douglas Fir, Selected Decking Grade, VJ1S, S2S, tongue and groove. Moisture content of 15% or less.

2. Softwood Plywood: Comply with U. S. Product Standard PS I-74 for softwood plywood, Group 1, Douglas Fir, Exterior Grade only.

   a. A-B Grade: Where one side is exposed.

   b. C-C Grade: Where used at gutters, or fully concealed.

   c. Provide rough sawn Douglas Fir plywood where shown, Grade A-C.

   d. Provide Redwood veneer plywood, rough sawn where shown, Exterior Grade A-C.

3. Concealed Performance-Rated Plywood: Where plywood panels will be used for concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposed durability classification, edge detail (where applicable) and thickness.

E. Fasteners:

1. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable ANSI Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

a. All fasteners and anchorages shall be of hot-dip zinc coated galvanized or of stainless steel type.

b. Hot-dip zinc-coated galvanizing shall conform to ASTM A 153 and UBC Std. Table No. 25-17-T. Where the hot-dipped zinc-coated fastener is to be used in connection with treated wood foundations, its coating weight shall be at least 2.00 oz/sf for the average of specimens tested and 1.70 oz/sf for any individual specimens, mechanically galvanized and electrogalvanized nails having additional coatings of thermoplastic polymer shall be applied.

c. Nails: "Ring-shank" type stainless steel nails. Do not use smooth stainless steel nails.

2. Moisture Barrier: 30-lbs. roofing felt, asphalt saturated, ASTM D 226.

2.02 WOOD TREATMENT

A. Fire Retardant Treatment

1. All fire retardant treated lumber and plywood shall be Dricon fire retardant treated wood manufactured by one of Hickson Corporation's licensed producers.

2. The fire retardant chemical provides protection against termites and fungal decay and must be registered for use as a wood preservative by the U. S. Environmental Protection Agency.

3. All fire retardant wood must have a flamespread of less than 25 when tested in an extended 30-minute tunnel test in accordance with ASTM E-84, NFPA 255 or UL 723.

4. All lumber must be kiln dried to a maximum moisture content of 19 percent after treatment. All plywood must be kiln dried to a maximum moisture content of 15 percent after treatment.

5. All fire retardant wood must comply with the requirements in AWPA Standard C-20 for lumber and C-27 for plywood.

6. Carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood must exhibit corrosion rates less than one mil per

year when tested in accordance with Federal Specification MIL-L-19140 Paragraph 4.6.5.2.

7. The fire retardant chemicals used to treated the lumber shall be free of halogens, sulfates and ammonium phosphate.

8. Testing on the fire performance, strength and corrosive properties of the fire retardant treated wood shall be recognized by issuance of a National Evaluation Services Report.

B. All other lumber and plywood shall be treated in accordance with Section 06311 - TREATED LUMBER.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Discard units of material with defects which might impair quality of work, and units which too small to use in fabricating work with minimum joints or optimum joint arrangement.

1. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.

2. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.

3. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

B. Wood Framing, General:

1. Provide framing members of sizes and on spacings shown, and frame openings as shown, or if not shown, comply with recommendations of "Manual for House Framing" of National Forest Products Association. Do not splice structural members between supports.

2. Anchor and nail as shown, and to comply with "Recommended Nailing Schedule" of "Manual for House Framing" and other recommendations of N.F.P.A..

3. Provide moisture barrier below all wood plates resting on concrete.

C. Wood Blocking, Rough Bucks, and Furring Strips: Provide wherever shown and where required for attachment of other work. Form to shapes as shown and cuts as required for true line and level of work to be attached. Coordinate location with other work involved. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown.

D. Retreat cut and penetrated non-fire-retardant-treated lumber including all coring holes for bolts and fastenings in accordance with Section 06311 - TREATED LUMBER.

E. Do not rip or mill fire retardant treated lumber. Only end cuts, drilling holes and joining cuts are permitted unless the material carries a UL approved milling after treatment classification. All cuts on plywood are considered end cuts due to the nature of the product. Nailing schedules and panel spacing of Dricon FRT plywood shall be in accordance with the Design and Construction Guide for Residential and Commercial Uses (1993) of APA - The Engineered Wood Association. Dricon FRT plywood shall be nailed and not stapled.

F. Dricon fire retardant treated plywood used in structural applications shall be graded or span-rated material that has been applied using the design adjustments provided in NER-303. A corrosion resistant fastener, such as hot-dipped galvanized nails, or better, shall be used. Dricon FRTW shall not be used in roof designs employing a radiant barrier located beneath the bottom surface of the sheathing.

G. Fastening By Pneumatic, Gas and Electric Powered Drivers

1. Fasteners having chipped coatings shall not be used.

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

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

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

5. Where the corrosion resistant coating on the head of the fastener has been chipped by the pneumatic, gas and electric power driven device in excess of 25%, the fastener shall be removed and replaced. The device shall not be used until its driver blade has been checked for wear and tear and repaired as necessary.

6. Nails shall be of the proper length to suit their particular application (the point of the nail shall not be exposed after being driven).

END OF SECTION

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Provide all finish carpentry work, complete, including, but not limited to, the following items.

1. All finish carpentry work blocking, etc.

2. Wood trim.

3. Millwork.

4. Custom casework.

5. FRP panels.

6. Rough hardware.

7. Install doors and frames, finish hardware, toilet partitions and doors, toilet room accessories, fire extinguishers cabinets, and any other items specified to be installed under this section but furnished under other sections of these specifications.

B. Related Work Specified Elsewhere

1. Occupancy, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS-AIR QUALITY REQUIREMENTS.

2. Wood treatment is under Section 06311 - TREATED LUMBER.

1.03 QUALITY ASSURANCE

A. Grading Marks: Factory mark each piece of lumber and plywood with type, grade, mill, and grading agency identification. Certificate of inspection and grading by a

recognized agency may be submitted with each shipment in lieu of factory marking, at the CONTRACTOR's option.

B. Wood Treatment: In accordance with Section 06311.

1.04 GUARANTEES

A. Provide one (1) year written guarantee against defective finished carpentry materials and workmanship for all individual products or assemblies of products shown on the drawings and specified herein. The one (1) year guarantee period shall begin after the project final acceptance date.

1.05 SUBMITTALS

A. Shop Drawings: Submit shop drawings to Engineer showing location of each item, dimensioned plans and elevations, materials, large scale details, attachment devices and other components. Submit shop drawings for millwork.

B. Samples: Submit 4 each samples of the following:

1. Each kind of finish wood, 12 inch length with 6 inches finished.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver finish carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

PART 2 - PRODUCTS

2.01 WOOD PRODUCT QUALITY STANDARDS

A. Softwood Lumber Standards: Comply with PS 20 and with applicable grading rules of the respective grading and inspection agency for the species and product indicated.

B. Plywood Standards: Comply with PS 1 for softwood plywood; PS 51 for hardwood plywood. All framing plywood shall be pressure treated as per Section 06311.

C. Hardwood Lumber Standard: Comply with National Hardwood Lumber Association (NHLA) rules. Premium (First) Grade White Oak.

D. Solid Wood Trim: Maple, Birch or Oak. Premium Grade for transparent finish.

E. Wood Veneered Plywood for Exposed Wall Paneling and Casework: Exposed and semi-exposed wood surfaces shall be of Maple, Birch or Oak veneer plywood, grade A-D where exposed on one side; grade A-A where exposed on two sides.

2.02 MATERIALS

A. GENERAL

1. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and pattern as shown, unless otherwise indicated.

2. Moisture Content of Softwood Lumber: Provide kiln-dried lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspecting agency for the species and product indicated.

3. Moisture Content of Hardwood Lumber: Provide kiln-dried lumber having a moisture content from time of manufacture until time of installation within a range of 8% to 13% for individual pieces, and an average of 11% for the entire lot.

4. Lumber for Transparent Finish: Use pieces made of solid lumber stock.

B. Interior Finish Carpentry

1. Solid Wood Hardwood: Oak as specified above for transparent finish for areas where “hardwood” is indicated unless specifically noted as another wood species.

2. Formed Millwork (including door, window and trims): Kiln dried, "B and Better", S4S, vertical grain, Douglas Fir.

3. Casework: Exposed and semi-exposed wood surfaces shall be finished with veneer material as indicated on the drawings:

   a. Hardwood veneer plywood and solid stock hardwood of Philippine Mahogany;

   b. Laminated plastic.

C. Exterior Finish Carpentry

1. Solid Wood Trim for Opaque Paint Finish: Douglas Fir, vertical grain, clear, C and Better.

2. T-1-11 Siding: 5/8-inch thick Douglas Fir, textured finish with grooves spacing to match existing ajoining siding, T&G in largest panel sizes available to minimize joints.

D. Miscellaneous Materials

1. Fasteners and Anchorage: Provide nails, screws and other anchoring devices of the proper type, size, material and finish for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications and ANSI.

   a. Fasteners shall be stainless steel.

2. Moisture Barrier: 30-lbs. roofing felt, asphalt saturated, ASTM D 226.

3. FRP Panels: Equal to Marlite panels as manufactured by Masonite or approved equal. Panels shall be 3/32 inch thick, 4 feet wide by heights indicated. Mouldings shall be manufacturer's standard matching colors for starting, splining joints, and base. Adhesive shall be as recommended by the manufacturer for the substrates indicated. Sealant shall be silicone sealant as recommended by the manufacturer.

2.03 FABRICATION

A. Millwork and custom casework shall be fabricated at the mill in accordance with detailed drawings, in as large units as practicable for shipment and introduction into permanent position in an orderly arrangement for neat and rigid field assembly. All units when erected in place shall be straight, square, plumb, level, and free from damage and tool marks; all units shall be belt-sanded at mill and hand-sanded smooth

immediately following installation in place. All joints shall be made up with waterproof glue. Nails and screws shall be placed in concealed surfaces to the maximum extent possible. Particleboard core shall not be used.

B. Wood custom casework shall be as follows:

1. Cabinet Construction: 3/4" plywood throughout unless noted otherwise. Flush overlay type construction.

2. Cabinet Doors and Exposed Cabinet Sides: Wood plywood with laminated plastic or hardwood veneer on both faces and edges.

3. Cabinet Trim shall be solid hardwood.

4. Shelves shall be hardwood veneer plywood with solid wood edging, unless otherwise noted.

C. Plastic laminate finished casework shall be as follows:

1. Cabinet Construction, including Countertops: 3/4" plywood throughout unless noted otherwise. Flush overlay type casework construction, unless detailed otherwise. Countertops shall have postforming grade (NEMA Std. PF42; 0.042” ± 0.005”) plastic laminate with coved backsplash and raised, rounded front edges.

2. Cabinet Doors and Exposed Cabinet Sides: 3/4" plywood with laminated plastic on exposed sides.

3. Cabinet Trim shall be solid wood.

4. Shelves shall be 3/4" plywood with solid wood edging, unless otherwise noted.

5. Exposed Surfaces: provide high pressure laminate in grades indicated for the following types of surfaces:

   a. Horizontal Surfaces: GP-50 (0.049" nominal thickness).

   b. Interior Vertical Surfaces: GP-28 (0.028" nominal thickness).

6. Semi-Exposed Surfaces:

   a. Cabinet Liner: CL20.

b. Backer Sheet: BK20.

D. All Custom Casework

1. Visible Plywood edges banded with wood or pressure glued veneer. No visible nails.

2. Division and end panels shall be dadoed to receive bottoms, web frames and stretchers.

3. Pre-Cut Openings: Fabricate casework with pre-cut openings, where possible, to receive hardware, plumbing fixtures, and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.

4. Measurements: before proceeding with fabrication of casework required to be fitted to other construction, obtain measurements and verify dimensions and shop drawing details as required for accurate fit.

   Where sequence of measuring substrates before fabrication would delay the project, proceed with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

5. Cabinet Door Tolerances: Clearance gap between adjoining doors shall be 1/8" maximum, with a 1/32" maximum allowable variation in gap width.

7. Maximum warp or twist allowed in any surface shall be 1/32" per lin. ft.

E. Millwork:

1. Wood Trims: For interior running trims, including door stops, use long lengths of finish lumber, keeping splices to a minimum. All trims shall be installed straight and level and with mitered splices nailed together. Splices will not be permitted in vertical trims.

2. Wood Frames: Wood frames for doors and other openings shall be constructed as per detail drawings, rigidly and properly fitted together, and installed in place square, plumb. Wherever the detail of joint is lacking, this trade shall employ the best standard practice used in a first-class shop. All finished frames shall be

machine and hand-sanded at the shop. All door frames shall be assembled with waterproof glue in all cut joints. As soon as frames are nailed together, wipe off all excess glue that appears on the surface. Frames shall be set plumb and true, solid blocked, and rigidly secured to structural backing at not more than 24" on centers. Frames shall be of Douglas Fir unless otherwise specified.

2.04 CABINET HARDWARE

A. General: Cabinet hardware is furnished under Section 08710 - FINISH HARDWARE.

2.05 WOOD TREATMENT

A. Wood Treatment: Apply brush coat on surfaces cut after treatment in accordance with Section 06311 - Treated Lumber.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes or patterns.

B. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims.

C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum lengths of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.

E. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and where prefinished matching fasteners heads are required, use

fine finishing nail for exposed nailings, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

F. Casework: Install without distortion so that doors will fit openings properly and be accurately aligned. Adjust hardware to center doors in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

G. Millwork:

1. Wood Frames: All bucks shall be set plumb and true, braced, and kept aligned until partitions are completed, and ready for attachment of finished frames. Install solid wood wedges between frames and CMU block wall, fill all gaps solid and caulk.

2. Installation of Doors: All doors shall be neatly fitted to openings and hung to frames with hardware, plumb and square with proper clearance at side, top, and over threshold, and with all edges of door slightly beveled with tool and sandpaper.

H. Finish Hardware: Specified under Section 08710 - FINISH HARDWARE shall be carefully fitted and installed in accordance with the manufacturer's directions and shall be adjusted for perfect working order to the satisfaction of the Engineer with further adjustment if necessary within one year after acceptance of the project.

1. Closer shall be set as recommended by the manufacturer's direction for the required degree of opening.

2. Door bumpers shall be placed at point of contact.

3. Installation shall be done by skilled mechanics to the satisfaction of the Engineer.

I. Retreat cut and penetrated lumber in accordance with Section 06311 - TREATED LUMBER.

J. FRP Panels: Install FRP panels on walls where indicated in accordance with the manufacturer’s printed instructions. Arrange panels for minimum number of joints except that panel widths of less than 6 inches shall be minimized. Install in a full bed of adhesive with all mouldings secured in place. Apply sealant at all joints as recommended by the manufacturer for a watertight system.

K. Installation of work furnished in other sections but to be installed under this section shall be done in strict accordance with the manufacturer's directions, to the satisfaction of the Engineer.

3.02 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace work. Adjust joinery for uniform appearance.

B. Clean hardware, lubricate and make final adjustments for proper operation.

C. Clean work on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

D. Protection: Installer shall advise the CONTRACTOR of procedures required to protect finish carpentry work during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

SECTION 06311 - TREATED LUMBER

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

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

B. Field treatment of field cut or drilled lumber.

C. Related Sections:

1. Section 06100 - ROUGH CARPENTRY: Lumber products and fire retardant treatment of lumber products.

2. Section 06200 - FINISH CARPENTRY: Lumber products and factory termiticide treated board products suitable for application of high pressure laminate veneers.

3. Section 08210 - FLUSH WOOD DOORS: Doors for dip treatment under provisions of this Section (06311).

1.03 REFERENCES

A. American Wood-Preservers' Association

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

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

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

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

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

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

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

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 - SUBMITTALS.

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.

b. Provide ICBO approvals for treatment solutions used.

2. Preserver Certifications: Provide a Certificate of Treatment showing compliance with these specifications for the following:

a. Kiln drying

b. Method of treatment performed, including dip treatment.

3. The 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.

4. Guarantee: Guarantee form for written guarantee.

1.05 REGULATORY REQUIREMENTS

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

1.06 QUALITY ASSURANCE

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

B. Treatment methods shall be approved by ICBO. Preservatives shall be EPA

registered.

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

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

1.07 DELIVERY STORAGE AND HANDLING

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.

1.08 GUARANTEE

A. Provide a two year guaranty to replace all treated wood which is attacked by subterranean termites up to a total cost of TWENTY THOUSAND AND NO/100 DOLLARS ($20,000.00) over the guaranty period.

B. Provide a five year guaranty to replace all treated wood which is attacked by dry wood termites or deteriorates due to dry rot. The Surety shall not be held liable beyond two years of the project acceptance date.

PART 2 - PRODUCTS

2.01 GENERAL

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

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

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.

2.02 PRESSURE TREATMENT WITH WATER-BORNE PRESERVATIVES

A. Treating Solutions:

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

2. Inorganic boron (SBX).

B. Treatment Methods:

1. 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.

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

3. 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).

C. Drying:

1. 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.

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

2.03 PRESSURE TREATMENT WITH OIL-BORNE PRESERVATIVES

A. Treating Solution:

1. 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.

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

B. Treatment Methods: 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.

C. Drying:

1. 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.

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

2.04 PRESERVATION BY DIP TREATMENT

A. Treating Solution:

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

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

B. Treatment Methods:

1. Immersion treat for a minimum period of 15 minutes. Hollow-core flush wood doors shall be immersion treated for a period of 5 minutes.

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

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

2.05 FIELD TREATMENT

A. Treatment Method:

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

2. Doors shall be treated after manufacture but, where applicable, before application of plastic laminate.

PART 3 - EXECUTION

3.01 SCHEDULE OF TREATMENTS

A. Species:

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

2. 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.

B. Application:

1. Pressure Treatment:

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

b. Hardwood flooring and exposed lumber 1-1/2 inch (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.

2. Dip Treatment: All finish lumber under 1-1/2 inch net thickness (except hardwood flooring); doors (solid wood and solid-core flush wood doors); 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.

3. 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.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07110 -MEMBRANE WATERPROOFING (Below Grade and Between Slab)

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. The CONTRACTOR shall be an approved applicator of the manufacturer whose membrane waterproofing system he proposes to apply. He shall be familiar with the products, equipment and the specified requirements and methods needed for the proper installation of the membrane waterproofing system.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit the following to the Engineer for approval:

1. Prior to the start of work, a signed certificate from the membrane waterproofing manufacturer stating that the CONTRACTOR is an approved applicator of his assemblies.

2. Six (6) copies of the manufacturer's material specifications, application instructions and Material Safety Data Sheets for the membrane waterproofing system and materials which he proposes to use.

3. Guaranty as noted under Section 1.04.

1.04 GUARANTY

A. The CONTRACTOR shall execute to the State of Hawaii a 2-year written guaranty that the installation will be watertight and that any leaks which develop during that period which are not due to improper use or willful damage will be repaired at no cost to the State.

1.05 PRODUCT HANDLING

A. Delivery of Materials: All materials shall be delivered to the site in the original unbroken manufacturer's wrapping material and containers with the original labels thereon intact.

B. Storage of Materials at Job Site

1. Materials shall be stored in accordance with the manufacturer's recommendations.

2. Materials which absorb moisture shall be kept under waterproof cover. Wet materials shall not be permitted to be used on the job and shall be removed promptly from the site.

C. Cautions and Warnings

1. Materials containing solvents shall be stored in a dry cool area with proper fire and safety precautions.

2. Vapors from bonding adhesives, lap cements, membrane material products, etc., may be harmful if breathed in. They may also be flammable. The CONTRACTOR shall consult container labels and Material Safety Data Sheets for specific information and shall employ the necessary safety precautions needed for the products being used.

1.06 TESTING

A. Horizontal membranes placed between slabs located above usable space shall be water tested for at least twenty-four (24) hours under a head equal to the thickness of the floor finish to be placed atop the depressed floor slab. Any leaks shall be sealed and the membrane similarly re-tested until it is watertight.

B. The CONTRACTOR shall notify the Engineer 24 hours in advance before membrane is tested.

C. Fluid-applied membranes shall be subject to compliance testing by the Engineer to ensure proper thickness of application.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Applied Membrane Systems:

Material:	Rubberized Asphalt or Butyl Rubber
Thickness:	60 mil min.
Facing Sheet:	Polyethylene or Polypropylene

Products of the following manufacturers are acceptable provided they meet the materials and construction specified:

Nord Bitumi:	Nordtene 60
Protecto Wrap Co.:	Jiffy Seal 140/60
Polygard Products, Inc.:	Polygard 650
Polyken Technologies:	Polyken 660
QSC Products, Ltd.:	QSC-701
Royston Laboratories:	104-AHT
WR Grace & Co.:	Bituthene 3000

B. Sheet Applied Membrane Systems:

Material:	E.P.D.M. (Ethylene Propylene Diene Monomer) or Chlorinated Polyethylene (CPE)
Thickness:	60 mil min.

Products of the following manufacturers are acceptable provided they meet the materials and construction specified:

Carlisle Syntec Systems:	Sure-Seal EPDM
The Noble Company:	NobleSeal CP

C. Sheet Applied Membrane Systems:

Material:	High density polyethylene (20 mils thick) with bentonite facing of 1# per sq. ft.

Products of the following manufacturers are acceptable provided they meet the materials and construction specified:

Paramount Technical Products Inc.	Paraseal (Below-grade application only.)

D. Fluid Applied Membrane Systems (Cold-Applied):

Material:	1 or 2 component Polyurethane
Thickness:	60 mil min.

Products of the following manufacturers are acceptable provided they meet the materials and construction specified:

Mameco International Inc.:	Vulkem 201 (moisture cure)
	Vulkem 222 (chemical cure)
Multi-Chemical Products, Inc.:	Mult-I-Thane 3000
	Mult-I-Flex 3200 (between slab use only)
The Neogard Corporation:	Permagard
Pacific Polymers, Inc.:	Elasto-Deck BT (Type I or II)
Sonneborn:	HLM 5000
Tremco:	Tremco TP-60

E. Fluid Applied Membrane Systems (Hot-Applied)

Material:	Rubberized Asphalt
Thickness:	Per Manufacturer's Printed Instructions but no less than 1/8" min.

Products of the following manufacturers are acceptable provided they meet the materials and construction specified:

Hydrotech:	Monolithic Membrane 6125
Tremco:	Tremproof 150

F. Surface Primers, Sealants, Flashings, Reinforcing Sheets, Adhesives, Asphalts, Welding Agents, etc. shall be as recommended by the membrane manufacturer for the specific project installation and shall be compatible with the substrate and membrane waterproofing with which it is in contact.

G. Protective Layer for membrane waterproofing applied on vertical surfaces below grade shall be of inert material, compatible with the waterproofing membrane over which it is overlayed and acceptable to the membrane manufacturer. The following materials are acceptable provided the above stipulations are also met:

1. 7/16" thick glass fiberboard.
2. 1/4" thick mineral hardboard.
3. 1/4" thick fiberglass-and-asphalt protection panels.
4. Heavy-duty reinforced rubberized asphalt sheets.

Inert, non-biodegradable Protective Boards which are compatible with the membrane waterproofing and are of sufficient thickness and density to protect the membrane waterproofing as recommended by the protective board manufactuer may be used in lieu of the protective layer described above. The indicated products of the following manufacturers are acceptable provided they also meet the above stipulations:

Amocor:	Amocor-PB4 (Extruded Polystyrene)
Pacific Allied Products, Ltd.:	Expanded Polystyrene
Dow Chemical Company:	Styrofoam (Extruded Polystyrene)
Paramount Technical Products Inc.:	Paradrain (Polyethylene geotextile)

PART 3 - EXECUTION

3.01 INSPECTION OF SURFACES

A. Before the work is started, the Membrane Waterproofing Installer, together with the CONTRACTOR and Engineer, shall examine the surfaces onto which membrane waterproofing is to be applied. Should any condition be found unsuitable, no work shall be done until the unsatisfactory condition has been corrected and is acceptable to the Membrane Waterproofing Installer. Proceeding with the work will imply acceptance of the conditions by the Membrane Waterproofing Installer.

B. Materials used to patch substrate defects shall be compatible with the substrate and the membrane waterproofing.

3.02 INSTALLATION

A. The procedures and details for the application of waterproofing membranes, especially such items as the patching of substrate defects; surface cleaning and preparation; surface priming; installation of bond breakers at joints; installation of inorganic cant strips at vertical and horizontal corners; mixing of components; number of membrane layers or coats; embedment of reinforcing sheets; details at edges, corners, laps, penetrations and discontinuities; sealing and/or fastening of the top edge of the membrane placed on vertical surfaces; protection of the membrane; repair of damage; etc., shall be in strict accordance with the manufacturer's printed instructions and recommendations.

B. For toilets, showers and other similar areas, the membrane shall be extended 4" up adjacent vertical surfaces or 1" above the finished floor level, whichever is higher.

C. Sheet applied membranes shall be rolled or squeegeed onto the surface to ensure total adhesion to the substrate. Wrinkles and buckles in the membrane shall be avoided.

D. Edges and ends of sheet applied membranes shall be lapped and sealed in accordance with the manufacturer's recommendations.

E. Adjoining surfaces which are not to receive waterproofing shall be protected to prevent spillage of liquid materials outside of the membrane area.

F. A protective layer as specified in Sub-paragraph 2.01 G. above shall be provided over membranes on vertical surfaces below grade.

G. The CONTRACTOR shall provide protection for horizontal between-slab membranes to prevent puncturing or damage as follows:

1. Protective layer/boards shall be neatly trimmed and tightly butted together to provide a continuous cover over the membrane waterproofing.

2. Care shall be taken during the backfilling operation to ensure that the membrane and protective layer/boards are not damaged.

H. Care shall be taken to protect under-tile membranes from puncture or damage at all times until topping materials have set.

I. Repair of any damage to the membrane waterproofing shall be in strict accordance with the manufacturer's recommendations.

3.03 CLEAN-UP

A. The installer shall take care to keep surfaces that will be exposed clean. At the completion of work, he shall clean all surfaces onto which waterproofing materials have been dropped, spattered, or brushed and repair damages or defects for which he is responsible. He shall also remove and properly dispose of leftover materials and debris.

END OF SECTION

SECTION 07720 - ROOF HATCH

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent and location of roof hatch and ladder is indicated on the drawings.

1.03 SUBMITTALS

A. Product Data: Submit six (6) copies of manufacturer's technical product data, including rough-in diagrams, details, and installation instructions.

B. Shop Drawings: Roof hatch and ladder shall be detailed and submitted for approval prior to fabrication. Full dimensions, wall and floor attachments, materials, construction and finish must be shown and comply with all safety orders pertinent to the installation.

PART 2 - PRODUCTS

2.01 PREFABRICATED ROOF HATCHES

A. Roof Hatch: Equal to Model 3636, size 3'-0" x 3'-0" for ladder access by O'Keeffe's, Inc. Architectural Building Products, 75 Williams Avenue, San Francisco, CA 94124-2693; Telephone (415) 822-4222; Fax (415) 822-5222, fabricated of 20 gauge galvanized steel cover and 14 gauge galvanized steel curb with green powder coat finish, or equal roof scuttle by Bilco, Milcor, WASCO Products, Inc., or Dur-Red Products, Inc. acceptable to Engineer. Unit shall include padlock on the interior. Key shall be master-keyed to existing master key system.

B. Safety Post: Conform to ANSI A14.3, OSHA and equal to O'Keeffe's Model SP400 or equal products of roof hatch manufacturer acceptable to Engineer. Unit shall have yellow powder coated finish. Unit shall have a vertical telescoping tubular shaft with a safety clamping device that fully locks in any position. Unit shall securely mount to access ladder.

2.02 PREFABRICATED ALUMINUM CAGE LADDERS

A. Type 531 Heavy Duty Cage Ladder by O'Keeffe's Inc. or approved equal.

B. Rungs shall be no less than 1-1/4” in section and 18–3/8” long, formed from tubular aluminum extrusions, alloy 6063-T6 and shall be squared and deeply serrated on all sides. Rungs shall be able to withstand a 1,000 pound load without failure.

C. Channel Side Rails shall be no less than 1/8” wall thickness by 3” wide.

D. Heavy Duty Tubular Side Rails shall be assembled from two interlocking aluminum extrusions no less than 1/8” wall thickness by 3” wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

E. Safety Cage shall be fabricated from 3/16” by 2” aluminum bar, alloy 6063-T5.

F. Security Doors, size as specified, shall be dual joint locking device, formed 1/8” thick aluminum sheet, alloy 5005. Security panels shall extend on both sides, perpendicular to the door face, to within 2” of the wall. Security door shall be furnished complete with continuous aluminum piano hinge and heavy duty forged steel locking hasps.

G. Finish shall be mill finish as extruded or acrylic urethane applied over a chemically pretreated surface in manufacturer’s standard color as selected by the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's instructions and rough-in diagrams. Co-ordinate with installation of roof deck to receive roof hatch, roofing, and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weather-tight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

B. Isolation: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

C. Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement, to form a seal.

D. Operational Unit: Test operational unit with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.02 CLEANING AND PROTECTION

A. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 DESCRIPTION OF WORK

A. Provide all labor, materials and equipment necessary to install flashing, counterflashing and other related work as shown on drawings and as specified herein.

B. Related Work Described Elsewhere:

1. Flashing for modified bitumen roofing are furnished under Section 07540 – FLUID APPLIED ROOF COATING.

2. Sealants shall conform to Section 07920 – SEALANTS.

1.03 SUBMITTALS

A. Shop Drawings: Submit shop drawings with reference made to detail numbers on the Agreement drawings to the Engineer for approval. No fabrication will be permitted before approval is secured.

1.04 STORAGE AND HANDLING

A. All materials shall be stored in such a manner as to afford adequate protection. Damaged materials shall not be used and shall be removed from the site.

1.05 GUARANTEE

A. The CONTRACTOR shall furnish to the Engineer a written guarantee on the sheet metal for a 2-year period after the Project Acceptance Date. The guarantee shall provide for the repair of all leaks as well as repair and replacement of damage to the building and/or its finishes at no cost to the STATE.

1.06 QUALITY ASSURANCE

A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in "Architectural

Sheet Metal Manual", latest edition, of the Sheet Metal and Air Conditioning Contractors National Association, Inc.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Exposed Flashing, Counterflashing, and Metal Edging shall be 20 gauge galvanized sheet metal, ASTM A 525, G90 hot-dip galvanized. Prime all surfaces, including all exposed underside concealed surfaces, area to be connected or lapped over and all cut edges, with corrosive resistant paint.

B. Lead Sheet for Vent Pipe Flashing: ASTM B 749, Grade B, copper-bearing sheet lead, minimum 2-1/2 pounds per square foot, unless indicated otherwise.

C. Solder shall be 50% virgin lead and 50% pure block tin, conforming to ASTM B 32.

D. Flux shall be non-corrosive resin type. Neutralize flux after soldering.

E. Bituminous Plastic Cement: ASTM D 4586, Type I or II.

F. Nails and fasteners shall be galvanized or bright zinc plated, of same metal as flashing, or other non-corrosive metal as recommended by sheet steel manufacturer.

G. Neoprene Flashing Cement: Standard brand (asbestos-free) meeting or surpassing test methods of ASTM D 816 or as recommended by the roofing manufacturer under Section 07540 – FLUID APPLIED ROOF COATING.

H. Flashing & Counterflashing for Galvanized Roof Hatch shall be 20 gauge galvanized sheet metal, ASTM A 525, G90 hot-dip galvanized. Prime all exposed and concealed surfaces and edges with corrosive resistant paint.

I. Bituminous Paint: Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect the surfaces with a coat of bituminous paint conforming to ASTM D 1187 to prevent galvanic or corrosive action. Coating shall be applied in two coats, 9 mils dry film thickness each coat. Bituminous Paint shall be asbestos-free, lead-free, zinc-chromate-free, strontium-chromate-free, cadmium-free and mercury-free.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. Carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that flashing and sheet metal may be installed in accordance with the original design, all pertinent codes and regulations, the referenced standards and the approved shop drawings.

B. Surface to which sheet metal is to be applied shall be even, smooth, sound, thoroughly clean and dry, and free from defects that might affect the application. Report any unsatisfactory surfaces to the Engineer. In the absence of such a report, the CONTRACTOR shall be held responsible for the finished product.

C. All accessories or other items essential for the completeness of the sheet metal installation, though not specifically indicated on the drawings or specified, shall be provided. All such items unless otherwise indicated on the drawings or specified, shall be of the same kind of materials as the item to be applied. Nails, screws and bolts shall be of the type best suited for the purpose intended and shall be of a composition that is compatible with the metal to which it will contact.

D. Except as otherwise indicated on the drawings or specified, the workmanship of sheet metal work, method of forming joints, anchoring, cleating, provisions for expansion, etc., shall conform to the standards details and recommendations of the Sheet Metal and Air Conditioning Contractors National Association's "Architectural Sheet Metal Manual" and shall be subject to the approval of the Engineer.

E. All sheet metal work shall be watertight and wind-tight in compliance with the purpose intended for the items indicated on the drawings or specified herein.

F. Cleating: Cleats for sheet metal work shall be provided where required, spaced approximately 36 inches on centers, unless otherwise indicated on the drawings. Cleats shall be not less than 2 inches wide by 3 inches long of the same material and weight as the metal being installed. Cleats for soldered seams shall be pretinned.

G. Protection from Contact of Dissimilar Materials: Whenever metal surfaces in contact with dissimilar metal or where aluminum is in contact with concrete, masonry, wood, or absorptive materials subject to wetting, entire metal surface in contact shall be painted with a minimum of two coats of heavy-bodied bituminous paint (not less than 9 mils dry thickness each coat). In dry, weather-protected, indoor space, dissimilar metal surfaces may be separated by means of continuous moisture-proof 30# building felt in lieu of bituminous coatings.

H. Paint all exposed sheet metal and connectors.

3.02 PROTECTION

A. Protect all sheet metal work until final acceptance of the Project.

3.03 CLEAN-UP

A. At completion of the work, clean up and remove all rubbish and debris from the premises which resulted from this work.

END OF SECTION

SECTION 07540 – FLUID APPLIED ROOF COATING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. The CONTRACTOR shall visit the job site to verify the site conditions and dimensions prior to submitting his bid.

B. The roof coating operations shall be so coordinated with appurtenant work such as sheet metal work that once started shall be continuous to completion.

C. The Roof Coating subcontractor shall be an approved applicator of the manufacturer whose coating system he proposes to apply and his men shall have been instructed by that manufacturer (or their representative or independent roof coating auditor/inspector) in the proper application of his system.

D. The Technical Representative and their independent auditor/inspector (where applicable) shall be competent, thoroughly trained and experienced in the work and shall be completely familiar with the products, equipment and the specified requirements and methods needed for the proper installation of the roof coating and flashings.

A Corporate Officer of the Manufacturer shall provide a letter authorizing the Technical Representative to provide onsite inspection through out all stages of the product installation.

E. The CONTRACTOR and the Technical Representative and/or their independent coating auditor/inspector shall attend a pre-construction conference to review the preparation and installation requirements for the roof coating system and the coordinating and scheduling required with related trades. They shall also inspect the roof surfaces at the following times:

1. Prior to the start of the roof coating installation as noted under Section 3.01 A. where required by the manufacturer to validate his warranty.

2. At the actual start of the roof coating application.

3. Once during the roof coating application.

4. At job completion.

(Note: It shall be the responsibility of the CONTRACTOR to notify the roof coating applicator, Technical Representative or their independent auditor/inspector (where applicable) and the Engineer of his schedule of operations. Parties shall be notified at least 5 days in advance to enable their attendance.

F. The cost of hiring the Technical Representative and their independent auditor/inspector shall be entirely borne by the CONTRACTOR.

G. Related Work Described Elsewhere:

1. Coordinate installation of flashing and sheet metal with Section 07600 - FLASHING AND SHEET METAL.

2. Coordinate installation of roof hatches with Section 07720 - ROOF HATCHES.

1.03 REFERENCES

A. ASTM B117 - Test Method of Salt Spray (Fog) Testing.

B. ASTM G-29 - Test Method for Algae Resistance.

C. ASTM E-108 - Test Method for Fire Test of Roof Coverings.

D. ASTM D1653 - Test Method for Water Vapor Permeability.

E. ASTM G26 - Practice for Operating Light-Exposure Apparatus (Xenon Arc Type).

F. ASTM D - 412 Ultimate Tensile Strength at Break.

1.04 SUBMITTALS

A. The CONTRACTOR shall submit the following to the Engineer:

1. Prior to the start of any work, a signed certificate from the proposed roof coating manufacturer showing that the applicator is a trained and authorized applicator of his assemblies.

2. A signed certificate from the proposed manufacturer naming their representative and their independent roof coating auditor/inspector (where applicable) and showing that he is authorized to act on and make commitments in their behalf.

3. Six (6) complete sets of the following information for the roof coating system he proposes to use. Submittals shall be marked-up as necessary to clearly identify the item being submitted and its conformance to the requirements of these specifications.

   a. Manufacturer's material product data and Material Safety Data Sheets for the following items:

      Fluid Applied Roof Coating System:

      (1) Primer.
      (2) Foundation coat.
      (3) Reinforcing fabric.
      (4) Fabric saturation coat.
      (5) Finish coat.
      (6) Roof drains.
      (7) Fasteners, etc.

   b. Detailed installation drawings and specifications for the proposed roof coating system/assembly. Indicate joint reinforcing, flashing details, termination conditions and conditions of interface with other materials.

   c. Test report from a qualified testing laboratory indicating that the proposed roof coating system has a fire classification rating of Class A.

   d. Where required, Factory Mutual, UL, or Warnock Hersey approval for the proposed roof coating system.

4. Detailed roof coating inspection reports by the Technical Representative or their independent roof coating auditor/inspector to coincide with required inspection times.

5. Warranties and Guaranties as noted under Section 1.05.

1.05 WARRANTIES AND GUARANTIES

A. The CONTRACTOR shall furnish to the Engineer the following:

1. A written guaranty on the roof coating membrane system and flashing for a 2-year period after the Project Acceptance Date. The guaranty shall provide the following at no cost to the STATE:

a. Repair of roofing, fascias and flashings as necessary to seal leaks which are attributable to faulty materials and/or workmanship;

b. Repair or replacement of damage to the building and/or its finishes, equipment and/or furniture when occasioned by such leaks; and

c. Inspection of the roof coating system and flashings together with the Engineer, on or about the 1st and 2nd anniversaries of the Project Acceptance Date, and repair or replacement of roof coating and/or flashing as necessary to correct any deficiencies in workmanship or materials, such as by eliminating blisters exceeding 12 inches in any dimension or re-adhering open seams. Such repair or replacement of the roof coating system and/or flashings shall be done in a manner which will preserve the integrity of the roof coating membrane.

2. A 10-year roof coating membrane system warranty and flashing endorsement from the manufacturer. The warranty shall cover both material and workmanship and shall provide that in the event of failure due to normal weathering and wind conditions during the remainder of the warranty period (the 3rd through 10th years after the Project Acceptance Date), the roof coating system manufacturer will make repairs as necessary to maintain the roof in a watertight condition at no cost to the STATE. The warranty shall also state the manufacturers acceptance and certification that the work has been installed in accordance with the manufacturer's instructions and that the owners personnel have been properly instructed in its maintenance.

1.06 PRODUCT HANDLING

A. Deliver materials to site in manufacturer's unopened and undamaged containers bearing the following information:

1. Name of manufacturer.

2. Name of contents and products code.

3. Net volume of contents.

4. Lot or batch number.

5. Storage temperature limits.

6. Shelf life expiration date.

7. Mixing instructions and proportions of contents.

8. Safety information and instructions: Store and protect materials from damage and weather in accordance with manufacturer's instructions.

B. Store materials at temperatures between 50 and 90 degrees F (10 and 32 degrees C). Keep out of direct sunlight.

PART 2 - PRODUCTS

2.01 ROOF COATING ASSEMBLIES

A. General Requirements:

1. The waterproofing system must be Tested, Approved, and Listed as a Factory of Mutual Class One Roof Construction (Standard 4470, Class 1 for Fire, Windstorms and Hail Classifications). The system must Class A Fire Rating. All materials shall be labeled in accordance with the appropriate requirements they meet Factory of Mutual or U. L. labeling.

2. Roof coating materials shall conform to ASTM specifications as indicated.

3. Color of membrane/coating shall be tan.

B. Roof Coating Assemblies: Premium Coat System by Hydro-Stop or approved equal.

2.02 SOURCE QUALITY

A. Source Quality: Obtain roof coating products in this Section from a single manufacturer.

2.03 MATERIALS

A. Waterproofing Material: Hydro Stop's Premium Coat System, three-stage, fabric reinforced, flexible acrylic coating, liquid applied in successive stages to form one continuous, seamless, watertight membrane; 40 mil minimum cured total system thickness; comprised of the following:

B. Foundation and Saturation Coats: This coating shall be a liquid applied highly flexible water base 100% pure acrylic polymer resin coatings (no styrene, vinyl or styrene butadiene), co-polymer internally plasticized to maintain elastomeric properties. Both the Foundation Coat and Finish Coat must consist of the same resins and quantity of resins.

C. Finish Coat shall be highly flexible, ultraviolet light resistant, water base 100% pure acrylic polymer resin coating (no styrene, vinyl or styrene butadiene), co-polymer internally plasticized to maintain elastomeric properties. This coat shall contain the necessary pigment for the specified finish color. Color as selected from manufacturer's standard colors.

D. Barrier Guard: Designed for waterproofing all types of masonry surfaces such as foundation walls, concrete panels, exterior basement walls, retaining walls, and moisture-retaining structures such as cisterns and concrete shrubbery boxes. Mixed with water and Portland cement, and fully reinforced with Barrier Guard Fabric, it forms a hardwearing, flexible compound. It is also resistant to hydrostatic pressure and ideal for subterranean waterproofing.

E. Traffic Coat: Traffic Coat is a specially formulated coating for use over the Premium Coat System. It resists wear, yet remains flexible to absorb surface stresses, and provides a positive aesthetic appearance.

F. Surebond Primer: Pure Acrylic primer used for sealing all types of masonry, metal, and chalky surfaces for painting.

G. Stable Rust Primer: StableRust Primer is water based surfactant-free primer used in direct metal applications to stabilize and protect metal surfaces.

H. Reinforcing-Fabric: This material shall be non-woven, stitch-bonded, heat-set fabric with the following characteristics:

Weight	3 oz. per square yard
Tensile Strength	57.1 lbs. per ASTM D1682
Elongation	61.65% per ASTM D1682
Mullen Burst	176.8 lbs. per ASTM D3786
Trapezoid	16.1 lbs. per ASTM D1117

I. Cured Membrane Characteristics:

Property	Test	Result
Elongation	ASTM D412	>322% elastomeric, 61% reinforcing fabric
Cured System Tensile Strength	ASTM D412	>2000 PSI
Algae Resistance	ASTM G29	No Growth Supported
Moisture Vapor	ASTM D1653	3 Perms

weathering	ASTM G26	No effect after 3,000 hours.
Salt Spray Test	ASTM B117	No effect.
Fire Rating	ASTM E108	Class A
Wind Uplift		FM or Dade County Compliant 120 lbs/sf minimum

J. Cement Mortar: Polymer-modified, cementitous mortar. The following products are acceptable provided they meet the materials and construction specified hereinafter:

1. Hydro Stop Barrier Guard Sand Slurry
2. Sika Corporation, SikaTop 122 Plus
3. Sonneborn, Sonopatch 300
4. Conspec, All Patch-2 Minute

2.04 ACCESSORIES

A. Cant Strips: Premould composition material recommended by roofing manufacturer.

B. Dens-Deck Underlayment manufactured by Georgia-Pacific or approved equal. 1/2" thick, glass mat face both sides, silicone treated gypsum core roof board, non-combustible when tested in accordance with ASTM E-136. Zero Flame Spread and Zero Smoke Developed when tested in accordance with ASTM E-84.

C. Chem Curb System Penetration Seals by Chemlink or approved equal. A three component system.

1. ChemCurb precast forms composed of either black structural urethane or gray, polymer cement. Round curbs have an inside diameter of 7.5 and 5 inches, 12- and 6-inch straight curbs to extend the round curbs, and combine with corner curbs to form square or rectangular seals. All pieces are two inches high. The curved outer surfaces are impervious to ice, corrosion, ultraviolet light and ponding water.

2. M-1 Structural Sealant, a durable, self-fixturing, moisture cure mastic.

3. Pro Pack, a black, two-part urethane pourable sealer designed for self-leveling, horizontal applications. It cures to a tough, waterproof rubber mass with low temperature elasticity and adhesion. 100% solid rubber with no volatile organic content, thermosetting and will not shrink, resistant to weathering, joint movement, water and ice.

PART 3 - EXECUTION

3.01 INSPECTION OF SURFACES

A. Before the work under this section is started, the CONTRACTOR, together with the Technical Representative or their independent auditor/inspector (where applicable) and the CONTRACTOR shall meet with the Engineer at the job-site to examine all surfaces on which roof coating will be placed and all adjoining work, including inserts, which will affect or be affected by the roof coating work. All unacceptable areas and/or conditions such as those listed in Subparagraph 3.02 A.5 shall be corrected by the CONTRACTOR and verified and accepted by the roof coating applicator and the Technical Representative or their independent auditor/inspector prior to start of the work.

B. Before the work under this section is started, the CONTRACTOR and Engineer shall inspect and record the conditions of the building interior rooms and ceilings. The CONTRACTOR shall protect the interior finishes, furniture and equipment against damage.

3.02 APPLICATION

A. General:

1. Workmanship: The CONTRACTOR shall have a responsible foreman on the job during roof coating operations who shall ensure that all work is done in accordance with the plans and specifications.

2. No roof coating shall be installed during precipitation and shall not be started in the event there is a possibility of precipitation during application.

3. No roof coating shall be started in the absence of the Engineer or his representative. The CONTRACTOR shall call the Engineer to give at least one day (24 hours minimum) advance notice of the starting of roof coating operations.

4. The application of roof coating shall be as specified or as shown in the plans, and strictly follow manufacturer's recommendations.

5. Absolutely no roof coating shall be applied before the substrates and the work in connection therewith have met the following conditions:

   a. Surfaces shall be smooth, free from loose materials, properly graded to outlets, and swept clean. All sharp projections and lumpy surfaces shall have been removed.

b. Adjoining work, such as existing sheet metal work and vent pipes, roof mounted junction box and conduit penetration shall either be in place, ready for the CONTRACTOR to work in. This work shall be coordinated so that the total roof coating system will be watertight.

B. Apply the Barrier Guard Cement slurry to all exposed cement or masonry surfaces at a rate of 250 square feet per gallon.

C. Apply the Stable Rust Primer to the surfaces of all exposed metal at a rate of 250 square feet per gallon.

D. Apply the Surebond Primer to the surface of all pre-painted surfaces, at a rate of 250 square feet per gallon.

E. Install cant strip at all 90 degree angle areas.

F. Strip in all joints produced by decking using the six-inch wide polyester fabric and the Premium Foundation Coat. Apply coating at a rate of 40 sq. ft. per gallon.

G. Strip in all cracks and non-working joints and all boards using either the twelve inch or six inch wide polyester fabric or the Premium Foundation Coat. Apply coating at a rate of 40 sq. ft. per gallon.

H. Apply Premium Foundation Coat and polyester fabric to all identified horizontal and vertical areas.

I. The Premium Foundation Coat shall be applied to the surface and the fabric shall be immediately brushed into the coating, while it is still fluid.

J. After the fabric is brushed in (removing all voids and air pockets) immediately apply a second application of Foundation Coat shall be brushed onto the surface of the polyester.

K. The rate of application shall not exceed 40 square feet of polyester per gallon of Foundation Coat.

L. Overlap seams shall be a minimum of 4 inches width (minimum).

M. The Technical Representative must inspect the installation of the Foundation Coat and Polyester prior to the application of the Finish Coat.

N. Apply 2 coats of Finish Coat at a combined total coverage rate of 70 sq. ft/gal.

O. Seal items projecting through waterproofing material watertight.

P. Apply waterproofing material to minimum 40-mil total cured thickness.

Q. Apply an additional application of Premium Finish Coat, for the mural 24 hours after the application of the 40-mil system.

3.03 PROTECTION AND CLEANING

A. Protection

1. Any work or materials damaged during the handling of roof coating materials shall be restored to their original (undamaged) condition or replaced.

2. The work of other trades shall not be marred or injured. Roof coatings splashed onto adjoining surfaces shall be removed and the surface or finish restored to its original finish and appearance. Coating runs, sags and streaks over sheet metal surfaces shall be carefully removed so as not to scratch those surfaces.

3. Protective coverings shall be installed as necessary to prevent the marring of existing surfaces.

4. Protection shall remain in place for the duration of the roof coating work.

B. Cleaning

1. Debris from roof coating work shall be removed from the premises and disposed of at the end of each working day and upon completion of the work to the satisfaction of the Engineer. The roof shall be left in good, clean condition.

2. Immediately clean waterproofing system from unscheduled surfaces in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 DESCRIPTION OF WORK

A. The extent of building insulation work is shown on the Drawings, by the generic name.

B. The types of building insulation specified in this section include, but are not limited to, the following:

1. Acoustical batt insulation for stud partitions.

2. Thermal batt or blanket insulation for cool storage walls and ceiling.

3. Thermal rigid insulation for roof.

C. Related Work Specified in Other Sections:

1. Occupancy, air quality requirements are specified in Section 01575 TEMPORARY CONTROLS-AIR QUALITY REQUIREMENTS.

2. Coordinate installation of thermal insulation and sound insulation with Section 09250 – GYPSUM WALLBOARD.

1.03 SUBMITTALS

A. Manufacturer’s Data: Submit six (6) copies of manufacturer’s specifications and installation instructions for types of insulation required. Submit six (6) copies of certificate of compliance certifying materials complied with specified requirements.

1.04 DELIVERY AND STORAGE

A. 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 in a manner 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.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Thermal Batt or Blanket Insulation

1. ASTM C 665, Type III; except a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. 6-inches thick.

2. Thermal Resistance Value (R Value): R-19. Aluminum foil face with scrim kraft glass fiber, 48" width roll.

B. Sound Deadening Batt Insulation: ASTM C 665, Type I; except a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Noise Reduction Coefficient (NRC) of not less than 0.90 for 2-1/2 inch metal stud wall, and not less than 0.95 for 3-1/2-inch metal stud wall. NRC values as determined in accordance with ASTM C 423.

C. Accessories for Batt or Blanket Insulation

1. Duct Tape: As recommended by the insulation manufacturer.

2. Clip Fasteners: Zinc-coated steel consisting of a perforated base plate with protruded nail and a wide-base projecting split prong of appropriate type and length to penetrate the full thickness of the insulation. The clip fasteners shall be installed per manufacturer's specifications and not less than 24" o.c. The sharp tip of each nail shall be capped.

D. Thermal Rigid Insulation for Roof: FS HH-I-1972-1 Foil-faced, except minimum compressive strength shall be 20 pounds per square inch, R-19 minimum. Thickness shall be as indicated in the Drawings.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

A. Surfaces shall be clean, dry and free of any projections.

3.02 INSPECTION OF SURFACES

A. Before the work under this Section is started, examine all surfaces on which insulation will be placed and all adjoining work, including inserts, blockings, etc. which will affect the insulation work. Report any unacceptable areas and/or conditions to the Engineer. The CONTRACTOR shall make corrections to the satisfaction of the Engineer at no cost to the STATE.

3.03 INSTALLATION

A. General:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.

2. Extend roof and wall insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

3. Apply a single layer of insulation of the required thickness, unless otherwise shown or required to make up the total thickness.

4. All insulation shall be neatly taped.

B. Installation of Batt or Blanket Insulation

1. Installation at Metal Framing and Furring Members: Size insulation to the width of members spacing. Press friction-fit insulation between the members as recommended by the insulation manufacturer. Neatly tape all insulation exposed to view.

2. Installation Over Gypsum Board Ceiling: Size insulation to the width of members spacing. Do not place insulation closer than 3 inches from the sides of recessed lighting fixtures and heat producing devices or within 24 inches of the top of such fixtures and devices. Pack insulation into narrowly spaced framing as recommended by the insulation manufacturer.

3. Installation shall be neat and fit. No sagging or loosening are allowed.

C. Installation of Thermal Rigid Roof Insulation: Install over substrate with either mechanical fasteners or adhesive as recommended by the insulation manufacturer to secure in place.

END OF SECTION

SECTION 07920 - SEALANTS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Completely close with sealant all joints indicated or specified to be sealed and elsewhere as required to an airtight and watertight condition.

B. Related Work in Other Sections:

1. Occupancy, air quality requirements are specified in Section 01575 – TEMPORARY CONTROLS – AIR QUALITY REQUIREMENTS.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit six (6) copies of manufacturer's product data and specifications for type of sealant required, to the Engineer for approval.

B. Color Samples: Three (3) sets each of color finish samples of sealants. Where sealants are to remain unpainted, they shall match the finish color of adjacent surfaces.

1.04 JOB CONDITIONS

A. Examine joint surfaces and backing, and their anchorage to the structure, and conditions under which joint sealer work is to be performed, and notify the 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.

B. 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.

1.05 PRODUCT HANDLING

A. 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.

1.06 GUARANTEE

A. Furnish a written two (2)-year warranty to the Engineer signed by the CONTRACTOR which shall provide for repairs or replacement of materials where leaking occurs due to faulty materials and workmanship at no cost to the STATE. The two (2)-year warranty shall begin after the final acceptance date.

PART 2 - PRODUCTS

2.01 MATERIALS

A. 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.

B. Bond-Preventive Materials: Polyethylene tape, pressure-sensitive adhesive. The adhesive is required only to hold tape to the construction materials.

C. Masking Tape: Nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

D. Primer for Sealants: Nonstaining, as recommended by the sealant manufacturer.

E. Sealants:

1. At Exterior Vertical and Overhead Joints: One-part polyurethane-based sealant, conforming to ASTM C 920. Type S, Grade NS, Class 25, Use NT. Color shall match adjacent surfaces. Provide one of the following, or approved equal.

a. Dymonic; Tremco.
b. Chem-Calk 900; Bostik Construction Products Div.
c. Sikaflex la; Sika Corp.
d. Permapol RC-1; PRC.

2. At Interior Vertical and Overhead Joints: Non-Elastomeric Sealant; acrylic-emulsion type, conforming to ASTM C 834. Color shall match adjacent surfaces. Provide one of the following or approved equal.

   a. AC-20 Acrylic Latex: Pecora Corp.
   b. Tremco Acrylic Latex 834; Tremco.
   c. Chem-Calk 600; Bostik Construction Products Div.

3. At Horizontal Traffic-Bearing Joints: Two-part polyurethane-based sealant, conforming to ASTM C 920, Type M, Grade P, Class 25, Use T. Provide one of the following, or approved equal.

   a. Silaflex 2c SL; Sika Corp.
   b. THC-900; Tremco.
   c. Urexpan NR-300; Type HM; Pecora Corp.

4. Silicone Sealant: At Perimeter of All Plumbing Fixtures and Fittings: One-Part mildew-resistant silicone sealant conforming to ASTM C 920, Type S, Grade NS, Class 25, Use NT, formulated with fungicide; intended for sealing interior joints with non-porous substrates. Provide one of the following or approved equal.

   a. Dow Corning 786; Dow Corning Corp.
   b. SCS 1702 Sanitary; General Electric Co.
   c. Proglaxe White; Tremco Corp.
   d. Omni Plus; Sonneborn.
   e. 898 or 893, No. 345; Pecora Corp.

5. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints; complying with ASTM C 834. Provide one of the following or approved equal.

   a. BA-98; Pecora Corp.
   b. Tremco Acoustical Sealant; Tremco.
   c. USG Acoustical Sealant.

F. Bituminous Joint Filler:

1. Provide resilient and non-extruding type premolded bituminous composition of organic fiber or granulated cork, between 2 bituminous felt liners, complying with ASTM D 944 or D 1751, AASHTO M 33 or M 213.

2. Provide one of the following products, or approved equal.

   a. "Elastite"; Celotex.
   b. "Tex-Mastic"; J.P. Petroleum Products.
   c. "Corkfill"; W.R. Meadows.

G. Sealant Tape: For bedding compound for installation of thresholds and similar items indicated to be bedded in sealant: A preformed butyl-polyisobutylene sealant tape. Size of tape as required for the specific application.

   1. Bostik Products – Chem-Tape 40
   2. Pecora – Extru-Seal
   3. Tremco – 440 Tape

H. Expansion Joint Filler:

   1. Provide resilient and non-extruding type bw density, closed cell, cross-linked ethylene vinyl acetate polyethylene copolymer foam capable of resisting foot traffic.

   2. Provide "Evazote 50, E.S.P." by Epoxy Industries, Inc. or approved equal.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 EXAMINATION

A. 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.

3.03 JOINT PREPARATION

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

1. 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.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile 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.

3. Remove laitance and form release agents from concrete.

4. 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.

5. Clean metal, glass, glazed surfaces of ceramic tile; 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.

B. 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 primer/sealer to spill or migrate onto adjoining surfaces.

C. 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.

3.04 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirement apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

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

1. Install joint fillers of type indicated 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.

2. 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.

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

F. 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.

G. 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 joints. 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.

1. Provide concave joint configuration per Figure 5A in ASTM C 962, unless otherwise indicated.

2. Provide flush joint configuration per Figure 5B in ASTM C 962, where indicated.

H. Apply sealant around penetrations through the finish materials (e.g. shower head, valve handles, soap dishes, etc.). Type of sealant shall be compatible with the surfaces where it is applied.

3.05 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.06 PROTECTION

A. 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 Substantial Completion. 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.

END OF SECTION

DIVISION 8 - DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent of standard steel doors and frames and interior window frames is indicated and scheduled in the Drawings. Metal doors and frames of fire resistive construction are called out in the Drawings.

B. Related Work Described Elsewhere:

1. Finish Hardware is specified in Section 08710 - FINISH HARDWARE.

2. Glazing is specified in Section 08800 - GLAZING.

3. Field Applied Painting is specified in Section 09900 - PAINTING.

1.03 QUALITY ASSURANCE

A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" ANSI/SDI-100 and as herein specified.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assembles" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction, complete with type of hardware to be required.

1.04 REGULATORY REQUIREMENTS

A. Doors and frames shall conform to applicable codes for fire ratings.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements.

B. Shop Drawings: Submit for fabrication and installation of steel doors and frames, and interior window frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

C. Schedule: Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

D. Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

E. Installation Specifications: Submit manufacturer’s and referenced ANSI, SDI, DHI, ADAAG, etc. installation specifications.

1.06 GUARANTEE

A. Submit two (2) copies of written guarantee signed jointly by the manufacturer, installer and the CONTRACTOR, agreeing to replace metal doors and frames which fail in material or workmanship within one (1) year of the date of acceptance at no cost to the STATE.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory finished doors. Strap knock-down frames in bundles. Provide temporary steel spreaders securely fastened to the bottom of each welded frame.

B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Engineer; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4" high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create

humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheets: All doors and frames and interior window frames shall be manufactured of commercial quality, stretcher leveled flatness, cold-rolled steel per ASTM A 366 "Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality" and A 568 "Specification for Steel, Carbon, and High Strength Low-Alloy Hot-Rolled Strip, and Cold-Rolled Sheet, General Requirements" and galvanealed to 'A-60' minimum coating weight standard for interior applications and 'G-90' minimum coating weight standard per ASTM A 924 "General Requirements for Steel Sheet, Metallic Coated by Hot-Dip Process" for exterior application. Internal reinforcing shall be manufactured of hot-rolled, pickled, and oiled steel per ASTM A 569 "Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial Quality".

B. Supports and Anchors: Fabricate of not less than 18 gauge galvanized sheet steel.

C. Frame Anchors:

1. Wall anchors for frame attachment to masonry construction: Masonry anchors, adjustable, flat, corrugated or perforated 'T' shaped anchors with leg not less than 2 inches wide by 10 inches long or masonry "wire" type not less than 3/16 inch diameter.

2. Wall anchors for attachment to drywall partitions:

   a. Use manufacturer's adjustable type compression anchors with knocked down die mitered frames at drywall locations.

   b. Use stud anchors sized to accommodate frame jamb depth and face dimension on all welded frames.

3. All frame jamb anchors to be provided; one each jamb per 30 inches of frame height or fraction thereof (3 minimum).

4. Floor anchors: Anchor clip type:

a. 16 gauge minimum.

b. To receive 2 fasteners per jamb.

c. Welded to the bottom of each jamb.

5. In-place masonry or concrete:

a. 3/8 inch countersunk flat head stove bolt and expansion shields.

b. Weld pipe spacers or other type of spacers per manufacturer's standard design in back of frame soffit to protect frame profile during tightening of bolts and anchors.

6. Head struts: For frames not anchored to masonry or concrete construction provide ceiling struts spot welded to jambs each side extending to building structure.

D. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize, complying with ASTM A 153 "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware", Class C or D as applicable or stainless steel.

E. Shop Applied Primer Paint: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints conforming to ANSI A224.1 "Testing Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames". Primers shall be free from asbestos, lead, mercury, chromate, and cadmium.

2.02 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steelcraft.

2. Republic Builders Products.

3. Amweld Building Products, Inc.

4. Curries Co.

5. Or approved equal.

2.03 FABRICATION, GENERAL

A. Fabricate steel door and frame and interior window frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site. Comply with ANSI/SDI-100 requirements as follows:

1. Exterior and Interior Flush Panel Doors: Grade III, extra heavy-duty, Model 2, minimum 14-gage faces.

2. Doors shall conform to ANSI/SDI A151.1 test procedure and acceptance criteria for physical endurance for minimum Level A performance for 16 gauge doors.

B. Fabricate exposed faces of doors and panels from only cold-rolled steel.

C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).

D. Fabricate all doors and frames and interior window frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels, flush cover plate, and sealed to prevent water instrusion. Door hinge edge shall be one-piece full height, 14 gauge channel, formed and tapped for hinges. Doors shall have a beveled (1/8-inch in 2 inches) lock edge and square hinge edge.

E. Exposed Fasteners: Unless otherwise indicated, provide counter-sunk flat Phillips heads for exposed screws and bolts.

F. Finish Hardware Preparation: Prepare doors and frames to receive finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

1. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site. Provide minimum gauge hardware reinforcing for mortise or surface applied hardware as follows:

a. Hinges:

i. 10 gauge or equivalent number of threads on doors.

ii. 7 gauge on frames.

b. Locks: 12 gauge or equivalent number of threads.

c. Surface Closers: 12 gauge.

d. Hold Open Arms: 12 gauge.

e. Panic Devices: 12 gauge.

2. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with DHI-05 "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute and the American With Disabilities Acts Accessibility Guidelines (ADAAG).

G. Shop Painting

1. Clean, phosphatize, and prime paint exposed surfaces of steel door and frame units, including galvanized surfaces.

2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

3. Apply shop coat of prime paint with a 1.0 mil DFT (dry film thickness) to an even consistency to provide a uniformly finished surface ready to receive finish paint.

2.04 STANDARD STEEL DOORS

A. Provide metal doors of types and styles indicated on drawings or schedule.

B. Composite Core Doors for Cool Storage Entrance: Fill all flush panel doors with with polyurethane, ASTM C591, 1.75 lb. Minimum density rigid cellular isocyanurate foam, R Value 12.5.

C. Steel Reinforced Core Doors for Other Entrances: Fill all flush panel doors with mineral fiber insulation at steel reinforced doors.

D. Louvers: Louvers, where indicated, shall be sight proof type inserted into the door. Louvers in exterior doors shall be inverted Y type. Form louvers of 20 gauge galvanized

steel for interior doors and 16 gauge galvanized steel for exterior doors. Louvers shall be nonremovable from the outside of exterior doors or the secure side of interior doors. Insect screen for exterior doors shall be removable type with 18 x 16 mesh aluminum or bronze cloth.

2.05 STANDARD STEEL FRAMES

A. Provide metal frames for doors, vision lites and interior windows of type and style as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 14 gauge of cold-rolled furniture steel.

1. Fabricate frames with mitered corners, welded construction for exterior applications and either knock-down (mechanical interlock joint) with hairline seam or welded construction for interior frames.

2. Form all frames of hot-dip galvanized steel.

3. Frames shall comply with ANSI/SDI-119 "Performance Test Procedures for Steel Door Frames and Frame Anchors", Level A, one million cycle swing test performance for a 4070 door frame.

4. Provide thermal break frames with closed cell polyethylene foam for Cool Storage entrance.

B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

C. Plaster Guards: Provide 26-gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

D. Template Hardware: Factory cut doors and frames for all template hardware including hinges, bolts, etc. Double acting door shall conform to hardware as specified.

E. Vision Lite Frames: Frames shall be constructed as specified in ANSI/SDI-100 and shall be non-removable from the non-secure side of the unit.

F. Compression Seals: Provide all door frames with compression seals as specified in Section 08710 - FINISH HARDWARE.

2.06 FINISH HARDWARE

A. For fire rated doors, provide fire rated closers, appropriate locksets and other finish hardware necessary for complete fire rated door and frame assemblies.

2.07 FIRE-RATED ASSEMBLIES

A. Assemblies shall bear the listing identification label of the Underwriters Laboratories, Inc. or a nationally recognized testing laboratory qualified to perform tests of fire assemblies in accordance with ASTM E 152 and having a listing for the tested assemblies. Doors exceeding the sizes for which listing label service is offered shall be inspected in accordance with NFPA 80 and NFPA 80A. Listing identification labels shall be constructed and permanently applied by a method which results in their destruction should they be removed. Labels shall be metal with raised letters and shall bear the name and file number of the door and frame manufacturer. Labels shall not be painted.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.

1. Anchors: Provide sufficient anchorage to attach to wall in accordance with ANSI/SDI 119 Test compliance Level A of one million cycles, or anchorage as detailed on drawings to specific wall conditions.

2. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

3. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.

4. At in-place masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.

5. Install fire-rated frames in accordance with NFPA Standard No. 80.

6. Frames at CMU wall construction shall be grouted, the inside of the frame shall be given a coat of heavy-bodied bituminous paint.

C. Door Installation

1. Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.

2. Weatherstripping shall be installed at exterior door openings to provide a weathertight installation.

3. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

D. Door Clearances: Provide uniform clearances as listed below:

1.	Head, jamb, and lock edge:	1/8 inch maximum
2.	Meeting stile:	1/8 inch maximum
3.	Top of decorative floor finish or covering:	1/8 inch minimum to 1/4 inch maximum
4.	Threshold:	1/4 inch maximum for doors that do not receive door shoe.

3.02 ADJUST AND CLEAN

A. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas or prime coat and apply touch-up to compatible air-drying primer.

B. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating conditions.

END OF SECTION

SECTION 08710 - FINISH HARDWARE

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish and deliver to the building site, all finishing hardware required for all new doors complete as indicated on the drawings and as specified herein.

B. It is the intent of these specifications to cover in general the class and character of all finish hardware required.

C. The hardware list specified hereinafter has been made for the convenience of the CONTRACTOR and covers in general the necessary hardware for new doors, but all other doors shown on the plan and not covered by the general characterization shall be fitted with appropriate hardware of the same standards as the hardware described throughout these specifications. The CONTRACTOR shall furnish hardware schedule as hereinafter specified.

D. Suppliers proposing substitutes of equivalent products of other than manufacturers named hereinafter shall submit schedules listing product and manufacturer specified or product and manufacturer of proposed substitute.

E. Products of manufacturers which are not locally represented are not acceptable.

F. Products which are not locally stocked or serviced, or which must be special ordered are not acceptable.

G. All hardware shall conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG), Sections 4.13.8, 4.13.9, 4.13.10, 4.13.11 and 4.13.12.

H. The CONTRACTOR shall field verify door and frame condition, key brand, lockset functions and keying requirements with the STATE through the Engineer even if hardware schedule has been reviewed and returned to the CONTRACTOR. Notify the Engineer immediately of any discrepancies and conflicts in writing before any ordering. The CONTRACTOR shall obtain written approval of the key brand, lockset functions and keying requirements from the STATE and the Engineer before any ordering.

I. All locks shall be keyed to the existing masterkeying system.

1.03 SUBMITTALS

A. Hardware Schedule: Furnish six (6) copies of the schedule of hardware in compliance with specifications and drawings. List each opening and hardware to be applied. State keying, materials, finish and manufacturer's number for each item. Required types are listed. Submit hardware schedule for approval by the Engineer. Door designation listed in the Hardware Schedule shall be same as those used on drawings.

B. Manufacturer's Data: Submit manufacturer's descriptive literature along with schedule for information only.

C. Keying System: Submit for approval. Also submit key bitting charts to the Engineer for approval prior to completion of the contract.

D. 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.

1.04 QUALITY ASSURANCE

A. Employ an Architectural Hardware Consultant to assist in the work of this Section at no cost to the STATE. Architectural Hardware Consultant shall verify site condition and that the finish hardware schedule specified is appropriate for the project. Architectural Hardware Consultant shall inspect complete installation, and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified herein. Submit certification to the Engineer. Architectural Hardware Consultant shall be available for meetings with the STATE Designated representative, Engineer, the CONTRACTOR, etc.

1.05 DELIVERY

A. Examine the plans, specifications, and details in order to check all items so they will be suitable and of perfect fit and delivered where and when required.

B. All hardware shall be delivered at the site, packed separately with all trimmings, screws, etc., for the particular door, all properly labeled and numbered so that they can be checked with the hardware list which shall be furnished with the goods when delivered.

C. Upon delivery of the finishing hardware to the job site by the hardware supplier, the CONTRACTOR shall have a responsible person check in the material at the place for storage. The hardware shall be protected from damage at all times, both prior to and after installation.

PART 2 - PRODUCTS

2.01 GENERAL CHARACTER

A. All hardware shall be of the best quality in construction, design and finish, and free from any defects. Any defective pieces shall be replaced by the CONTRACTOR at his own expense.

B. Hardware shall be of the manufacture, type, weight, function and quality as shown by factory numbers or an approved equal.

C. Locksets

1. All mortise locksets and latchsets shall be the product of one manufacturer. All locksets and latchsets shall be of heavy duty Grade I construction with wrought cases. Latchbolts shall have a minimum projection of 5/8 inch.

   Lock Trim: Cast, forged, or heavy wrought construction and commercial plain design. In addition to meeting the test requirements of ANSI/BHMA A156. 13, levers, roses, and escutcheons shall be 0.050 inch thick if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch, except that lever shanks shall be 0.060 inch thick.

2. Bored Locks and Latches: ANS/BHMA A156.2, Series 4000, Grade I. 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.

3. Auxiliary Locks: ANSI/BHMA A156.5, Grade 1 Provide trim of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges.

4. Lever Handles: Provide lever handles (ADAAG 4.13.9) in lieu of knobs for doors. Lever handles for exit devices shall meet the test requirements of ANSI/BHMA A156.13 for mortise locks.

   Lever handles shall be attached by thru-bolts and must be supported by an internal spring.

5. Lockset strikes shall be furnished in accordance with the American Standard Association, Inc., Specifications Al15.1, A115.2, and A115.3.

D. Hinges: ANSI/BHMA A 156.1. Construct loose pin hinges for outswinging exterior doors and reverse bevel swing interior doors with locks so that pins will be nonremovable NRP when door is in closed position.

1. Hinges Pins: Except as otherwise indicated, provide hinge pins as follows:

   a. Nonferrous Hinges: Stainless steel pins.

b. Exterior, Out-Swing Doors: Non-removable pins (NRP).
c. Interior Doors: Nonrising pins.
d. Tips: Flat button and matching plug, finished to match leaves.
e. Stainless Steel Hinges must not be passivated.

2. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.

3. Provide size of hinges indicated but not less than the followings:

Door thickness	width	Hinge height	Hinge width
1-3/4 inch	to 36 inches	4-1/2 inch	4 or 4-1/2 inch
1-3/4 inch	over 36 inches	5-inch	4-1/2 Extra Heavy Ball Bearing
1-3/4 inch	over 48 inches	5-inch	4-1/2 Extra Heavy Ball Bearing

Hinges shall be recessed into doors and frames as per manufacturer's recommendation.

E. Door Bolts: ANSI/BHMA A156.16.

F. Door Closers: Closers shall be mounted (either regular or parallel arm application) so they are not visible from the corridor or public side of opening when door is in closed position. The door closer sweep period shall be adjusted so that from a 70 degree open position to a point 3 inches from the latch (measured to the leading edge of the door) shall be a minimum of 3 seconds. The door opening force shall be 5 lbf (22.2 N).

G. Exit Devices: ANSI A156.31, Grade 1. All rim exit devices must have deadlatching feature.

H. Door Thresholds: Maximum height of door threshold shall be 1/2-inch, beveled with a slope no greater than 1:2. Thresholds shall be stainless steel unless stated otherwise in Hardware Schedule below.

I. Hardware required for accessible door passage such as locksets and trims shall be mounted at ~~a minimum~~ 36 inches above the finished floor.

J. Hardware shall not require tight grasping and pinching, twisting of the wrist to operate.

2.02 KEYING

A. Locks shall have four (4) keys each. Furnish six (6) masterkeys and two (2) permanent control keys.

B. All locks shall be construction masterkeyed.

C. Permanent keys stamped "DO NOT DUPLICATE".

D. All locks shall be keyed to the existing building masterkey.

E. Keying Instruction:

1. All locks shall be master keyed and grandmaster keyed as directed by the Engineer.

2. Locks on mechanical and electrical room doors shall be operated by the custodian utility key.

3. Exterior entrance doors giving access to a common corridor system shall be keyed alike.

4. Multiple doors to a single room shall be keyed alike.

5. Entrance doors to two or more connected room shall be keyed alike if no lock is provided between the rooms.

6. Where entrance to a room is within a room, the inner room key shall operate the outer room lock.

7. Doors to individual rooms shall be keyed differently.

F. During period of construction, all locks shall be operated by a special master key. Regular day master keys are to be retained by the CONTRACTOR so they cannot be obtained or duplicated by unauthorized persons. The special construction master key shall become inoperative when regular keys are turned over to the STATE.

G. Furnish proper certification of factory assembly of all locks as well as factory masterkeying prior to final acceptance of this portion of work.

2.03 FASTENINGS

A. Furnish necessary screws, bolts, and other fastenings for proper application of hardware. Fastenings shall be of suitable size and type of securing hardware for heavy use. For example, expansion shields securing hardware such as door stops/holders to concrete or solid routed masonry substrates should completely fill the depth and diameter of drilled holes. Shimming of the shields or the use of plastic shields are not acceptable. Fastenings must harmonize with the hardware as to material and finish.

B. Furnish necessary expansion shields, toggle bolts, machine or wood screws or other suitable approved anchoring devices where hardware is to be installed on concrete, masonry or other types of backing.

C. Fasteners exposed to weather shall be of stainless steel.

D. Where exit device is to be installed on hollow-metal doors, they shall be mounted with theft resistant through bolts.

E. Floor Mounted Door Stops/Bumpers shall be secured to the substrate using fasteners as noted in Item A above or stainless steel inserts shall be installed onto which the stop/bumper can be secured to using theft-resistant fasteners. The top plate of the insert shall be flush with the top of the floor finish.

2.04 TEMPLATES

A. 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 ANSI/BHMA A156.7. Coordinate hardware items to prevent interference with other hardware.

2.05 TOOLS AND INSTRUCTIONS

A. All tools and maintenance or installation instruction packed with the closers and locksets shall be given to the STATE of Hawaii when the project is completed.

PART 3 - EXECUTION

3.01 GENERAL

A. Installation:

1. The CONTRACTOR shall schedule a pre-installation meeting between the CONTRACTOR, Architectural Hardware Consultant, hardware installer and hardware manufacturer's representative or supplier and the Engineer to review the hardware installation instructions and installation conditions.

2. Before final inspection of the work under this contract and acceptance of the project by the Engineer, the Architectural Hardware Consultant, the hardware manufacturer's representative or supplier shall visit the site and carefully inspect all parts for conformance to this specifications, adequacy for intended use, proper function, appearance, finish and successful operation, assuming joint responsibility with the CONTRACTOR.

a. All keys cut for the project shall be tested to ensure proper operation.

b. The manufacturer's representative shall also instruct the user's staff on the hardware's maintenance procedure (type of lubricant needed and frequency of maintenance).

3.02 HARDWARE SCHEDULE

MANUFACTURER LIST

CATEGORY	VENDOR NAME	MFG
HINGE	BY McKINNEY PRODUCTS COMPANY	MCK
ASTRAGAL	BY PEMKO	PEM
DOOR GASKETING	BY PEMKO	PEM
THRESHOLD	BY PEMKO	PEM
DOOR CLOSER	BY SARGENT MANUFACTURING COMPANY	SAR
DOOR STATUS SWITCH	BY SARGENT MANUFACTURING COMPANY	SAR
ELECTRIFIED ALARM	BY SARGENT MANUFACTURING COMPANY	SAR
POWER SUPPLY	BY SARGENT MANUFACTURING COMPANY	SAR
ENTRANCE LOCK	BY SCHLAGE LOCK COMPANY	SCH
OFFICE LOCK	BY SCHLAGE LOCK COMPANY	SCH
PASSAGE SET	BY SCHLAGE LOCK COMPANY	SCH
PADLOCK	BY SCHLAGE LOCK COMPANY	SCH
AUTO FLUSH BOLT	BY TRIMCO	TRI
COORDINATOR	BY TRIMCO	TRI
D.P. STRIKE	BY TRIMCO	TRI
KICKPLATE	BY TRIMCO	TRI
WALL STOP	BY TRIMCO	TRI

HW GROUP – 001

6.0 EA	HINGE	TA2314 4.5 X 4.5 US32D-NRP	MCK
1.0 EA	STORAGE LOCK	L9080P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	AUTO FLUSH BOLT	3820 X 3810 630	TRI
1.0 EA	D.P. STRIKE	3911 630	TRI
2.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
2.0 EA	ASTRAGAL	29310 CV	PEM

HW GROUP – 002

6.0 EA	HINGE	T4A3386 5 X 4.5 US32D-NRP	MCK
1.0 EA	ENTRANCE LOCK	L9453P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	AUTO FLUSH BOLT	3820 X 3810 630	TRI
1.0 EA	D.P. STRIKE	3911 630	TRI

1.0 EA	COORDINATOR	3092	TRI
2.0 EA	DOOR CLOSER	351 CPS EN (ACTIVE LEAF)	SAR
2.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
2.0 EA	ASTRAGAL	29310 CV	PEM
1.0 EA	DOOR GASKETING	S44D20	PEM
For Work Shop No. 1: Add			
1.0 EA	THRESHOLD	154SS	PEM
1.0 EA	DOOR BOTTOM	317AN	PEM

HW GROUP – 003

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D-NRP	MCK
1.0 EA	ENTRANCE LOCK	L9453P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
1.0 EA	DOOR GASKETING	S44D17	PEM
1.0 EA	WALL STOP	1270CVCP 630	TRI

HW GROUP – 004

3.0 EA	HINGE	T4A3386 5 X 4.5 US32D-NRP	MCK
1.0 EA	ELECTRIFIED ALARM	91-12-5800	SAR
1.0 EA	POWER SUPPLY	3510	SAR
1.0 EA	DOOR STATUS SWITCH	3287	SAR
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	DOOR CLOSER	351 CPS EN	SAR
1.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
1.0 EA	DOOR GASKETING	S44D17	PEM
1.0 EA	THRESHOLD	154SS	PEM

HW GROUP – 005

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D-NRP	MCK
1.0 EA	ENTRANCE LOCK	L9453P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	DOOR CLOSER	351 UO EN	SAR
1.0 EA	DOOR GASKETING	S44D17	PEM
1.0 EA	WALL STOP	1270CVCP 630	TRI
1.0 EA	DOOR VIEWER	976U BR	TRI

HW GROUP – 006

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D	MCK
1.0 EA	PASSAGE SET	L9010 06 630	SCH

1.0 EA	DOOR CLOSER	351 UO EN	SAR
1.0 EA	DOOR GASKETING	S44D17	PEM
2.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
1.0 EA	WALL STOP	1270CVCP 630	TRI
1.0 EA	MARBLE THRESHOLD, see Section 09310 – CERAMIC TILE		

HW GROUP – 007

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D	MCK
1.0 EA	OFFICE LOCK	L9050P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	DOOR CLOSER	351 UO EN	SAR
1.0 EA	DOOR GASKETING	S44D17	PEM
2.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
1.0 EA	WALL STOP	1270CVCP 630	TRI
1.0 EA	MARBLE THRESHOLD, see Section 09310 – CERAMIC TILE		

HW GROUP – 008

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D-NRP	MCK
1.0 EA	STORAGE LOCK	L9080P 06 630	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		
1.0 EA	KICKPLATE	K0050 12" X 34" 630	TRI
1.0 EA	WALL STOP	1270CVCP 630	TRI

HW GROUP – 009

(for roof hatch door, ladder security door and chain link gates)

1.0 EA	PADLOCK	45-101 2” SHACKLE	SCH
1.0 EA	CYLINDER BY SALTZ LOCKSMITH KEYED TO EXISTING SYSTEM		

HW GROUP – 010

3.0 EA	HINGE	TA2314 4.5 X 4.5 US32D	MCK
1.0 EA	PASSAGE SET	L9010 06 630	SCH

CABINET HARDWARE

CABINET HINGE	77M5550 X 175H7100/90	BLU
CABINET PULL	64-FINISH	DON
DOOR LOCK	21-1654	SAR
ELBOW CATCH	1590-625	DON

END OF SECTION

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent of aluminum windows is shown on Drawings.

B. Related Work Described Elsewhere:

1. Sealant and caulking are specified under Section 07920 - SEALANTS.

2. Glazing is specified under Section 08800 - GLAZING.

1.03 SYSTEM DESCRIPTION

A. Framing System Performance Requirements:

1. Windloads: Provide framing system; include anchorage, capable of withstanding windload design pressures of 66.42 lbs./sq. ft. inward and 66.42 lbs./sq. ft. outward. The design pressures are based on the Uniform Building Code; 1997 Edition.

2. Air Infiltration: The test specimen shall be tested in accordance with DCBCCO Protocol PA 202 and ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 6.24 psf.

3. Water Resistance: The test specimen shall be tested in accordance with DCBCCO Protocol PA 202 and ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 12 psf as defined in AAMA 501.

4. Uniform Load: A static air design load of +/- 65 psf (without steel reinforcing) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of l/180 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.4% of their clear spans shall occur.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and data along with shop drawings for review.

B. Shop Drawings: Submit shop drawings for review; do not fabricate prior to acceptance.

C. Samples: Submit 3 samples of required finish.

D. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

E. Maintenance Manual: Submit 3 maintenance manuals for each type of aluminum window.

1.05 GUARANTEE

A. Provide a written guarantee from the manufacturer or his authorized representative and countersigned by the CONTRACTOR, that the completed work will not be defective in workmanship, materials or installation (including watertightness of the entire application) for a period of 2 years from the date of final acceptance and that repair or replacement of any defective work will be done promptly.

1.06 QUALITY ASSURANCE

A. Standards: Comply with the applicable provisions of "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" of the Architectural Aluminum Manufacturers Association (AAMA).

B. Manufacturer: Provide systems produced by a firm with at least 5 years of experience in the fabrication of aluminum windows of the types required for this project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Window Framing System: Series IR 500 Framing System by Kawneer Company, Co.

1. Framing Member Profile: 2-1/2" x 5" nominal dimension; Non-Thermal; Center Glazed; Interior Structural Silicone Glazed; Screw Spline Fabrication.

B. Similar products of Vistawall Architectural Products, and Peerless Products, Inc., or other manufacturers will be considered provided they meet the design criteria, profiles, and specifications, and when submitted for substitution approval.

2.02 MATERIALS

A. Aluminum (Framing System and Components):

1. Material Standard: Extruded Aluminum, ASTM B 221; 6063-T6 alloy and temper.

2. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.

3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of framing system members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 ACCESSORIES

A. Fasteners: Shall be 300 Series Stainless Steel.

B. Gaskets: Exterior Glazing gaskets shall be extruded EPDM rubber. Interior Spacer shall be compatible with Silicone Sealant.

C. Perimeter Strap Anchors: Aluminum 6063-T6 Alloy and Temper.

D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.04 RELATED MATERIALS

A. Sealants: Refer to Section 07920 - SEALANTS.

1. Structural silicone sealant to be Dow Corning 983 or 995.

B. Glass: 1-inch insulating glass. Refer to Section 08800 - GLAZING.

2.05 FABRICATION

A. General:

1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

3. Prepare components to receive anchor devices. Fabricate anchors.

4. Arrange fasteners and attachments to conceal from view.

2.06 FINISHES

A. Shop Finishing: Kawneer Permanodic® AA-M12C22A44, AAMA 611, Architectural Class I Color Anodic Coating (Color: Medium Bronze Anodized).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify wall openings dimensions and conditions, and adjoining air and vapor seal materials before any ordering and fabrication.

3.02 INSTALLATION

A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of work. Adjust window unit height to within a tolerance of not more than 1/4 inch from window to window within the same floor level.

B. Attach window units and shims to perimeter receptor extrusions with snap in closures from the outside.

C. Set units plumb, level, and true to line, without warp or rack of frames or sash. Anchor securely in place.

D. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

E. Weathertight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weathertight construction. Coordinate installation with wall flashings and other components of construction. Refer to Section 07920 - SEALANTS for installation requirements.

3.03 FIELD QUALITY CONTROL

A. Field Tests: Conduct tests for air infiltration and water penetration with manufacturer's representative present. Submit test results to the Engineer. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the Agreement amount.

1. Testing: Testing shall be performed by a qualified independent testing agency. Cost of testing shall be borne by the CONTRACTOR. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.

   a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft^2, which ever is greater.

   b. Water Penetration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf.

B. Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.04 ADJUST AND CLEAN

A. Clean surfaces promptly after installation of windows, exercising care to avoid damage to protective finishes. Remove excess glazing and sealant compounds, dirt and other substances.

B. Initiate and maintain all protection and other precautions required to ensure that window units will be without damage or deterioration (other than normal weathering) at time of acceptance.

END OF SECTION

SECTION 08211 – FLUSH WOOD DOORS

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent of flush wood doors is indicated and scheduled on Drawings.

B. Related Work Described Elsewhere:

1. Occupancy, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS - AIR QUALITY REQUIREMENTS.

2. Steel door frames are provided under Section 08110 - STEEL DOORS AND FRAMES.

3. Finish Hardware is specified in Section 08710 - FINISH HARDWARE.

4. Field Applied Painting is specified in Section 09900 - PAINTING.

1.03 SUBMITTALS

A. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction.

B. Shop Drawings: Submit shop drawings indicating the location and size of each door, elevation of each kind of door, details of construction all openings and louvers, location and extent of hardware blocking, fire ratings, and other pertinent data. Make reference to doors by using identification system depicted in architectural plans.

C. Schedule: Provide schedule of doors and frames using same reference numbers for details and openings as those on Agreement drawings.

1.04 QUALITY ASSURANCE

A. Quality Standards: Comply with the following standards

1. NWWDA Quality Standard: I.S. 1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door Association (NWWDA).

2. AWI Quality Standard: "Architectural Woodwork Quality Standards", including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, and other requirements exceeding those of NWWDA quality standard.

B. NWWDA Quality Marking: Mark each wood door with NWWDA Wood Flush Door Certification Hallmark certifying compliance with applicable requirements of NWWDA I.S. 1 Series.

1. For manufacturers not participating in NWWDA Hallmark Program, a certification of compliance may be substituted for marking of individual doors.

C. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for ratings indicated by UL, or other testing and inspection agency acceptable to authorities having jurisdiction.

D. Manufacturer: Obtain doors from a single manufacturer.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Complying with the "On-Site Care" recommendations of NWWDA pamphlet "Care and Finishing of Wood Doors" and with manufacturer's instructions.

1.06 WARRANTY

A. General: Warranties shall be in addition to, and not a limitation of, other rights the STATE may have under the Agreement Documents.

B. All doors shall carry the manufacturer's "Standard Door Warranty" for the following:

1. Interior Doors: Life of Installation.

C. The CONTRACTOR's Responsibilities: Replace or refinish doors where the CONTRACTOR's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 - PRODUCTS

2.01 INTERIOR WOOD DOORS

A. Solid Core Doors for Semi-Transparent Finish:

1. Faces: Birch or Red Oak

2. AWI Grade: Premium

3. Construction: SLC-5 or SLC-7 (Glued block core, 5-or 7-ply).

B. Fire Rated Solid Core Doors: Comply with the following requirements:

1. Faces and AWI Grade: Provide faces and grade to match non-rated doors unless otherwise indicated.

2. Construction: Manufacturer's standard core construction as required to provide fire-resistance rating indicated. The doors and frames shall bear an approved label showing the rating thereof.

3. When doors and frames are required to be one-hour fire-resistive construction, door opening shall be protected by a tight fitting smoke and draft-control assembly having a fire-protection rating of not less than 20 minutes. The door and frame shall bear an approved label or other identification showing the rating thereof, the name of the manufacturer and the identification of the service conducting the inspection of materials and workmanship at the factory during fabrication and assembly.

2.02 DOOR LOUVERS

A. Door louvers shall be Model 800-A-1/800R by Air Louvers, Inc. or approved equal. All door louvers shall be manufactured from cold-rolled steel and have mitered and welded corners. Louver blades shall be inverted Y and tenoned to vertical channel and welded to exterior frame. Provide screens for all exterior doors. Interior frame shall screw into pre-punched holes in louver assembly:

Louver blades shall be 18 gauge.
Louver frames shall be 18 gauge.

B. Finish: All are to be degreased and phosphatized, and a baked-on polyester powder coat bronze finish applied.

2.03 TREATMENT FOR DOORS

A. All doors shall be treated as per Section 06311 - TREATED LUMBER.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine installed door frames prior to hanging door:

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

2. Reject doors with defects.

B. Prefit Doors: Fit to frames for uniform clearance at each edge.

3.02 INSTALLATION

A. Hardware for doors shall be furnished for installation under SECTION 08710 - FINISH HARDWARE.

B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.

C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Fitting Clearances for Non-Rated Doors: Provide 1/8-inch at jambs and heads; 1/16-inch per leaf at meeting stiles for pairs of doors; and 1/8-inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/8-inch clearance from bottom of door to top of threshold.

2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.

3. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

4. Bevel fire-rated doors 1/8" in 2" in lock edge; trim stiles and rails only to extend permitted by labeling agency.

3.03 ADJUSTING AND PROJECTION

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Protection: Protect doors as recommended by door manufacturer to assure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Provide all glass and glazing materials to complete all glazing work as shown and as specified herein.

B. Related Work Described Elsewhere:

1. Sealants are provided under Section 07920 - SEALANTS.

2. Steel doors and frames, and interior window frames are provided under Section 08110 - STEEL DOORS AND FRAMES.

3. Aluminum windows are provided under Section 08520 - ALUMINUM WINDOWS.

4. Framed mirrors at toilet rooms are provided under Section 10800 - TOILET AND BATH ACCESSORIES.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated.

b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

1) Load Duration: 60 seconds or less.

c. Maximum Lateral Deflection: of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

d.Minimum Glass Thickness for Interior and Exterior Lites: Not less than 6 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 100 deg. F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer’s published test data.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit copies of manufacturer's product specifications, and instructions for handling, storing, installing, cleaning, and protecting each type of glass and glazing material.

B. Samples:

1. Submit 3 each 4" x 4" samples of each type and thickness of glass to the Engineer for approval prior to ordering.

2. Submit exposed glazing sealant.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Shop Drawings: Submit shop drawings of typical details of glazing, including glazing materials and methods to be used, for approval.

E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

F. Qualification Data: For firms and individuals specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners and other information specified.

1.05 QUALITY ASSURANCE

A. Installer Qualifications (field glazing): An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this project; whose work has resulted in glass installations with a record of successful in-service performance.

B. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

1. Subject to compliance with requirements, permanently mark safety glass with cerification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdication.

C. Insulating Glass: Provide insulating glass units complying with requirements indicated which are permanently marked with certification label of the following inspection and testing agency.

1. Insulating Glass Certification Council.

2. Associated Laboratories, Inc.

D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's " Glazing Manual".

2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines".

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's instruction for shipping, handling, storing and protecting glass and glazing materials. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coatings (if any) on glass.

PART 2 - PRODUCTS

2.01 FLOAT GLASS

A. All glass products shall be of the quality as manufactured by Pittsburgh Plate Glass Company, Libbey Owens Ford Company, ASG Industries, CE Glass Company, Guardian Industries, Sierracin/Sylmar, or approved equal. Thickness as shown.

B. Float Glass, Tempered and Clear: 1/4" thick, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I, Class 1 (clear), Quality q^3.

C. Float Glass, Tempered and Tinted: 1/4" thick, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I, Class 2 (Tinted, Heat-absorbing, and Light-reducing), Quality q^3.

2.02 INSULATING GLASS

A. Sealed Insulating Glass Units, General: Comply with requirements of ASTM E 774 for Class A units and the following:

B. Performance characteristics indicated are those of units and are based on manufacturer's published test data for units with 1/4" thick panes and 1/2" thick air space. U-values are indicated in Btu per hr. per sq. ft. per deg. F difference.

C. Insulating Glass Unit for Double Door and Window at Work Shop No. 1: Units composed of interior and exterior panes of 1/4" fully tempered clear float glass. Standards of float are described in paragraph 2.01.

D. Low Emissivity-Coated Insulating Glass Unit for Aluminum Window: Units composed of interior pane of 1/4" fully tempered clear float glass and exterior pane of 1/4" fully tempered tinted float glass, with vacuum deposited low-emissivity coating on second surface, standards of float glass are as described in paragraph 2.01; 65 percent visible light transmittance, 0.31 summer daytime U-value, 0.32 winter nighttime U-value; 0.44 shading coefficient, and 10 percent outdoor reflectance.

E. Sealing System: Manufacturer's standard.

F. Spacer Material: Manufacturer's standard.

2.03 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected from manufacturer's full range for this characteristic.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

2.04 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl -based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.

2.05 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.06 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Presence and functioning of weep system.

3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass-framing members.

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

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING. GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar

characteristics.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.07 PROTECTION AND CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09250 - GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Complete all gypsum wallboard installation work as indicated on the drawings and as specified herein. Work shall include, but not be limited to, the following:

1. Gypsum wallboard on metal framing and furring.
2. Metal stud framing for wallboard.
3. Metal ceiling suspension system.
4. Vent shaft partitioning, where shown.

B. Related Work Described Elsewhere:

1. Treated wood blocking and furring are specified in Section 06100 - ROUGH CARPENTRY.

2. Thermal and sound insulation are specified in Section 07210 - BUILDING INSULATION.

1.03 QUALITY ASSURANCE

A. Fire Resistive Design: The construction shall comply with the applicable provisions of the Uniform Building Code, including all amendments thereto. Installation and materials shall be in strict accordance with the above mentioned code.

In general, the Fire Resistant Design shall be as listed on the "Fire Resistant, Design Data" Edition of the Gypsum Association, as follows:

One-Hour Fire Resistant Partitions:

3-5/8-inch nailable or screw type metal studs with plasterboard both faces	T-209 or T-3296,UL,4/18/66

B. Industry Standard: Comply with applicable requirements of GA-216 "Application and Finishing of Gypsum Board" by the Gypsum Association, except where more detailed or more stringent requirements are indicated including the recommendations of the manufacturer.

C. Interior Transverse Loading: The metal framing shall be capable or carrying a transverse load of 5 psf without exceeding the allowable stress or a deflection of L/360. Increase stud gauge, decrease stud spacing, or provide hidden from view lateral bracing to comply with these requirements at no additional cost to the STATE.

D. Exterior Transverse Loading: Exterior wall framing shall be capable of carrying a transverse load of 80 mph per UBC Exposure C.

E. Partition Alignment: Partition substrate for ceramic tile work is based on a tile system with aligned wall and floor tile joints. Substrate systems that do not allow the indicated tile systems to be installed without imperceptible tile joint alignment corrections or changes in tile width shall be rejected by the Engineer and the Ceramic Tile subcontractor.

1.04 SUBMITTALS

A. Manufacturer's Literature: Material description and recommended installation procedures for each material.

B. Installation Literature: Provide copies of all applicable ASTM, GA, UL, etcl, installation specifications for each material.

1.05 PRODUCT HANDLING

A. Deliver gypsum wallboard materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type and grade; store in a dry well ventilated space, protected from the weather, under cover and off the ground. Joint materials shall be stored in accordance with manufacturer's printed instructions. Damaged or deteriorated materials shall be removed from the jobsite.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum Wallboard: ASTM C 36. 1/2-inch over metal deck and roof insulation, 5/8-inch for other application, recessed edge type, 48-inches wide, and shall comply with the "Standard Specifications for Gypsum Wallboard" ASTM Designation C35 latest

edition, Type "X" (Special Fire Retardant). Install water-resistant "Firecode C" type board in wet areas, at window openings' head and jambs and where indicated. All cut edges shall be coated with water resistant compound before installation. Water resistant compound shall be type as recommended by wall board manufacturer.

1. Provide 1 inch thick gypsum coreboard "V" T & G panels, used as base layer for vent shaft partitioning, where noted.

B. Cementitious Backer Unit (CBU): ANSI A118.9, glass mesh reinforced mortar backer board, 5/8-inch thick, used for base under ceramic tile in wet areas as indicated. "Wonder-Board" by Modulars, Inc., "Durock Tile Backer Board" by USG Industries, Inc. or approved equal. Provide tape and joint compound materials as recommended by manufacturer.

C. Water Resistant Backing Board: ASTM C 630, Type "WR" water-resistant backing board, 5/8-inch thick, with tapered edges, 48-inches wide, unless indicated otherwise (for walls only). Provide Type "WR-X" (Special Fire Retardant) for fire rated partitions.

D. Wallboard Fasteners: Gypsum wallboard shall be secured to metal framing and furring with ASTM C 1002 manufacturer's standard bugle head self-drilling, self-tapping drywall screws. Screws used in fire-resistive rated construction shall be of type approved for use by governing building code. Screws for structural studs shall conform to ASTM C 954.

E. Cementitious Fiber Board Fasteners: Cementitious fiber board shall be firmly secured to the framing and/or plywood sheathing with ceramic coated screws ASTM A548 manufacturer's standard bugle head self-drilling self-tapping corrosion resistance screws at 6-inches on center throughout.

F. Reinforced Tape and Cement: ASTM C 475, materials for treating joints and fastener heads shall be as manufactured or recommended by the Manufacturer of the wall board used. Provide "setting" type joint compound that is unaffected by humidity for exterior applications.

G. Studs: ASTM C 645, studs shall be 1-5/8, 2-1/2, 3-5/8, 4 and 6-inch unless indicated otherwise on the drawings. Studs shall be rolled formed channel of 20 gauge electro-zinc plated steel except 16 gage (0.0598-inch) and 18 gage (0.0478-inch) shall conform to ASTM A 446, Grade A (33,000 psi) G60 galvanized steel. Provide holes and notches for conduit or electrical wiring.

H. Tracks: Metal floor and ceiling tracks shall be rolled formed channel of 20 gauge electro-zinc plated steel with width dimensions suitable to corresponding stud sizes indicated on the drawings.

I. Metal Channels and Furring Accessories: Rolled-formed electro-zinc plated steel, 20 gauge metal channels and furring accessories by United States Gypsum Company or approved equal.

1. Furring Channels: Hat-shaped, 7/8-inch deep, approximate weight 292 lbs./MLF.

2. Z-Furring Channels: Furring depth 3-inches.

3. J-Runner: Width as necessary.

4. C-H Studs: Width as necessary.

5. Jamb Struts: Width as necessary.

6. Metal Runners: Angle runners, 1-3/8-inch x 7/8-inch.

7. Other Accessories: As indicated or necessary for complete furred-out wall framing and shaft wall framing installation.

J. Ceiling Support Materials and Systems:

1. General: Size ceiling support components to comply with ASTM C 754 unless indicated otherwise.

2. Direct Suspension Systems: Manufacturer's standard zinc-coated or painted steel system of furring runners, furring tees, and accessories designed for concealed support of gypsum drywall ceilings; of proper type for use intended.

a. System Manufacturer
Chicago Metallic Corp.,
Donn Corp.,
United States Gypsum Co. or approved equal.

3. Wire for Hangers and Ties: ASTM C 641, Class 1 zinc coating, soft temper, 9 gauge minimum.

K. Wallboard Accessories: ASTM C 1047, Vinyl Corp., Plastic Components Inc., Vinyl Tech or approved equal.

1. Bullnose Corner Bead: Vinyl Corp. Bullnose Corner Bead BCB 100 or approved equal at all outside wall corners. 3/4" radius.

2. Corner Bead: Vinyl Corp. Corner Bead CB 125 or approved equal at all outside wall corners.

3. Channel Reveal: Vinyl Corp. “F” Channel Reveal FDR58-50 or approved equal, 1/2".

4. Other Accessories: As indicated or necessary for complete installation.

5. All accessories shall be corrosion resistance and weatherable vinyl, PVC, or approved equal.

L. Joint Treatment Materials: ASTM C 475; type recommended by manufacturer for the application indicated, except as otherwise noted. Perforated tape, and joint and topping compound, or "all-purpose" compound.

M. Laminating Adhesive: Special adhesive or joint compound specifically recommended for laminating gypsum boards.

N. Acoustical Sealant: Latex, acrylic, or acrylic-latex type; permanently elastic and paintable.

1. USG Acoustical Sealant.

2. BA-98; Pecora Corp.

3. Tremco Acoustical Sealant; Tremco.

O. Deflection Slip Track: Dale VST-11 slip track minimum 18 gauge unless indicated otherwise galvanized steel.

2.02 DENS-SHIELD BACKER BOARDS

A. Georgia-Pacific Corporation, 5/8” Dens-Shield Fireguard Type X or approved equal. Water-resistant treated core with glass mat moisture protectant coating and embedded glass mats, both sides. The face side is surfaced with heat-cured copolymer water- and vapor-retardant coating. Fire resistance Type X when tested in accordance with ASTM E 119, UL classified. Meets ASTM C1178.

B. Accessories:

1. Trim: Sheet steel zinc-coated by hot-dip process.

2. Metal Framing Fasteners:

   a. Screws: Light-gauge metal framing: Type S, bugle or wafer head, self-tapping, rust resistant.

   b. Screws: Heavy-gauge metal framing: Type S-12, bugle or wafer head, rust resistant.

3. Joint Treatment Materials:

   a. Joint Tape:

      1. 2" wide, 10x10 glass mesh tape, Dens-Shield or comparable glass mesh tape.

      2. Reinforcing fabric: Balanced, alkali-resistant, open-weave, glass fiber fabric, made from containuous multi-end strands with tensile strength of not less than 120 lbs. And 140 lbs. In warp and fill directions, respectively, per ASTM D 1682 and complying with ASTM D 578, and of 4.30 oz./sq. yd. minimum weight.

   b. Setting-type joint compound - untiled, non-wet areas: G-P Gypsum Corporation GyProc setting compounds or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Comply with ASTM C 840, Gypsum Association GA 216 and ASTM C 754 as applicable to the type of substrate and drywall support system indicated; and

comply with the Gypsum Association GA-203 for installation of furring members. Comply with applicable provisions of ASTM E 580 for seismic zone 2a.

1. Do not bridge building expansion joints with support system. Frame both sides of joints with furring and other support as indicated or required.

B. Ceiling Support Suspension Systems:

1. Secure hangers to structural support by connecting directly to structure where possible, otherwise connect to inserts, clips or other anchorage devices or fasteners as indicated. Ensure that structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

2. Space main runners, 4-feet on center. and space hangers 4-feet on center along runners, except as otherwise shown.

3. Level main runners to a tolerance of 1/4-inch in 12-feet, measured both lengthwise on each runner and transversely between parallel runners.

4. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

5. Direct-hung Metal Support System: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall track.

6. Space furring member 16-inches on center, except as otherwise indicated.

7. Install auxiliary framing at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.

8. Do not connect or suspend steel framing from dusts, pipes and conduits.

9. Keep hangers and braces 2-inches clear of ducts, pipes and conduits.

10. Sway-brace suspended steel framing with hangers used for support.

C. Metal Wall Framing:

1. Install supplementary framing, blocking and bracing to support fixtures, equipment, services, heavy trim, furnishings and similar work which cannot be

adequately supported on gypsum board alone to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.

2. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.

3. Install runner tracks at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.

4. Extend partition stud system through acoustical ceilings and elsewhere as indicated to the structural support or substrate above the ceiling except where indicated for terminate at ceiling with compression tap seal.

5. Extend partition stud system at ceilings, except where indicated to be extended to structural support or substrate above.

6. Space studs 16-inches on center, except as otherwise indicated.

7. Frame door openings with vertical studs securely attached by screws at each jamb either directly to frames or to jamb anchor clips on door frame in accordance with GA 219; install runner track sections (for jack studs) at head and secure to jamb studs. Provide runner tracks of same gage as jamb studs. Space jack studs same as partition studs.

8. Install 20 gage studs at each jamb for all doors 2-feet-8-inches wide to 4-feet wide weighing not more than 200 lbs.; and for all doors less than 2-feet-8-inches wide weighing more than 100 lbs. but not more than 200 lbs.

9. Install double 20 gage studs for single doors up to 4-feet wide, weighing more than 200 lbs. but not more than 300 lbs.; screw attach web of back-to-back studs direct to jamb anchor clips nested between flange of stud.

10. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

11. Space wall furring members 16-inches on center, except as otherwise indicated.

12. Install each steel framing and furring member so that fastening surface do not vary more than 1/8-inch from plane of faces of adjacent framing.

13. Vent Shaft Furring: (Design U-505, 12-29-64): Install floor, ceiling, and sidewall angle runners accurately according to partition layout, and securely to structural supports with suitable fasteners, in accordance with wallboard manufacturer's recommendations. Install ceiling runners by fastening through the web. Install angle runners horizontally as bracing at quarter points, and spaced no greater than 5-feet on center.

D. Gypsum Wallboard, General:

1. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 1-foot in alternate courses of board.

2. Install wall/partition boards vertically to avoid end-butt joints wherever possible. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.

3. Install exposed gypsum board with face side out. Do not install imperfect, damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16-inch open space between boards. Do not force into place.

4. Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that both tapered edge joints abut, and mill-cut or field-cut end joints abut. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

5. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts.

6. Cover both faces of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are properly braced internally. Except where concealed application is required for sound, fire, air or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. area, and may be limited to not less than 75% of full coverage.

7. Isolate perimeter of non-load-bearing drywall partitions at structural abutments. Provide 1/4-inch to 1/2-inch space and trim edge with J-type semi-finishing edge trim. Seal joints with acoustical sealant. Do not fasten drywall directly to stud system runner tracks.

8. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board with "floating" internal corner construction, unless isolation of the intersecting boards is indicated, unless control or expansion joints are indicated, or unless fire rating is indicated.

9. Space fasteners in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.

10. Install sound insulation at metal framing as indicated. Size insulation to width of members spacing. Press friction fit insulation between members as recommended by the insulation manufacturer.

11. Install cementitious backer units in accordance with ANSI A108.11.

E. Methods of Gypsum Wallboard Application:

1. Single-Layer Application:

a. On ceilings, apply gypsum board prior to wall/partition board application, to greatest extent possible.

b. On partitions/walls higher than 8-feet-1-inch, apply gypsum board vertically (parallel), unless otherwise indicated, and provide sheet lengths which will minimize end joints.

c. On partitions/walls 8-feet-1-inch or less in height apply gypsum board horizontally (perpendicular); use maximum length sheets possible to minimize end joints.

2. Single-Layer Fastening Method: Apply gypsum boards to supports by fastening with screws, spaced not to exceed 16-inches centers for walls and 12-inch centers for ceilings.

3. Gypsum wallboard construction for fire-rated and acoustical-rated assemblies shall be in accordance with the design indicated in the Drawings. Provide minimum one-hour fire-rated wall in accordance with the 1994 Uniform Building Code. Table 7-B. Item No. 16.1.1 and as described as follow.

5/8” Type X gypsum wallboard secure to minimum 24-gage 3-5/8” metal channel-shaped stud at 24” on center on both sides. The wallboards shall be applied horizontally with 1-inch long no. 6 drywall screw fastened to stud at 8” on center at vertical edges and 12” on center at intermediate studs. The horizontal joints shall be staggered with those on the opposite side.

4. Multi-Layer Application: Application of base layer may be either perpendicular or parallel except it shall be in accordance with the applicable fire tests. Face ply shall be offset by a minimum of 10-inches from the joints of the base ply. Apply with fasteners or adhesive and fasteners in accordance with the applicable fire test.

5. Ceiling Installation: Install two layers of Type X gypsum wallboard. Base layer 5/8-inch Type X gypsum wallboard applied at right angles to joist or truss 24-inches on center. with 1-1/4-inch Type S or Type W drywall screws 24-inches on center. Face layer 5/8-inch Type X gypsum wallboard or veneer base applied at right angles to joist or truss through base layer with 1-7/8-inch Type S or Type W drywall screws 12-inches on center. at joints and intermediate joist or truss. Face layer joints offset 24-inches from base layer joints, 1-1/2-inch Type G drywall screws placed 2-inches back on either side of face layer end joints, 12-inches on center. Tape and sand all joints. Provide smooth finish at exposed surface.

6. Vent Shaft Wallboard Application: (Design U-505, 12-29-64). Install 5/8-inch gypsum wallboard Type X base layer, 1 inch coreboard, and 5/8-inch Type X wallboard face layer to series of metal angle runners and angle bracing in strict accordance with manufacturer's printed instructions for 2-hour vent shaft construction, using type S screw fasteners and adhesive lamination methods.

F. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Engineer for visual effect. In fire rated construction install joints systems rated for the fire resistance rating of the partition. ASTM C 840 requirements are summarized below:

1. Install control joints in areas exceeding 2500 square feet.

2. Space control joints not more than 50 feet on center.

3. Install control joints where ceiling framing or furring changes direction.

4. Install control joints in partitions and wall furring runs exceeding 30 feet.

5. Space control joints not more than 30 feet on center.

6. Install control joints in furred assemblies where control joints occur in base exterior wall.

G. Installation of Trim Accessories:

1. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.

2. Install corner beads at external corners of drywall work.

3. Install edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed, and except where plastic trim is indicated. Provide type with face flange to receive joint compound except where semi-finishing type is indicated. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).

4. Install J-type semi-finishing trim where indicated.

5. Install reveals as indicated with factory fabricated intersections where indicated.

6. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

H. Installation of Drywall Finishing:

1. General: Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fasteners heads, surface defects and elsewhere in accordance with ASTM C 840 and Gypsum Association GA 214 and GA 216 as required to prepare work for decoration. Prefill open joints and rounded or beveled edges, using type of compound recommended by manufacturer.

   a. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.

   b. Apply joint compound in 3 coats (not including prefill of openings in base), and sand between last 2 coats and after last coat. Fastener heads, dents, gouges, and cut-outs shall be filled with joint compound and sanded.

   c. Accessories at exposed joints, edges, corners, openings, and similar locations shall be taped, floated with joint compound, and sanded to produce surfaces ready for gypsum board finishes.

d. Treatment for water-resistant gypsum wallboard shall be as recommended by the gypsum wallboard manufacturer.

2. Finish interior gypsum wallboard by applying the following levels of gypsum board finish in accordance with GA-214.

a. Level 1: For ceiling plenum areas and other concealed areas.

Where Level 1 gypsum board finish is applicable, embed tape in joint compound.

b. Level 2: Where wall panels form substrates for tile.

Where Level 2 gypsum board finish is applicable, embed tape in joint compound and apply first coat of joint compound.

c. Level 4: For ceiling surfaces to receive paint.

Where Level 4 gypsum board finish is applicable, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

d. Level 5: For wall surfaces to receive semi-gloss enamel.

Where Level 5 gypsum board finish is applicable, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. For skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.

3. Tolerances:

a. Maximum variation of finish surface from true flatness shall be 1/8-inch in 10 feet in any direction.

b. Maximum variation of plumbness of wall shall be 1/8-inch in 10 feet of height.

c. Maximum variation from true position shall be 1/8-inch.

3.03 APPLICATION OF DENS-SHIELD BACKER BOARD

A. General

1. Provide Dens-Shield backer board where indicated on drawings using fastening systems specified.

2. Use maximum lengths possible to minimize number of joints. Locate edge joints parallel to and on framing. Stagger intermediate end joints of adjacent lengths of backer board. Attach backer board panels to framing with fasteners recommended by tile backer manufacturer, spaced 6” o.c. Butt ends and edges.

3. Locate control and expansion joints at same locations as substrate and where required by finishes.

   a. Walls: Expansion joints not to exceed every 30 lineal feet of continuous wall.

B. Wall Installations:

1. At walls, install backer board panels in accordance with manufacturer’s recommendations.

2. Install tile backer in accordance with manufacturer’s recommendations and TCA Handbook for Ceramic Tile Installation, Method W245 and C331.

3. For 1-hour fire rating assemblies, apply Dens-Shield backer board parallel or at right angles to each side of 3-5/8” metal studs 24” o.c. with 1-1/4” Type S drywall screws 8” o.c. to vertical studs and 12” o.c. to to perimeter track. Stagger joints each side.

4. Finishing:

   a. Substrate for tile: Apply glass mesh joint tape over joints. Embed tape in setting material indicated for specified tile finishes. Allow joints to dry prior to installing tile systems.

5. Accessories: Install accessories where indicated and in accordance with tile backer manufacturer's instructions.

3.04 BACKING PLATES AND ANCHORS

A. Backing plates and anchors or blocking which are to be attached to metal studs or furring for anchoring items and work indicated on the drawings or specified in other Sections shall be installed and secured. Plates and anchors shall be welded in place in accordance with approved setting drawings.

3.05 CLEANING AND REPAIRING

A. After installation and before painting, correct surface damage and defects. Leave surface clean and smooth, satisfactory to the painter. No painting shall be done over gypsum board work until the joints are thoroughly dry. Joints and fastenings are to be invisible after painting.

3.06 PROTECTION

A. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall construction being without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09540 - EXTERIOR FINISH SYSTEM

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 DESCRIPTION OF WORK

A. Work Included: The extent of exterior finish system is shown on the Drawings and includes the following:

1. Exterior finish system (EFS) over exterior EFS gypsum sheathing board. Apply exterior finish system to areas as called out on the Drawings.

B. Related Work Specified Elsewhere:

1. Requirements specified by reference for sealing joints in system with elastomeric joint sealants: Section 07920 - SEALANTS.

1.03 DEFINITIONS

A. Exterior Finish System (EFS) refers to exterior assembly composed of a textured protective finish coating, applied to a layer of gypsum sheathing board fastened to supporting metal construction.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide system complying with the following performance requirements:

1. Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other conditions.

2. Fire Resistive Design: 1 hour. The system shall be tested for fire performance as follows:

a. Surface Burning Characteristics: ASTM E84.

i. The adhesives and coatings shall have a Flame Spread index not exceeding 20 and Smoke Developed index not exceeding 10.

b. ASTM E108 Full Scale Fire Test.

c. UBC 26-9 Intermediate Scale Multi-Story Test (ISMA).

d. Ignitability Characteristics: BOCA National Building Code Radiant Heat Exposure Test of Exterior Wall Assemblies.

3. Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it that results in degradation of system and assemblies behind system including substrate construction and interior finish.

4. Wind Design Pressure: Work under this section shall comply with wind load requirements of the Uniform Building Code, current edition. Wind loads shall be for 80 mph and Exposure "D" as defined in the UBC. Those values are hereby established as follows:

a. Positive (inward) vertical flat wall loads: 30.31 psf.
b. Negative (outward) vertical flat wall loads: 37.88 psf.

1.05 SUBMITTALS

Submit in accordance with Section 01300 – SUBMITTALS.

A. General: Submit the following to the Engineer for approval:

1. Product data for each component of exterior finish systems.

2. Shop drawings showing installation of system, including sections, details of components, joint configurations within system and between system and adjacent construction.

3. Certification of performance requirements shall include ICBO and UL reports.

4. Samples for initial selection purposes in form of manufacturer's standard and custom integral color charts and small-scale samples indicating available textural choices.

Samples for verification purposes in the form of one-foot square panel for finish, color, and texture specified. Prepare samples using same tools and techniques intended for actual work.

5. Exhibit A completed by EFS subcontractor.

6. Exhibit B completed by Sealant Installer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is certified in writing by system manufacturer as qualified to install manufacturer's system.

B. Single-Source Responsibility: Obtain materials for systems from either a single manufacturer or manufacturers approved by the system manufacturer as compatible with other system components. System manufacturer shall provide single source warranty for sheathing, finish and all other system components.

C. Provide assembly test data or UL Design number for fire rating of assemblies indicated.

D. Provide ICBO report or approved equal with attending details indicating system evaluation and performance. Provide all components as required by the manufacturer or ICBO.

E. Mock-Up: Provide a 4 foot by 8 foot mock-up of the exterior finish system at a location as directed by the Engineer. Finish in selected materials, color and texture. Mock-up shall be approved by the Engineer prior to ordering project materials.

1.07 DELIVERY, STORAGE, AND HANDLING

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

B. Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.

C. Stack sheathing boards flat and off the ground.

1.08 SEQUENCING AND SCHEDULING

A. Sequence installation of system with related work specified in other sections to ensure that wall assemblies, including flashing, trim, and joint sealers, are protected against damage from weather, aging, corrosion, or other causes.

1.09 WARRANTY

A. The exterior finish system manufacturer shall submit to the Engineer a minimum of 5-year system warranty. The warranty shall cover but not limit to the gypsum sheathing boards, sealants and trims, and all the components of the manufacturer's system. In the event of system failure during the warranty period, the system manufacturer will make repairs as necessary to the satisfaction of the Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide EFS of Dryvit Systems, STO Industries, Thoro System Products or approved equal. Exterior finish system shall be equal to Dryvit Fast Track 4000.

2.02 MATERIALS

A. Compatibility: Provide adhesive, sheathing board, reinforcing fabrics, base and finish coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer.

B. Colors and Textures of Protective Coating: Comply with the following requirements:

1. Provide color selection made by Engineer from manufacturer's full range of standard colors for type of finish coat indicated.

C. Moisture Barrier: 30-lbs. asphalt coated glass fiber base sheet roofing felt.

D. EFS Gypsum Sheathing Board: Georgia Pacific "Dens-Glass Gold" shealthing or approved equal; made of a silicone-treated gypsum core, surfaced with inorganic fiberglass mats, and alkali-resistant surface coating; thickness - 5/8-inch, Firestop, Type X. Board shall be specifically approved by the system manufacturer.

E. Exterior Finish, Polymer Based

1. Base Coat: System manufacturer's standard factory-mixed, polymer admixture formulation, suitable for embedding reinforcing fabric over gypsum sheathing board substrate, and for receiving finish coating.

2. Finish Coat: Finish coating shall be a smooth, non-textured 100% acrylic based coating utilizing an elastomeric binder. "Weatherlastic Smooth" or approved equal.

3. Water: Clean and potable.

4. Reinforcing Fabric: Balanced, alkali-resistant open weave glass fiber fabric treated for compatibility with other system materials; made from continuous twisted multi-end strands with tensile strength of not less than 145 lb and 150 lb in warp and fill directions per ASTM D1682; comply with ASTM D578.

   Regular weight mesh (4 ounce per square yard) shall be required for all non-traffic areas. Heavy duty weight, impact resistant, will be used at walkways, lanais, sidewalk and other areas subject to contact from the ground/floor to 6 feet high. Heavy duty weight is defined as two layers of mesh: one regular weight mesh plus one 20 oz/sy (minimum) weight mesh in the manufacturers recommended layering. Shop drawings shall clearly show extent of use of heavy duty weight mesh. Provide detail of where heavy duty weight mesh and regular weight meshes meet.

F. Mechanical Fasteners Assemblies: System manufacturer's standard corrosion-resistant fastener assemblies; selected for properties of pull-out, tensile, and shear strength required to resist design loads of application indicated, capable of pulling fastener head below surface of sheathing board.

2.03 ELASTOMERIC SEALANTS

A. Sealant Products: Provide manufacturer's standard chemically curing, one-part Nonsag Urethane, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials and complies with requirements of Section 07920 - SEALANTS.

B. Sealant Color: Match finish coat color of system.

2.04 MISCELLANEOUS MATERIALS

A. Wallboard Accessories: ASTM C 1047, Vinyl Corp., Plastic Components Inc., Vinyl Tech or approved equal.

1. Standard Corner Bead: Vinyl Corp. Corner Bead CB 158E: Install at all outside corners of wall fascia, ceiling, and soffit as indicated.

2. F-Channel Reveals: Install at soffit. Vinyl Corp. CS58-50, 1/2" reveal.

3. Expansion Joints: Install for soffit. Vinyl Corp. 4058-100, 1" reveal. Provide expansion joint at maximum length of every 20 feet.

4. Drip Screed Reveals: Install at corners of fascia and soffit, 3/4" reveal. Vinyl Corp. DCS 58-75 for EFS. Verify sizes of assembly.

5. Shadow Reveals: Install at soffit and wall corner: Vinyl Corp. RS58-100, 1" reveal.

6. Starter Strip Casing Beads with Drip Edge: Install at the bottom of all exterior EFS wall panel. Vinyl corp. DE/CS 58-16D for EFS. Verify sizes of assembly.

7. Trim: Vinyl Corp. "L" Bead SB 58 as indicated.

8. Soffit Vent: Vinyl Corp. CSJ58-300V.

9. Other Accessories: As indicated or necessary for complete installation.

10. All accessories shall be corrosion resistance and weatherable vinyl, PVC, or equal.

B. Special Tools: Provide special tools for wrapping and forming mesh into joints without tearing mesh. Provide other special tools as recommended by the System manufacturer.

2.05 MIXING

A. General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as approved by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, to determine if they are in satisfactory condition for installation of system. Do not proceed with installation of system until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling resulting from application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.

B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.

C. All substrate surfaces shall be unpainted, clean, dry, structurally sound and free of dirt, dust, chalk, mildew, algae, efflorescence or foreign materials which would affect the adhesion of coatings.

3.03 INSTALLATION OVER EFS GYPSUM SHEATHING (EFS)

A. General: Comply with system manufacturer's current published instructions for installation of system as applicable to type of substrate indicated. The system shall be installed in accordance with the Dryvit Fasttrak System 4000 Application Pocket Guide (DS215).

B. Mechanically attach EFS gypsum sheathing board to wall framing with recommended fasteners.

1. Install moisture barrier under EFS gypsum sheathing board. Cut EFS gypsum sheathing board to fit corners, projections, and reveals precisely and to produce edges and shapes conforming to details indicated.

2. Form joints for sealant application by leaving gaps of width needed between adjoining sheathing edges as well as between sheathing edges and dissimilar adjoining surfaces.

3. Install expansion joints between boards as indicated on the Drawings, or with a spacing between joints at a maximum of 30 feet and a maximum of 900 square feet, whichever is more stringent.

4. Treat exposed edges of sheathing board by encapsulating with base coat, reinforcing fabric, and finish coat.

5. Install aluminum trim at base of exposed wall sheathing panels.

C. Base Coat Over Gypsum Sheathing:

1. Apply base coat to system manufacturer's recommended thickness over entire sheathing board surfaces, including edges.

2. Immediately place the reinforcing fabric against the wet base coat and by troweling from the center to the edges, embed the fabric into the coating.

3. Reinforcing fabric must be continuous, free of wrinkles and be fully embedded in the base coat. Butt edges of fabric; do not overlap.

4. Allow at least 24 hours drying time. Additional time may be required for temperature or humidity conditions.

D. Finish Coat Over Gypsum Sheathing:

1. Thoroughly mix the factory-prepared finish coat material in accordance with manufacturer's printed instructions. A minimum of 10 mils dry film thickness is required.

2. Provide finish color(s) and texture(s) to match approved samples.

3. Apply finish coat by trowel over cured base coat in thickness required by system manufacturer to produce a uniform finish of texture and color, matching approved sample.

3.04 REINFORCING FABRIC

A. Fully embed reinforcing fabric of type indicated below in wet base coat to produce wrinkle-free installation with fabric continuous at corners and lapped or otherwise treated at joints to comply with system manufacturer's requirements.

1. Standard reinforcing fabric unless otherwise indicated.

2. Impact-resistant reinforcing fabric to a minimum height of 6 feet above walkway, lanais, sidewalk, and other areas subject to contact.

3. Provide double mesh at all tooled joints and grooves.

3.05 INSTALLATION OF JOINT SEALANTS

A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements of Section 07920, SEALANTS, and with "EIMA Joint Sealant Specifications for Exterior Finish Systems". EFS surfaces in contact with sealant shall be coated with Demandit or Color Prime. Sealant shall not be applied directly to textured finishes or base coat surfaces.

3.06 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove protective coatings from roof and walls and any other surfaces outside areas indicated to receive exterior finish system coating. Remove the mock-up from the project site.

B. Provide final protection and maintain conditions in a manner acceptable to Installer and system manufacturer that ensures system's being without damage or deterioration at time of Substantial Completion.

END OF SECTION

EXHIBIT A

(EFS SUBCONTRACTOR NAME)

Completion Date: _____

THE EXTERIOR FINISH SYSTEM (EFS) INSTALLED ON THE STRUCTURE LOCATED AT THE ADDRESS INDICATED BELOW:

(_____) CONFORMS (_____) DOES NOT CONFORMS

TO (EFS MANUFACTURER NAME) RECOMMENDED INSTALLATION PRACTICES AND SECTION(S) _____ OF ICBO ES, INC., REPORT NO. _____.

Address of Structure:

_____

_____

_____

_____

Product Component Names:

Adhesive (s) _____

Fasteners (mech) _____

Base Coat_____

Reinforcing Fabric_____

Finish Coat (s)_____

	INSTALLATION	CONFORMS	DOES NOT CONFORM
A.	Substrate Type and Tolerance	_____	_____
B.	EFS		
	1. Adhesive and/or Fasteners	_____	_____
	2. Reinforcing Fabric	_____	_____
	3. Base Coat	_____	_____
	4. Finish	_____	_____

C. The information entered above is offered in testimony that the EFS installation conforms with the EFS manufacturer's installation methods and procedures, and the EFS manufacturer's ES report.

NOTE: An installation card shall be received from the Sealant Installer indicating that the sealant installation conforms with the EFS evaluation report and sealant manufacturer's installation methods and procedures must accompany this declaration.

EFS Subcontractor Name and Address:

_____

_____

_____

Signature of Responsible Officer: _____

Typed Name and Title of Officer: _____

Telephone Number (_____) _____

cc: Original: Building Department(Must be submitted with sealant installer declaration)

Copy: EFS Manufacturer

EXHIBIT B

(SEALANT INSTALLER NAME)

Completion Date: _____

THE SEALANT INSTALLED IN CONJUNCTION WITH AN EXTERIOR FINISH SYSTEM (EFS) INSTALLED ON THE STRUCTURE LOCATED AT THE ADDRESS INDICATED BELOW:

(_____) CONFORMS (_____) DOES NOT CONFORMS

TO (EFS MANUFACTURER NAME) AND (SEALANT MANUFACTURER'S NAME) RECOMMENDED INSTALLATION PRACTICES AND SECTION(S) _____ OF ICBO ES, INC., REPORT NO. _____.

Address of Structure:

_____
_____
_____
_____

Product Component Names:
Primer (s) _____
Sealers_____
Bond Breakers_____
Sealant Materials_____

	INSTALLATION	CONFORMS	DOES NOT CONFORM
A.	Designer's requirements, details and instructions	_____	_____
B.	Sealant manufacturer's details and requirements	_____	_____
C.	Exterior finish system (EFS) manufacturer's requirements		

D. The information entered above is offered in testimony that the Sealant installation conforms with the Sealant manufacturer's installation methods and procedures, and the EFS manufacturer's evaluation report.

Sealant Installer Company Name and Address:

_____
_____
_____
_____

Signature of Responsible Officer: _____
Typed Name and Title of Officer: _____
Telephone Number (_____) _____

cc: Original: Building Department (Must be submitted with sealant installer declaration)
Copy: EFS Manufacturer
EFS Contractor
Sealant Manufacturer

SECTION 09512 - RESILIENT TILE FLOOR

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent of new and replacement of existing resilient tile and base work is indicated on Drawings, notes and schedules. In the event of new installation adjacent to existing tiled area or replacement of existing tiles, the type, finish, pattern, sizes, thickness and color of tile and base shall match with tiles at the existing offices and corridor. New tiles adjoining existing tiled area shall be installed aligned to existing tiles.

B. All the existing tiled areas not called for replacement in the drawings but incidentally damaged or removed by the CONTRACTOR and/or his subcontractors as a result of the renovation work shall be replaced with new tiles and bases with type, finish, pattern, sizes, thickness and color match to existing. All the removal and installation work shall be part of the base work. No additional compensation will be allowed.

C. Related Work Specified Elsewhere:

1. Occupancy, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS - AIR QUALITY REQUIREMENTS.

1.03 QUALITY ASSURANCE

A. Slip Resistance: This product shall meet or exceed the slip resistance requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) Paragraph 4.5.1.

1.04 SUBMITTALS

A. Product Data for materials specified.

B. Three (3) samples of floor tiles and cove bases match to existing adjoining tiled surfaces shall be submitted to the Engineer for review and approval. In the event that matching tile and base colors are discontinued, submit written statement and submit manufacturer's full range of color and/or pattern to the Engineer for selection.

C. Manufacturer's cleaning and maintenance data.

D. Certification: Flooring manufacturer shall provide a letter or other document of certification that the installed flooring slip resistance with standard finish meets the slip resistance requirements listed above.

1.05 EXTRA MATERIALS

Furnish extra materials as described below, packaged in their original container and identified with labels describing their contents:

A. Furnish one (1) box of each type, color, pattern, class, wearing surface and size of tile installed.

B. Furnish ten (10) lineal feet for each 500 lineal feet or fraction thereof, of each type, color, pattern and size of resilient accessory installed.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Vinyl composition tile shall be 12 in. x 12 in. x 1/8" thick, conforming to ASTM F1066, Composition 1 (non-asbestos formulated), Class 2 (through pattern tile), marbleized design or as indicated in Drawings with a smooth wearing surface, factory waxed with a minimum light reflectance of 30%.

B. Cove base shall be vinyl or rubber, top-set type, 1/8" thick, with a smooth exposed surface and textured bonding surface on its unexposed face. The rubber or vinyl material shall be free from offensive odor and its color shall be uniform throughout the thickness of the base.

C. Adhesives shall be water-resistant type, as recommended by the manufacturer for the specific materials used. Do not use adhesive not intended for its purpose.

D. Edging:

1. Transitions from resilient tile to substrate shall be beveled vinyl strip, one inch wide, same thickness as tile.

2. Transitions from carpet to resilient tile shall be vinyl carpet to tile adaptor.

3. Metal edge strips shall not be used.

4. Edging color shall match resilient base.

E. Patching and leveling compounds shall be latex-modified, Portland cement based formulation unless otherwise required by the flooring manufacturer for the application indicated. Gypsum based compounds shall not be used.

F. Floor tiles and bases shall be matched exactly to type, finish, pattern, sizes, thickness and color of the tiles at the existing offices and corridor.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

A. Materials shall be delivered to the jobsite in original unopened containers marked with grade and manufacturer's brand name. Handle and store materials carefully.

3.02 EXAMINATION

A. The Installer shall examine substrates where resilient tile flooring will be installed for compliance with the flooring manufacturer’s requirements. Installation shall not proceed until unsatisfactory conditions have been corrected. Proceeding with installation will indicate acceptance of the substrate conditions by the Installer.

3.03 PREPARATION OF SUBFLOORS

A. General: Comply with the flooring material manufacturer’s installation instructions for the preparation of substrates to receive resilient flooring.

B. Unless otherwise required by the flooring manufacturer, the subfloor shall be broomed, damp mopped and scrubbed until it is free from dust, dirt, grease or other foreign material. It shall also be scraped to make the surface smooth and level.

C. The concrete subfloor shall be free of materials such as curing compounds, sealers, hardeners and other materials that may interfere with adhesive bond and shall be clean, dry and smooth before tiles are laid. Defects such as ridges, holes, cracks and depressions shall be corrected and filled with patching/leveling compounds approved by the flooring manufacturer.

D. Sealing compound shall be applied to all slabs-on-grade receiving resilient tile flooring and shall be compatible with the floor finish. The compound shall conform to the requirements of ASTM C109 and shall permanently seal and waterproof the concrete against water intrusion.

E. If floor tile is laid on defective subfloors, such tile shall be removed and replaced at the CONTRACTOR's expense.

3.04 PROJECT CONDITIONS

A. Flooring materials and the spaces to receive flooring materials shall be conditioned in accordance with the flooring manufacturer's recommendation and instructions.

B. Provide adequate ventilation to remove moisture and fumes from the areas where floor tiles are being installed.

C. Install resilient flooring after all other finishing operations, specially overhead trades have been completed.

D. The areas to receive flooring shall be cleaned, dried and fully enclosed; and the building air conditioning system shall be in operation for at least one week prior to the installation of resilient flooring.

3.05 MINOR REPAIRS USING PATCHING COMPOUND

A. Apply a sufficient amount of patching compound to cover all depressions, joints, etc. Apply successive coats, if necessary, once the previous coat has dried according to manufacturer's guidelines. Sand and/or scrape all uneven spots or any trowel ridges smooth. Vacuum repaired surfaces.

3.06 TESTING

A. Flooring materials shall not be installed over concrete slabs until the slabs have cured and are sufficiently dry.

B. After cleaning, test concrete slabs for alkalinity, moisture and adhesive bond as listed below. Floor tile installation shall not proceed until unsatisfactory conditions have been corrected.

C. Testing.

1. pH Testing: Use pH paper and distilled water. If the pH is 10 or higher at the time of installation, do not proceed until condition is corrected.

2. Moisture Testing: Test all slabs regardless of grade level. Test cleaned sections of concrete for moisture using a calcium chloride test kit. Follow the instructions included with the kit. A minimum of three tests shall be conducted for each 1000 square feet of flooring. Do not proceed with flooring installation if moisture emission from the concrete exceeds three pounds per 1000 square feet per 24 hours.

3. Adhesive Bond Testing: Perform bond test as recommended by the flooring material manufacturer.

4. Submit copy of test results to the Engineer.

3.07 INSTALLATION OF MATERIALS

A. See Room Finish Schedule for locations and types of flooring required. Flooring and cove base shall continue, respectively, under and behind removable and/or portable cabinets, cases, etc. Flooring shall continue into closets where the floor of the closets and adjacent floor are at the same level. Installation shall not begin until the work of other trades, including painting, has been completed.

B. All work shall be done by experienced tradesmen in strict accordance with recommended specifications of the respective manufacturer. Where not contrary to manufacturer's recommendations, adhesive shall be applied with a notched trowel in a thin and even coat. Tiles shall be laid with tight joints in true alignment both ways. They shall be cut to fit accurately at joining with other materials and at vertical surfaces. The under side of the tiles shall be heated if necessary to obtain satisfactory bond to the subfloor.

C. Tiles shall be laid symmetrically about the center lines of the room in both directions, starting at the center of the room and working toward the wall so that border tiles shall not be less than half the width of the field tiles. Grain shall be reversed in alternate tiles, etc.. Vinyl edging shall be installed with contact adhesive at all marginal edges of flooring not stopped by raised thresholds or other vertical surfaces.

D. Cove base shall be applied onto thoroughly-dried walls with cove base adhesive only. Because of the thermoplastic character of vinyl base, care shall be taken not to stretch it during installation since it will shrink and leave a gap at joints. The top and bottom edges shall be in firm contact with the wall and floor. Pre-molded interior and exterior corners shall be used unless otherwise approved by the Engineer. If corners are formed

on the job, the wrap around from the corner shall be not less than 12 inches long. Otherwise, the cove base shall be continuous around the corners.

E. Cove base shall be applied to all wall base and built-in furnitures base whenever exposed to view.

F. Where new tiles are adjoining existing tiled area, the installation of new tile shall be aligned to the existing tiles.

3.08 CLEANING AND PROTECTION

A. Spots of adhesive shall be removed immediately as work progresses. Floor shall not be washed or waxed until the adhesive has completely set, and in no case until after the minimum length of time recommended by the manufacturer has elapsed. The flooring shall be cleaned with a neutral cleaner and recommended by the manufacturer and then damp-mopped with clear water. Flooding of the floor is not permitted. When the floor is dry, 2 coats of an approved non-slip wax shall be applied with a clean lambs wool mop. Each coat shall be buffed thoroughly when dry with a weighted rotary electric floor polishing machine. After polishing, the CONTRACTOR shall be responsible for protecting the flooring until acceptance of the project.

END OF SECTION

SECTION 09510 - ACOUSTICAL CEILING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Provide suspended lay-in acoustical ceiling systems as indicated and herein specified.

B. Related Work Specified Elsewhere:

1. Occupany, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS, AIR QUALITY REQUIREMENTS.

2. Coordinate location of all mechanical items with Division 15 - MECHANICAL.

3. Coordinate location of all electrical items with Division 16 - ELECTRICAL.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for suspension system and lay-in panels substantiating that all products comply with requirements.

B. Samples: Submit three (3) samples of each type of acoustical unit, edge molding, and suspension runner.

C. Shop Drawings: Submit drawings which clearly show all components of the systems to be installed at this project. Include suspension system, furring, jointing, method of anchoring and fastening, and locations of electrical features. Jointing diagrams shall show typical arrangement of the panels in each space, including the termination at margins of ceilings and at intersections with vertical surfaces. Include typical details of the following:

1. Intermediate framing for hanger supports that fall between structural framing members.

2. Hanger fastenings at structural framing members and at main runners.

3. Acoustical-unit support at ceiling penetrations.

4. Splicing method for main and cross runners.

5. Seismic restraint system.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry Underwriters' Laboratory classification of NRC, CAC and AC.

1.04 REFERENCES

A. ASTM A 366 "Standard Specification for Steel, Carbon Cold-Rolled Sheet Commercial Quality".

B. ASTM A 641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".

C. ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process".

D. ASTM C 423 "Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".

E. ASTM C 635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings".

F. ASTM C 636 "Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels".

G. ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials".

H. ASTM E 1414 "Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum".

I. ASTM E 1264 "Classification for Acoustical Ceiling Products".

J. ASTM E 1477 "Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers."

K. Seismic: Install ceiling system in accordance with ASTM E 580.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: To ensure proper interface and color match, all acoustical panel units and grid components shall be produced or supplied by a single manufacturer. Materials supplied by more than one manufacturer are not permissible.

1.06 DELIVERY AND STORAGE

A. 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.

1.07 ENVIRONMENTAL CONDITIONS

A. For 24 hours before, during, and 24 hours after installation of acoustical units, maintain temperature and relative humidity at typical in-service conditions. Interior finish work such as plastering and 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.

1.08 GUARANTEE

A. The Acoustical subcontractor shall execute to the STATE, a one (1) year written warranty from the time of acceptance of the project as a whole, countersigned and guaranteed by the subcontractor covering all materials and workmanship, and on written demand by the STATE within that period, shall correct or replace any defective material or workmanship at its own expense.

1.09 MAINTENANCE

A. Extra Materials: Provide extra acoustical ceiling system materials in unopened, clearly marked cartons equivalent to 1% to 2% of the total quantity of installed acoustical panel material and 12 pieces each of 4’-0” long tees and 2’-0” long tees.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acoustical Tile Ceiling Units: ASTM E 1264 and the following requirements.

2.02 AVAILABLE MANUFACTURERS

A. Products specified in this Section are products of Armstrong World Industries, Inc. Products of one the following manufacturers are acceptable subject to visual comparability and the requirements of this Section:

B. Suspension System

1. Donn/U.S. Gypsum Interiors, Inc.
2. Chicago Metallic Corp.
3. or approved equal.

C. Acoustical Units

1. Donn/U.S. Gypsum Interiors, Inc.
2. Chicago Metallic Corp.
3. or approved equal.

2.03 SUSPENSION SYSTEM

A. Product: Armstrong Prelude XL Fire Guard 15/16" Exposed Tee System or approved equal.

B. Components: All main beams and cross tees shall be commercial-quality hot dipped galvanized steel coating as per ASTM A 653. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main Beams shall have prepunched expansion relief. Main Beams and Cross Tees are double-web steel construction with rotary stitching for improved column strength and have a 15/16" type exposed flange design. Cross Tees shall have staked-on end detail allowing for easy cross tee removal and remounting.

1. Structural Classification: Intermediate duty.

2. Exposed bottom flange shall be continuous with unbroken roll-formed cap, made from steel, running the length of the member.

a. Main Beam: Web height shall be 1-1/2".

b. 4' Cross Tee: Web height shall be 1-1/2".

c. 2' Cross Tee: Web height shall be (1-3/8") (1").

d. End condition of Cross Runners: override.

C. Wall moldings shall be angle molding, Item #7800, manufactured by Armstrong World Industries, Inc. or approved equal, and have a nominal 7/8" exposed flange.

D. Finish: All steel roll-formed parts shall be chemically cleansed hot dipped galvanized steel. Capping shall be prefinished galvanized steel in a baked polyester paint finish.

1. Color shall be WHITE and match the actual color of the selected ceiling tile, unless otherwise specified. Off-white is not acceptable.

E. Hanger Wire: Hanger wire shall be galvanized carbon steel per ASTM A 641, soft temper, prestretched, with a yield stress load of at least three (3) times design load, but not less than 12 gauge (0.106") diameter.

F. Hold down clip shall be as recommended by the manufacturer of suspended system, keeping ceiling panels from uplifting by air pressure and allowing 100% accessibility to the plenum. The clips shall be compatible to the acoustical ceiling panels and corrosion resistant.

2.04 ACOUSTICAL CEILING

A. Type: Armstrong Fine Fissured Square Lay-In/medium texture Item #: 1811 or approved equal.

B. Performance Characteristics:

1. Sound Control:

a. UL classified Noise Reduction Coefficient: NRC of 0.70 in compliance with ASTM C 423, classified with UL label on product carton.

b. UL classified Ceiling Attenuation Class: CAC minimum of 40 in compliance with ASTM E 1414, classified with UL label on product carton.

2. Flame Spread/Fire Resistance:

a. 0-25, per ASTM E 84.

b. Class A, per ASTM E 1264.

c. Fire Guard: A fire resistive ceiling when used in applicable UL assemblies.

3. Light Reflectance:

a. LR of 0.84, per ASTM E 1477.

4. Dimensional Stability:

a. Ceilings shall have HumiGuard Plus sag resistance performance.

b. The surface and back of the product have been treated with BioBlock, a paint that contains a special biocide that inhibits or retards the growth of mold or mildew.

C. Surface Texture, Substrate, Size and Edges:

1. Surface Texture: Nondirectional Fine Fissured, Medium Texture.

2. Substrate: Panels shall have mineral fiber substrate.

3. Size: 24” x 48” x 5/8”.

4. Edge Detail: Square Lay-in for interface with Armstrong Prelude XL Fire Guard 15/16” Exposed Tee grid or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION WORK

A. Surfaces to receive acoustical units shall be dry, level, and free from irregularities. The Acoustical subcontractor shall be responsible for the examination and acceptance of all surfaces and conditions affecting the installation of his work. Start of his work shall constitute acceptance of all conditions. Unsatisfactory conditions shall be reported to the Engineer so that corrective measures can be taken.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid the use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

3.02 INSTALLATION AND WORKMANSHIP

A. General: Install materials in accordance with manufacturer's directions for the suspension system and lay-in panels used and to the layout shown on the drawings for the size grid to be installed and to comply with governing regulations, and industry standards applicable to the work.

B. Refer to electrical drawings for quantities and locations of lighting fixtures and similar electrical items, and to mechanical drawings for quantities and locations of air supply and return diffusers, grilles, and similar items which will be installed in ceilings and which will replace and/or pierce acoustical units.

C. Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panel shall conform to ASTM C636.

1. Hangers: Space hangers 4 feet on centers each direction. Lay hangers 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.

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

3. 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. Units in exposed-grid system shall be held in place with manufacturer's standard hold-down clips, it units weigh less than 1 psf.

4. 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.

3.03 CLEANING AND REJECTION

A. The CONTRACTOR shall exercise all necessary precautions to avoid damaging or soiling the units. Final appearance shall be to the satisfaction of the Engineer. All damaged units shall be replaced with new units by the CONTRACTOR.

B. The following defects shall also be cause for rejection or replacement at the CONTRACTOR's expense:

1. Uneven joints or unaligned surfaces.

2. Soiled tiles not cleaned to original condition.

3. Fractures, cracks or corner chips.
4. Color variation.
5. Loose or fallen tiles.
6. Structurally unsound suspended system.
7. Damaged suspended system.
8. Warping, buckling, or sagging of acoustic board.

END OF SECTION

SECTION 09310 - CERAMIC TILE

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

B. Extent of new ceramic tile work is indicated on Drawings, notes and schedules.

1.03 COORDINATION WITH OTHER SECTIONS

A. Coordinate installation of waterproof membrane with Section 07110 - MEMBRANE WATERPROOFING.

B. Coordinate installation of backer-rods, sealants and caulking at expansion and control joints with Section 07920 - SEALANTS.

1.04 QUALITY ASSURANCE

A. The material to be furnished and the workmanship to be performed may be subject to inspection and/or tests for conformance of the tile to ANSI A137.1 by the Engineer.

1.05 SUBMITTALS

A. Samples: Three (3) samples of various ceramic tiles and marble thresholds shall be subscribed to the Engineer for approval and for color and pattern selection. Samples shall be identified as to their grade and manufacturer and clearly marked their location.

B. Certificate: Before installation of ceramic tile, the Standard Form of Master Grade Certificate signed by the CONTRACTOR and Manufacturer stating grade and kind of tile shall be submitted to the Engineer. All packages of tile shall be delivered to the job in sealed cartons bearing grade seals in conformance with U.S. Department of Commerce Simplified Practice Recommendation R61-61.

C. Warranties and Guaranties: Warranty for a min. of 2 years against defects resulting from the use of defective or inferior materials, equipment or workmanship.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ceramic Wall and Floor Tiles: Standard grade complying with ANSI A137.1. The CONTRACTOR shall submit test reports, from an independent laboratory, indicating conformance of the tile to ANSI A137.1

1. Ceramic wall tile, wall base and trims shall be dust-pressed, white non-vitreous body, 4-1/4" x 4-1/4" x 5/16" thick with a slightly beveled modified straight edge and bright glazed finish.

2. Ceramic accent tile shall be standard quality, dust-pressed, machine made porcelain body tile, 1" x 1" square with a slightly beveled modified straight edge, from price range group 2, 3 and 4.

3. Unglazed ceramic floor tile shall be standard quality, dust-pressed, machine made porcelain body tile, 2" x 2" square with a slightly beveled modified straight edge, from price range group 2. Moisture absorption of the tile shall be less than 0.5%. Medleys consisting of not more than 3 colors may be selected. All ceramic floor tile shall have a minimum 0.6 coefficient of friction.

4. All trim shapes shall be provided as detailed and as required. External corners shall be rounded convex. Internal vertical corners shall be square. Top of wainscot shall be rounded with full (4-1/4") bull nose cap. Base tile shall be 4 inches high, sanitary coved base. Other shapes such as curbs, beads, shoes, round out corners and square in corners, etc., shall be provided to achieve a neat complete installation.

B. Pointing Grout for Ceramic Tile: Commercial Portland Cement Grout, water-resistant, non-shrinking, white or gray as required, complying with ANSI 118.6 - Ceramic Tile Grouts.

C. Cement: Portland Cement conforming to the requirements of ASTM C-150, Type I.

D. Waterproof Admixture: Approved integral waterproof admixture

E. Sand: Conforming to ASTM C-144.

F. Hydrated Lime: Conforming to ASTM C-206, Type S or ASTM C-207, Type S.

G. Water: Fresh, clean and drinkable.

H. Reinforcing Wire Mesh: 2 x 2 - 16/16 welded wire fabric, galvanized.

I. Dry Set Materials for Interior Walls:

1. Cementitious backer units – ANSI A118.9 or ASTM C-1325.

2. Fiber cement underlayment – ASTM C-1288.

3. 2-inch glass fiber mesh tape.

4. Membrane – 30 lb. roofing felt.

5. Hot-dipped fasteners meeting ASTM A653-96.

6. Dry-set mortar – ANSI A118.1.

7. Latex-portland cement mortar – ANSI A118.4.

8. Grout – ANSI A118.6 or A118.7.

J. Marble Threshold: Domestic Group "A" as classified by Marble Institute of America. Finish sand-rubbed or honed; width to match the width of door frame. Thresholds shall not exceed 1/2 in height, and shall be beveled with a slope no greater than 1:2.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before any work is begun, the Ceramic Tile subcontractor shall inspect the walls and floors on which tile work is to be applied. Such surface shall be sound, clean, free of oily film, and in proper condition; if not, the Ceramic Tile subcontractor should report defective conditions to the CONTRACTOR for corrective measures and send a copy of that report to the Engineer. Proceeding with tile work will imply acceptance of the surface by the Ceramic Tile subcontractor. Scratch coats or mortar setting beds shall not be applied until necessary grounds, hangers, anchors or other items to receive plumbing fixtures or other fittings of any kind which are to be secured against the tile surface have been installed properly. Coordinate work with other trades as necessary.

B. Preparation for Cement Backer Board Installation:

1. Maximum variation in the backing surface – 1/4" in 10'-0" from the the required plane.

2. Horizontal and vertical joints and corners – 1/8" spacing filled solid with dry set or latex-portland cement mortar.

3. 2-inch glass fiber mesh tape – embed in a skim coat of the mortar over joints and corners.

3.02 INSTALLATION

A. Ceramic Tile:

1. Installation shall be in accordance with ANSI A108.1 for Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile Installation with Portland Cement Mortar and the "Handbook for Ceramic Tile Installation" as published by the Tile Council of America.

2. Work shall be carefully laid out in an endeavor to center the tiles, to space them evenly, and to avoid cutting them. If cutting is necessary, all cut ends shall be rubbed smooth and even. Lay out tile on floors and lengthwise on walls so that no tile less than 1/2 size occurs. For height stated in feet and inches, maintain full courses to produce nearest attainable heights without cutting tile. All cutting and drilling shall be done without marring the surfaces and shall be done neatly to fit closely around pipes, fixtures and fittings so that cover plates will overlap cuts.

3. Floor tile shall be laid in a straight joint pattern. Joints in wall tile shall be aligned vertically and horizontally. Staggering of joints through openings will not be permitted.

4. Cementitious backer units – ANSI A108.11.

B. Cement Mortar:

1. Mortar shall be freshly prepared and uniformly mixed in a drum-type batch mixer for at least 3 minutes in the following proportion by volume. No retempering of mortar will be permitted. Mortar that has reached its initial set shall be discarded.

2. For mortar setting bed on floors:

1 part portland cement

6 parts damp sand

Waterproof admixture in accordance with manufacturer's specifications.

C. Setting Procedures:

1. On floors, apply mortar setting bed not less than 3/4" thick, over an area no greater than can be covered with tile before the initial set. If mortar setting bed is to be applied directly on concrete surface, first saturate the surface with water but do not allow free water to appear on the surface. Embed reinforcing wire mesh in the middle of the setting bed. Screed, tamp and slope the mortar setting bed toward the floor drains a minimum of 1/8" per foot (and/or slope as shown).

   Use a 3/32" to 1/16" thick skim coat of neat portland cement mixed to the consistency of a pasty thick cream to bond tile to the mortar setting bed. Press and beat the sheets of mounted tiles into the plastic mortar setting bed until exactly to the required slope or level as fixed by straight edges accurately placed at regular intervals. Joints shall be of uniform width of 1/16" or as determined by the spacers on the tiles.

2. On walls,

   a. Tile – ANSI A108.5.

   b. Grout – ANSI A108.10.

3. Sound tiles after setting to ensure proper bonding. Hollow sounding tiles shall be replaced.

4. Allow tiles to set a minimum of 48 hours prior to grouting.

D. Threshold: Marble threshold shall be installed similar to ceramic tile as described hereinbefore where shown on plans. Clean as recommended by the manufacturer.

E. Expansion and Control Joints: Install expansion and control joints as detailed on the contract drawings.

F. Grouting and Pointing of Joints: Installation shall be in accordance with ANSI A108.10 - Installation of Grout in Tilework. Joints shall be saturated with water and then grouted with a Commercial Portland Cement Grout mixed with an acrylic waterproofing admixture in accordance with the admixture manufacturer's

specifications to a uniform creamy consistency. The grout shall be forced into the joints to the full depth. Use gray color for floors and white for walls. Take special care not to scratch glazed tile during this operation. Remove surplus grout before it has hardened and leave the face of the tile clean. Keep expansion and control joints free of grout.

G. Curing Floors: Apply reinforced kraft paper over floor as soon as pointing or grouting is completed. Lap the paper not less than 6 inches and leave in place for 3 full days.

H. Cleaning: Upon completion of tile work, remove all rubbish, unused material, etc. and give the finished surface a thorough cleaning. Do not use acid solution on glazed tile work. Do not permit traffic on tile floors for 24 hours after laying. Thereafter permit no traffic unless floors are covered with heavy paper. Leave finished tile work clean and free from cracked, chipped or broken tile. Protect tile work and threshold until acceptance of project.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Paint and finish all interior and exterior exposed new surfaces.

B. Inspection and Approvals: The CONTRACTOR shall obtain written 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 only 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.

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.

C. 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 will be redone at no cost to the STATE.

D. In addition, the Engineer shall have the right to require the immediate removal of any paint applicator who demonstrates negligence, lack of competence or repeated non-compliance with the contract requirements.

E. Spray painting is not allowed.

F. Related Work Specified Elsewhere:

1. Occupany, air quality requirements are specified in Section 01575 - TEMPORARY CONTROLS, AIR QUALITY REQUIREMENTS.

1.03 SUBMITTALS

A. Schedule of Finishes: 4 sets of the proposed painting finish schedule shall be submitted to the Engineer for approval. The schedule shall indicate the spread rate 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.

B. Color Samples

1. Submit three (3) sets of the color samples to the Engineer for approval.

2. Colors shall be approved by the Engineer.

3. After the color finish sample has been approved, one set of color finish samples painted onto 8-1/2" x 11" cardboard shall be submitted to the Engineer. The cardboard shall be divided into 4 horizontal strips and painted as follows:

a. Prime 3 strips starting from the bottom.

b. 1st coat bottom 2 strips.

c. 2nd coat bottom strip.

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

D. Certifications: 4 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 subcontractors, he shall include these additional copies along with his submittal.

E. Manufacturer's Product Data Sheets: 4 copies of the Manufacturer's Product Data Sheets for 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 subcontractors, he shall include these additional copies along with his submittal.

F. Manufacturer's Material Safety Data Sheets: 4 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 subcontractors, he shall include these additional copies along with his submittal.

G. Receipt of Delivery: 3 copies of the receipt signed by the user's representative, attesting to delivery of the extra paint as required under Sub-Section 3.07C Extra Paint shall be submitted to the Engineer.

H. Standards: 3 copies of the Surface Preparation Standards referenced under Section 3.02 SURFACE PREPARATION.

I. Certificate of Public Liability and Property Damage Insurance.

1.04 ANALYZING AND TESTING

A. All paints and their applied thickness shall be subject to testing whenever the Engineer deems necessary to determine conformation to the requirements of these specifications. Should testing by a laboratory be required, the laboratory shall be selected by the STATE and the cost of testing shall be borne by the CONTRACTOR. However, should test results show that the paint is in compliance with this specifications, the cost will be borne by the STATE.

B. 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.

Where the required paint thickness is deficient, the affected surface(s) shall be recoated as necessary to provide the required paint thickness at no additional cost to the STATE.

C. Any laboratory testing costs initiated by the CONTRACTOR shall be borne by the CONTRACTOR.

1.05 GUARANTY

A. 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 two (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.

B. The STATE shall notify the CONTRACTOR in writing within a reasonable time after discovery of any failure or defect.

C. Should the CONTRACTOR fail to remedy any failure or defect described in Paragraph A above within ten (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.

1.06 SPECIAL REQUIREMENTS

A. Codes: The CONTRACTOR shall comply with the State OSHL (Occupational Safety and Health Law) and all pollution control regulations of the State Department of Health, the Federal Occupational Safety and Health Administration (OSHA), The Federal Environmental Protection Agency's (EPA) regulations, and the City and County of Honolulu's regulations, codes, and ordinances that pertain to this paint project.

B. Protection

1. 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 the CONTRACTOR's operations create hazardous conditions in order to properly protect the public and tenants.

2. Completed Work: The CONTRACTOR shall provide all necessary protection for wet paint surfaces.

3. Protective Covering and Enclosures: The CONTRACTOR shall provide and install protective covering over furniture, 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.

4. 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. Where the damaged property cannot be cleaned and restored to its original condition (i.e. prior to being damaged) it shall be replaced with a new product of equal quality. No proration or use of "used" products will be permitted.

a. The CONTRACTOR shall assume that cars will not be temporarily relocated from parking areas during painting work.

5. 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.

C. Storage Area for Materials:

1. No paint material, empty cans and paint brushes and rollers may be stored in the building. They shall be stored in separate storage facilities away from the building.

2. 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 the facility shall be locked when not in use or when no visual supervision is possible.

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

1. Surface preparation.

2. Prime coat.

3. First finish coat.

4. Second finish coat.

1.07 AREAS (SURFACES/STRUCTURES) TO BE PAINTED

A. The work includes painting and finishing of all exterior and interior exposed new surfaces and if part of the existing surfaces are renovated, scratched, damaged or exposed to view by the renovation work, then the entire surfaces (such as an entire section of wall, entire door frame, entire door surfaces, etc. as approved by the Engineer) shall be repainted and color shall be matched to adjoining existing surfaces.

B. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work is including in this Section.

C. "Paint" as used herein means all coating systems materials, including primers, enamels, sealers and fillers, stains and varnishes, and other applied materials whether used as prime, intermediate or finish coats, except as specifically noted herein.

D. Paint all exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, painted these the same as adjacent similar materials or areas. If color or finish is not designated, the Engineer will select these from standard colors and finishes available for the materials systems specified.

E. Paint all non-ferrous metals, plated or factory finished items specifically noted to be painted or when such items occur as accessories and appurtenances to surfaces required to be painted.

F. Paint both faces, top and side edges of doors.

1.08 PAINTING NOT INCLUDED

A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.

1. Shop Priming: Shop priming is required for all ferrous metal for all fabricated components such as shop-fabricated or factory-built equipment system or accessories. Type of shop priming, if covered by other Sections, should follow recommendation of manufacturer. Finish coats are as specified herein.

2. Mechanical and Electrical Work: The prime coat for mechanical and electrical work is specified in Division 15 and 16, respectively. Finish coats are as specified herein.

3. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) toilet enclosures, acoustic materials, plastic laminated surface, finished mechanical and electrical equipment including light fixtures.

4. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces and duct shafts.

5. Finished Metal Surfaces: Metal surfaces of anodized and inorganic coated aluminum, stainless steel, chromium plated, and similar finished materials will not require finish painting, unless otherwise indicated.

6. Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories, or any equipment identification, performance rating, name, or nomenclature plates.

1.09 OTHER INCIDENTAL WORK TO BE PERFORMED BY CONTRACTOR

A. Shrubbery and plants shall be trimmed a minimum of six inches back from surfaces to be painted and protected from damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lead Prohibition: All paint shall be lead-free.

B. Mercury Prohibition: All paint shall be mercury-free.

C. Chromate Prohibition: All paint shall be free of zinc-chromate and/or strontium-chromate.

D. Cadmium Prohibition: All paint shall be cadmium free.

E. 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.

F. 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.

G. Paints shall be as manufactured by Ace, Benjamin Moore, Cabot's, Carboline, DuPont, Dutch Boy, Fine Line Paint Corp., ICI Ameritone, ICI Decratrend, ICI Devoe, ICI Dulux, ICI Fuller O'Brien, ICI Glidden, ICI Sinclair, Martin Senour, Olympic Stain, Pervo, Pittsburgh, Porter Intl., Pratt & Lambert, Rust-Oleum, Sherwin-Williams, Smiland (Styletone), Spectra-Tone, Thoro Systems, Tnemec, United Paint and Coatings, EVR-GUARD Coatings or approved substitution.

H. 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.

I. 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.

J. The supplier shall submit a signed certificate indicating the amounts of mildewcide added by both the paint manufacturer and the paint supplier.

2.02 SCHEDULE OF FINISHES

A. All paints and stains, unless otherwise noted, are the products of ICI Dulux Paints, and are so named to establish desired quality and standard of materials. Painting materials, equal to those mentioned by trade name under the various treatments may be used, provided they meet with the approval of the Engineer. Number of coats shown are for guide only. Additional coats may be required to provide proper coverage at no cost to the STATE.

B. Treatments shall be applied on exposed surfaces of designated materials, in conformity with instructions of the paint product used.

C. Any painted surfaces not specifically noted in the finish schedule and drawings shall be finished to match adjoining work.

D. Painting Schedules: Painting shall comply to the schedules below and to the manufacturer's specifications and recommendations for the type of paint as specified. In the event there is any discrepancies, the most stringent one shall apply.

1. Exterior Surfaces

(a) Concrete Masonry Block Surface

1 coat - ICI 4000 BLOXFIL Interior/Exterior Heavy Duty Acrylic Block Filler @ 50-80 sf/gal.
2 coats - ICI 2406 DULUX Exterior 100% Acrylic Semi-Gloss Finish @ 1.5-2.0 mils DFT 300-400 sq.ft./gal.

(b) Concrete Surface

1 coat - ICI 3030 ULTRA-HIDE BOND PREP @1.5 – 2.0 mils DFT 350-450 sq.ft./gal.
2 coats - ICI 2406 DULUX Exterior 100% Acrylic Semi-Gloss Finish @ 1.5-2.0 mils DFT 300-400 sq.ft./gal.

(c) Ferrous Metal Surface, over Shop Prime Coat

1 coat - ICI 4160 DEVGUARD Multi-Purpose Tank & Structural Primer @ 2.0 – 2.5 mils DFT 334-417 sq.ft./gal.
2 coats - ICI 2406 DULUX Exterior 100% Acrylic Semi-Gloss Finish @ 1.5-2.0 mils DFT 300-400 sq.ft./gal.

(d) Galvanized Metal Surface

1 coat - ICI 4120 DEVGUARD All Purpose Metal & Galvanized Primer @ 1.5 – 2.0 mils DFT 400-535 sq.ft./gal.
2 coats - ICI 2406 DULUX Exterior 100% Acrylic Semi-Gloss Finish @ 1.5-2.0 mils DFT 300-400 sq.ft./gal.

(e) Wood Surface, Paint

1 coat - ICI 2110 ULTRA-HIDE DURUS Exterior Alkyd Primecoat @1.5 – 2.0 mils DFT 400-500 sq.ft./gal.
2 coats - ICI 2406 DULUX Exterior 100% Acrylic Semi-Gloss Finish @ 1.5-2.0 mils DFT 300-400 sq.ft./gal.

2. Interior Surfaces

(a) Concrete Masonry Block Surface

1 coat - ICI 4000 BLOXFIL Interior/Exterior Heavy Duty Acrylic Block Filler @ 50-80 sf/gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

(b) Concrete Surface

1 coat – ICI 3210 ULTRA-HIDE Aquacrylic GRIPPER Stain Killer Primer-Sealer @ 1.5-2.0 mils DFT 400 sq.ft./gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

(c) Plaster Surfaces

1 coat - ICI 3210 ULTRA-HIDE Aquacrylic GRIPPER Stain Killer Primer-Sealer @1.5 – 2.0 mils DFT 400 sq.ft./gal.

2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @1.5-2.0 mils DFT 400 sq.ft./gal.

(d) Ferrous Metals, over Shop Prime Coat

1 coat – ICI 4160 DEVGUARD Multi-Purpose Tank & Structural Primer @ 20-2.5 mils DFT 334-417 sq.ft./gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

(e) Galvanized Metal

1 coat – ICI 4020 DEVFLEX DTM Flat Interior/Exterior Waterborne Primer & Finish @2.2-3.5 mils DFT 275-350 sq.ft./gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

(f) Wood, Painted

1 coat – ICI 1120 ULTRA-HIDE Oil/Alkyd Interior Wood Undercoater @1.5-2.0 mils DFT 400-450 sq.ft./gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

(g) Wood Surface, Stain

1 coat - ICI 1700 WOODPRIDE Interior Oil Wood Finishing Stain @ 400-600 sq.ft./gal.
2 coats - ICI 1902 WOODPRIDE Interior Polyurethane Stain Varnish @1.2 – 1.5 mils DFT

(h) Gypsum Board

1 coat – ICI 1030 ULTRA-HIDE PVA Interior Primer-Sealer @1.3-1.7 mils DFT 400 sq.ft./gal.
2 coats - ICI 1407 DULUX Interior 100% Acrylic Semi-Gloss Enamel @ 1.5-2.0 mils DFT 400 sq.ft./gal.

PART 3 - EXECUTION

3.01 GENERAL

A. 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.

B. Top and bottom edges of doors to be finished the same as face of doors after they are fitted by the carpenter.

C. 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).

D. 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.

E. All mixing shall be done outside the building.

F. All waste materials shall not be left in or near the building but shall be stored in proper metal containers.

G. Prior to painting, concrete and masonry surfaces shall be allowed to cure and dry in accordance with the paint manufacturer’s instructions and recommendations.

H. Efflorescence and laitance shall be removed from the concrete and masonry surfaces.

I. Prior to paint application, interior and exterior concrete and masonry (including grout joints) scheduled to receive paint shall be tested to determine the alkalinity level of the surface. Testing shall be performed in strict accordance with the test kit manufacturer’s instructions. Test results shall be submitted to the Engineer.

J. Where the alkalinity level exceeds the resistance level of the proposed primer (accepted under Shop Drawing submittal), painting shall not commence until the alkaline level has dropped to within that permitted by the primer or a different primer that is able to resist

the measured alkalinity and is compatible with the paint finish (i.e. approved by the manufacturer of the finish paint) shall be provided. The substitute primer shall be submitted to the Engineer for review and acceptance and shall be provided at no additional cost. If a primer able to resist the alkaline level is not available and the construction schedule cannot accommodate a waiting period, the surface shall be neutralized in accordance with the primer manufacturer's instructions to reduce the alkaline level to within that permitted by the primer. Acid washing will not be permitted where the surface has been finished with a cementitious coating (e.g. cement wash) because the acid will cause the material to deteriorate and become dusty.

3.02 SURFACE PREPARATION

A. General

1. The painting subcontractor 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 the painting subcontractor considers any surfaces unsuitable for proper finish of his work, he shall notify the CONTRACTOR who 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. High pressure water washing will not be permitted.

3. Mildew Removal: Remove all mildew and sterilize the surface to be painted:

   a. Apply a treatment solution composed of the following ingredients and in the noted proportions to the affected surface using a sponge or low-pressure sprayer:

      2/3 cup TSP (Trisodium Phosphate)
      1 quart household bleach
      3 quarts warm water

      Note: Household bleach shall not be mixed with ammonia or any detergents or cleaners containing ammonia as this will create a poisonous gas.

   b. Scrub the surface as necessary to completely remove the mildew, or, apply a commercial mildew treatment solution such as Purex, Jomax Remover or equal in strict accordance with the manufacturer's recommendations and instructions.

c. Following treatment, the surface shall be cleaned with potable water and allowed to thoroughly dry before priming, painting or the applying of sealing and caulking compounds.

4. Cracks and openings found at joints and where different materials abut each other (e.g CMU / concrete, CMU or concrete / wood, etc.) shall be sealed with a caulking compound compatible with the substrate and primer/paint. The caulking shall be applied and allowed to set in accordance with the manufacturer's recommendations and instructions.

5. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finished-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.

B. Wood to be Painted or Repainted

1. Remove from surfaces to be painted or repainted all foreign matter such as nails, screws, staples, tape and gum.

2. Remove all loose, blistered, scaled, crazed or chalky finish to an existing tight and firm finish.

3. Remove all mildew as noted in Section 3.02 A above.

4. Where the existing finish remains tight and firm, prepare the surface by lightly sanding. Where the paint has been removed, sand the edges of scarred areas to a smooth feathered edge.

5. Wash all surfaces with a solution of T.S.P. (trisodium phosphate) and water or other appropriate solution to remove any accumulated film of wax, oil, grease, smoke, dust, dirt, chalking or other foreign matter which would impair the bond of, or bleed through the new paint finish. After washing, rinse the surface with potable water and allow to thoroughly dry.

6. After cleaning and/or washing of the surface with water, the wood shall not be primed, painted or sealed unless it has been allowed to thoroughly dry for a minimum of 24 hours and until the moisture content of the wood is less than 15% when measured with an electronic moisture meter.

7. Fill holes (nail, tack, staple, etc.), cracks, open joints and other imperfections with appropriate compound and allow to set (door and trim included). Seal and caulk all openings which will permit the entrance of water. Sealing and caulking compounds shall be compatible with the substrate and primer/paint and shall be applied and allowed to set in accordance with the manufacturer's recommendations and instructions.

8. Spot prime areas where bare wood or fill material is exposed with the specified primer and feather out onto adjacent paint.

C. Concrete and Cement Plaster (Smooth Finish) to be Painted or Repainted

1. Remove from surfaces to be painted or repainted all foreign matter such as nails, screws, staples, tape and gum.

2. Remove all loose, blistered, scaled, crazed or chalky finish to an existing tight and firm finish.

3. Remove all mildew as noted in Section 3.02 A above.

4. Where the existing finish remains tight and firm, prepare the surface by lightly sanding. Where paint has been removed, sand the edges of scarred areas to a smooth feathered edge.

5. Wash all surfaces with a solution of T.S.P. and water or other appropriate solution to remove any accumulated film of wax, oil, grease, smoke, dust, dirt, chalking or other foreign matter which would impair the bond of, or bleed through the new paint finish. After washing, rinse potable water and allow to thoroughly dry for a minimum of 24 hours.

6. Seal all cracks hairline to 1/8" in width with concrete patching compound. All cracks over 1/8" in width shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.

7. All holes 1/4" in diameter or greater shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.

8. Spot prime areas where bare concrete, seal or patch material is exposed with the specified primer and feather out onto adjacent paint.

D. Masonry Block to be Painted or Repainted

1. Remove from surfaces to be painted or repainted all foreign matter such as nails, screws, staples, tape and gum.

2. Remove all loose, blistered, scaled, crazed or chalky finish to an existing tight and firm finish.

3. Remove all mildew as noted in Section 3.02 A above.

4. Where the existing finish remains tight and firm, prepare the surface by lightly sanding. Where paint has been removed, sand the edges of scarred areas to a smooth feathered edge.

5. Wash all surfaces with a solution of T.S.P. and water or other appropriate solution to remove any accumulated film of wax, oil, grease, smoke, dust, dirt, chalking or other foreign matter which would impair bond of, or bleed through the new paint finish. After washing, rinse potable water and allow to thoroughly dry for a minimum of 24 hours.

6. Seal all cracks hairline to 1/8" in width with concrete patching compound. All cracks over 1/8" in width shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.

7. All holes 1/4" in diameter or greater shall be sealed with Tuff Patch (Fibre-Glass Cloth System) or equal method before paint application. All patching shall be done in accordance with the manufacturer's recommendations and instructions.

8. Spot prime areas where bare masonry, seal or patch material is exposed with the specified primer and feather out onto adjacent paint.

E. Ferrous Metal and Galvanized Metal to be Painted or Repainted.

1. Remove from surfaces to be painted or repainted all foreign matter such as oil, grease, dust, dirt, wax, soaps, powdery residue, form release agents, curing compounds, laitance, tape and gum.

2. Remove all loose, blistered, scaled, crazed or chalky paint finish to an existing tight and firm finish.

3. Remove all mildew as noted in Section 3.02 A.3. above.

4. For galvanized surfaces, solvent clean in accordance with Steel Structures Painting Council (SSPC) Standard SP1 and apply a test application of spot primer, allowing coating to dry at least one week before testing. If adhesion is poor, hand tool clean all surfaces before priming. Spot prime with a zinc rich primer at 3 mils dry film thickness (DFT) using a SSPC Paint 20 Type II primer. For intact galvanized surfaces, pretreat using one of the following methods: Phosphoric acid etchant applied per manufacturer's recommendations; or , solvent wipe and blast lightly with a fine abrasive.

5. For ferrous surfaces, blast to commercial metal surface cleanliness in accordance with Steel Structures Painting Council (SSPC) Standard SP3. Blast profile on steel should be 1-1/2 to 2-1/2 mils in depth and be of a sharp, jagged, nature. After blasting, vacuum off all abrasive dust and ensure surface remains clean before painting. Care shall be taken so that the surface in not burnished during cleaning.

6. Allow the surfaces to thoroughly dry and immediately spot prime bare metal areas with the specified primer and feather out onto adjacent paint.

3.03 PAINT APPLICATION

A. General

1. All work shall be done in a workmanlike manner by skilled and experienced mechanics and shall conform to the best painting practices.

2. All materials shall be applied in strict accordance with the manufacturer's specifications, including spread rates, 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.

3. 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.

4. Any mixing shall be done outside the building.

B. Colors: Each coat shall be tinted a different shade from the preceding coat.

C. Colors and finishes shall match that of the existing replaced items and in case of new items, colors and finishes shall match that of the adjoining items of the same nature.

3.04 BACK PAINTING AND PRIMING

A. All interior wood finish, trim and plywood shall be thoroughly back-painted on all surfaces which will be concealed after installation with one coat of exterior primer.

B. All knots and sap pockets in surfaces to be painted shall be shellacked before priming. Priming shall be done immediately after interior millwork and finish has been sized and fitted, sanded and approved before installation.

3.05 PROTECTION OF PROPERTY

A. 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.

3.06 INSPECTION

A. 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.

3.07 MISCELLANEOUS

A. Installation of Removed Items: After completion of final paint coat, removed items shall be reinstalled.

B. Clean-up:

1. 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.

2. 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. Work to correct damage and punchlist items shall be performed during non-business hours if the work will inconvenience the building occupants. Where necessary for access during non-busines hours, the Contactor shall pay for custodial staff to gain entry and to secure the building.

C. Extra Paint: The CONTRACTOR shall provide extra paint in each of the different colors of exterior and interior paint used for walls, doors, and ceiling to the Engineer upon completion of the project. The paint shall be in approved unopened one gallon cans and shall be in the quantities listed below:

1. 5 gallons of each color.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 10161 - PHENOLIC PLASTIC TOILET PARTITIONS AND URINAL SCREENS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Work under this section shall include but not be limited to the following:

Floor ceiling and wall anchored phenolic laminated plastic toilet compartment doors, partitions and urinal screens.

B. Related Work Specified Elsewhere:

1. Coordinate the installation of doors and partitions with grab bars, toilet tissue dispensers, etc. noted under Section 10800 - TOILET AND BATH ACCESSORIES.

1.03 REFERENCES

The publications listed below form a part of this specification:

A. Americans with Disabilities Act Accessibility Guidelines (ADAAG), 36 C.R.F. Pt. 1191.

B. National Electrical Manufacturers Association Standards LD 3.1 - Performance, Application, Fabrication, and Installation of High-Pressure Decorative Laminates.

C. American Society for Testing and Materials (ASTM) E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 GENERAL CONDITIONS

A. The CONTRACTOR shall visit the job site to verify the site conditions and dimensions prior to submitting his bid.

B. Toilet compartments that are accessible to the physically challenged shall be in conformance with the criteria noted in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) Section 4.17.1.

1.05 SUBMITTALS

The CONTRACTOR shall submit the following to the Engineer:

A. 4 sets of phenolic plastic samples for color selection. Provide manufacturer's complete full range of colors.

B. 3 sets of the proposed (selected) manufacturer's current brochures, specifications and shop drawings showing construction and installation details. Drawings shall indicate the elevations of partitions/screens, hardware, fittings, mounting brackets, proposed method of anchoring, and other related items and installation details.

C. Manufacturer's certificate attesting that his materials meet or exceed the specified requirements.

1.06 PRODUCT HANDLING

A. Materials shall be delivered to the job-site in their original sealed containers bearing the name of the manufacturer and brand designation.

B. Items shall be delivered and stored in a manner that ensures they will be protected against damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The products of the following manufacturers are acceptable provided they meet the materials, construction specified, Flame Spread Rating, Smoke Developed Rating and are installed as specified hereinafter:

1. Ampco Products Inc.

2. Accurate Partitions Corp.

3. Bobrick Washroom Equipment, Inc.

4. Capitol Partitions, Inc.

5. Columbia Partitions, Inc.

6. DesignRite Partitions

7. Flush Metal Partition Corp.

8. Gamco

9. General Partitions Manufacturing Corp.

10. Global Steel Products Corp.

11. Knickerbocker Case Corp., Inc.

12. Pioneer Plastics Corporation

13. Metpar Steel Products Corp.

14. Sanymetal Products Co.

15. Weis / Robart Partitions, Inc.

B. The products of other manufacturers are acceptable provided they meet or exceed the material and construction requirements specified hereinafter and are pre-qualified.

2.02 MATERIALS AND CONSTRUCTION

A. General: Compartments shall be of the type and size specified and as shown on the plans.

B. Phenolic Plastic Doors, Partitions, Stiles and Pilasters:

1. Shall be fabricated with a solid phenolic core of multiple resin-impregnated kraft paper sheets with a matte finish melamine surface fused under high temperature and pressure.

2. The exposed finish surfaces shall be self-lubricating; smooth; waterproof; non-absorbent; stain, chemical and graffiti resistant.

3. Phenolic Plastic shall have a Class A or B Flame Spread Rating and a maximum Smoke Developed Rating of 450 in conformance with ASTM E 84.

4. Edges shall be machined smoothed with 1/16" radius corners.

C. Doors:

1. Phenolic plastic doors shall be a minimum of 3/4" thick.

2. Unless otherwise noted on the drawings, a minimum clear door opening width of 32" shall be provided at the door leading to an accessible toilet stall. This clear width shall be measured between the edge of the door bumper/keeper and the face of the door when opened 90 degrees.

D. Partitions, Stiles and Pilasters:

1. Phenolic plastic partitions shall be a minimum of 1/2" thick. Stiles and pilasters shall be a minimum of 3/4" thick.

2. Pilasters and stiles for overhead-braced compartments shall have adjustable floor anchors with leveling devices, studs, and locking nuts to firmly secure pilasters and stiles to the floor.

3. Partitions to which grab bars are fastened, along with their respective brackets and connectors, shall be capable of supporting the imposed loads noted in the ADAAG. All grab bars shall comply with ADAAG Section 4.26.

E. Headrails: Headrails for overhead-braced compartments shall be of anodized, extruded aluminum alloy with end-caps, of anti-grip design or as standard with the manufacturer; or solid wood core surfaced with plastic laminate and having minimum cross-sectional dimensions of 1-1/4 in. x 2 in.

F. Urinal Screens:

1. Shall be of the types and sizes shown on plans.

2. Phenolic plastic screens shall be a minimum of 3/4" thick for wall-hung installations. Where screens are supported on two sides, phenolic plastic shall be of a minimum of 1/2" thick.

G. Hardware and Fittings:

1. Doors, partitions, pilasters and screens shall be furnished with the necessary hardware and fittings to provide a complete installation. They shall be pre-cut to facilitate erection and minimize field errors.

2. Materials: Hardware and fittings shall be satin-finish stainless steel. Non-ferrous alloys such as Zamac castings shall not be used.

3. Hinges: Stainless steel (minimum 16 ga.), continuous the full height of the door,

through-bolted to the door and stile with twelve (12) theft-resistant one-way stainless steel screws at approximately 12”o.c.

4. Brackets: Stainless steel (18 ga. minimum, Type 304), continuous the full height of the partition or stile. Acceptable bracket sections are “L”, “T” and “F”. Brackets shall be through-bolted to partitions and stiles/pilasters with theft-resistant one-way stainless steel screws spaced at approximately 12” o.c. Brackets shall be secured to concrete or solid grouted masonry walls using theft-resistant one way stainless steel bolts with lead or stainless steel expansion shields spaced at approximately 12” o.c. Bracket attachment to masonry walls at un-grouted cells shall be with theft-resistant stainless steel toggle-bolts at approximately 12” o.c. The number of fasteners to be provided at each connection are as follows:

Bracket to Partition:	6
Bracket to stile/pilaster:	12
Bracket to wall:	12

5. Latches: The latch shall be of a shape which is easy to grasp with one hand and which does not require tight grasping, tight pinching or twisting of the wrist to operate and shall be operable by a person on the outside in the event of an emergency. Mechanisms such as slide bolts with a projecting handle on the inside of the stall which can be opened by a person on the outside reaching over the door with a stick are acceptable.

6. Door Pulls: All toilet stall doors shall be furnished with wire pull on the pull side of door.

7. Coat Hook/Door Bumper: Furnish one each per door.

8. Hat and Shoe: All pilasters and stiles shall have a 4-inch high minimum hat at the top and a 4-inch shoe at the bottom of Type 302 or 304 stainless steel, min. 18 gauge, and stainless steel screw.

9. Hardware mounting heights: The highest part of any handle, pull, grab bar, latch or operating mechanism shall be at 36 inches maximum above the finished floor.

10. Fasteners: Hardware and fittings shall be fastened with theft-resistant one-way stainless steel through-bolts or machine screws in factory installed stainless steel inserts.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer together with the CONTRACTOR and Engineer shall examine the areas and conditions under which toilet stall doors, partitions, stiles/pilasters and screens are to be installed. Should any condition be found unsuitable, no work shall be performed until the unsatisfactory conditions have been corrected and are acceptable to the Installer. Proceeding with the work will imply acceptance of the conditions by the Installer.

3.02 INSTALLATION

A. Compartments and urinal screens shall be erected in strict accordance with the manufacturer's instructions.

B. All parts shall be securely screwed and/or bolted tight, well-anchored to the wall, true to line, level and plumb, with doors and hardware placed at the proper heights and in proper operating condition.

C. The following uniform clearances shall be provided:

1. 1/2" max. between the stiles/pilasters and partitions.

2. 1" max. between stiles/pilasters/partitions and walls.

3. 3/16" max. between stiles/pilasters and doors.

D. Anchorage to concrete or to masonry at grouted cells shall be bolts with lead or stainless steel expansion shields. Anchorage to masonry at un-grouted cells or to gypsum board walls shall be with toggle bolts.

3.03 PROTECTION AND CLEANING

A. Protect the work of other trades against damage, injury or soiling.

B. After installation, clean exposed surfaces with cleaners recommended and approved by the manufacturer and protect from damage.

C. Adjust hardware and lubricate moving parts as necessary to ensure smooth operation.

D. Repair and restore adjacent surfaces that are marred or damaged as a result of the installation of toilet partitions and urinal screens to their original condition. Leave adjacent surfaces in a neat and clean condition.

END OF SECTION

SECTION 10522 - FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Extent of fire extinguishers, cabinets and accessories is indicated on drawings.

B. Definition: "Fire extinguishers" as used in this section refers to units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems.

C. Types of products required include:

1. Fire extinguishers.

2. Fire extinguisher cabinets.

3. Mounting brackets.

1.03 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products in this section from one manufacturer.

B. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.04 SUBMITTALS

A. Product Data: Submit product data for each type of product included in this section. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.

B. For initial selection of colors and finishes, submit manufacturer's color cards showing full range of standard colors available.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturers/Products: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

J.L. Industries.
Larsen's Mfg. Co.
Johnson-Lee, Division of W.F. Lee Corp.
Muckle Manufacturing, Division of Technico, Inc.
Watrous, Inc.
or approved equal.

2.02 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by the Engineer from manufacturer's standard which comply with requirements of governing authorities.

B. Abbreviations indicated below to identify extinguisher types related to UL classification and ratings system and not necessarily to type and amount of extinguishing material contained in extinguisher.

C. Multi-Purpose Dry Chemical Types: UL-rated 4-A:60-B: C, 10 lb. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

2.03 MOUNTING BRACKETS

A. Provide manufacturer's standard bracket designed to prevent accidental dislodgment of extinguisher of sizes required for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

B. Provide brackets for extinguishers not located in cabinets.

2.04 FIRE EXTINGUISHER CABINETS

A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.

B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

C. Cabinet Type: Suitable for mounting conditions indicated, of the semi-recess type, cabinet box (tub) shall be partially recessed in walls of shallow depth, protruding not more than 4-inches from the wall. The CONTRACTOR shall make necessary modifications to the wall of prefabricated building to accommodate the cabinet.

D. Trim Style: Fabricate trim in one piece with corners mitered, welded and ground smooth.

E. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: Rounded edges with backbend depth of 2-1/2 inches.

2. Trim Metal: Stainless steel, ASTM A 167, AISI Type 302/304 alloy.

F. Door Material and Construction: Manufacturer's standard door construction fabricated from austenitic stainless steel complying with ASTM A 167, for AISI Type 302/304 alloy, coordinated with cabinet types and trim styles selected.

G. Door Style: Manufacturer's standard design as indicated below and on drawing: Duo-panel, laminated safety glass, 1/8" thick.

H. Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180 degrees. Provide key lock.

Finish: Bright chrome plated, Finish No. 651 per ANSI/BHMA A156.18.

2.05 FACTORY FINISHING OF FIRE EXTINGUISHER CABINETS

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

B. Finishes: Provide finish to comply with requirements indicated below for extent, preparation and type.

1. Extent of Painted Finish: Apply painted finish to both concealed and exposed surfaces of cabinet components except where other than a painted finish is indicated.

2. Color: Provide color or color matches indicated, or, if not otherwise indicated, as selected by Engineer from manufacturer's standard colors.

3. Preparation: Clean surfaces of dirt, grease, and loose rust of mill scale.

4. Baked Enamel Finish: Immediately after cleaning and pretreatment, apply cabinet manufacturer's standard baked enamel finish system to the following surfaces: Interior of cabinet.

5. Stainless Steel Finish: AISI No. 4 polished finish. Furnish with paper masking to protect finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

1. Prepare locations in walls for fire extinguisher cabinets as required by type and size of cabinet and style or trim and to comply with manufacturer's instructions.

2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

END OF SECTION

SECTION 10440 - SIGNAGE

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Provide all signage as shown and as specified herein, including the following. All signage shall comply with ADAAG Sections 4.1.2(7) and 4.1.3(16). Type, design, dimensions, color, finish and lettering sizes shall match those of existing room signage on the mezzanine floor.

1. Wall mounted panel signs.

2. International symbol of accessibility.

1.03 SUBMITTALS

A. Submit six sets of the following within 15 days after Notice to Proceed, for approval by the Engineer.

1. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

2. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

a. Provide message list for each sign required, including large-scale details of wording and layout of lettering. The CONTRACTOR shall verify room number and room name with the Engineer before preparing shop drawing submittal.

b. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.

c. Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings.

3. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

a. Samples for initial selection of color, pattern, and texture: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.

b. Samples for verification of color, pattern, and texture selected, and compliance with requirements indicated: Provide a sample panel not less than 12 square inches for each material indicated. Include a panel for each color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.04 QUALITY ASSURANCE

A. Single-Source Responsibilities: For each separate type of sign required, obtain signs from one source from a single manufacturer.

B. Design Criteria: Type, design, dimensions, color, finish and lettering sizes of new signs shall match those of existing room signage on the mezzanine floor. Signs deviated from the requirements may be considered provided that the deviations in dimensions and profiles are minor and do not change the design concept as judged by the Engineer. The burden of proof of equality is on the proposer.

1.05 GENERAL REQUIREMENTS

A. Signage for Accessible Sites and Exterior Facilities shall comply with ADAAG Section 4.1.2(7).

1. Signs designating permanent rooms and spaces shall comply with 4.30.1, 4.30.4, 4.30.5 and 4.30.6.

2. Signs which provide direction to, or information about, functional spaces of the building shall comply with 4.30.1, 4.30.2, 4.30.3 and 4.30.5.

3. Applicable elements and spaces for accessible facilties which shall be identified by the International Symbol of Accessibility for this Transition Plan which shall comply with 4.30.7 are:

   a) Parking spaces designated as reserved for individuals with disabilities.
   b) Not used.
   c) Accessible entrances when not all entrances are accessible (inaccessible entrances shall have directional signage to indicate the route to the nearest accessible entrance).
   d) Accessible toilet and bathing facilities when not all are accessible.

B. Accessible Building Signage shall comply with ADAAG Section 4.1.3(16).

1. Signs designating permanent rooms and spaces shall comply with 4.30.1, 4.30.4, 4.30.5 and 4.30.6, in accordance with ADAAG Section 4.1.3(16)(a).

2. Signs which provide direction to, or information about, functional spaces of the building shall comply with 4.30.1, 4.30.2, 4.30.3, and 4.30.5 in accordance with ADAAG Section 4.1.3(16)(b).

PART 2 - PRODUCTS

2.01 MATERIALS

A. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for installation as required for corrosion resistance. Use toothed steel expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.02 WALL MOUNTED PANEL SIGNS

A. General

1. Signage complying with ADAAG Section 4.1.3(16)(a) shall have letters and symbols raised. 1/32”, upper case, Sans Serif. Signs of individually cast letters shall not be used. Letters and numerals shall be accompanied with Grade 2 Braille.

2. Type, design, dimensions, color, finish and lettering sizes of new signs shall match those of existing room signage on the mezzanine floor. Sign shall have 1/8-inch frame, permanent room number and changeable message insert for room name.

B. Plastic Signs (Interior Only)

1. Melamine plastic laminate, approximately 1/8-inch thick, with contrasting core color, non-static, fire-retardant and self-extinguishing. Plastic laminate shall have a contrasting core color and shall be impervious to most acids, alkalies, alcohol, solvents, abrasives and boiling water.

2. Where a white or light colored background (core color) is provided, the background surface shall be coated with white or clear grafitti resistant coating as approved by the signage manufacturer. The coating shall provide a finish which is resistant to pencils, pens, and felt tip markers.

3. Manufacturers:

   a. Best Manufacturing Company.
   b. Signs, Letters & Nameplates, Inc. (SL & N)
   c. Allen Marking Products, Inc.
   d. Or approved equal.

C. Fiberglass Signs (Interior or Exterior)

1. Fiberglass, non-corrosive, 3-ply laminate, approximately 3/16 inch to 1/4-inch thick with contrasting core color.

2. Where a white or light colored background (core color) is provided, the background surface shall be coated with white or clear grafitti resistant coating as approved by the signage manufacturer. The coating shall provide a finish which is resistant to pencils, pens, felt tip markers, and spray paint.

3. Manufacturers:

   a. Best Manufacturing Company.
   b. Signs, Letters & Nameplates, Inc. (SL & *N)*
   c. Architectural Graphics, Inc.
   e. Or approved equal.

D. Metal Signs (Interior or Exterior)

1. Signs shall be anodized die-stamped aluminum approximately 3/32-inch or cast aluminum approximately 1/4-inch thick. Signs shall be provided with a baked-on enamel background color finish.

2. Manufacturers:

a. Supersine Company
b. Mills Manufacturing Company
c. Spanjer Brothers, Inc.
f. Or approved equal.

2.03 INTERNATIONAL SYMBOL OF ACCESSIBILITY

A. Accessible restrooms, entrances, parking and passenger loading zones shall be identified by the International Symbol of Accessibility in conformance with ADAAG Section 4.1.2(7), ADAAG Section 4.1.3(16)(b), ADAAG Section 4.30.7.

2.04 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Engineer from the manufacturer's standards.

B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Installation of all signage shall be in strict accordance with manufacturer's printed instructions and approved shop drawings. Installation shall be accomplished by experienced mechanics and in a workmanlike manner.

2. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

3. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance and in accordance to ADAAG Section 4.1.3(16).

B. Wall Mounted Panel Signs:

1. For exterior signs and signs on the Ground Floor: Anchor sign to CMU walls with minimum 3/16” diameter toggle bolts. Anchor sign to concrete walls with min. 1/4" diameter expanding tip type concrete anchors (Redhead or similar). Plastic sleeve type fasteners are not acceptable.

2. For interior signs on the Mezzanine Floor: Adhere sign to wall per manufacturer’s recommendation.

3. Attach sign to glass with very high bond (VHB) exterior transparent tape. Apply tape along perimeter and horizontal through middle of frame. Apply solid back plate of the same material and finish as the sign in the front. Use thin VHB transparent exterior tape.

C. Mounting location and height: signs for rooms and spaces shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, sign shall be placed on the nearest adjacent wall. Mounting height shall be 60 in. above the finish floor to the centerline of the text and Braille of room number sign and 60 in. above the finish floor to the centerline of the text and Braille of room name sign if room number sign is not exist. Mounting location for such signage shall be so that a person may approach within 3 in. of signage without encountering protruding objects or standing within the swing of a door.

3.02 CLEANING AND PROTECTION

A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Engineer. Remove all tools, equipment, debris, and surplus materials.

END OF SECTION

SECTION 10800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Section 00700.

1.02 GENERAL REQUIREMENTS

A. Furnish and Install the following Toilet and Bath Accessories as shown on the drawings and as specified:

1. Grab Bars.
2. Toilet Tissue Dispenser.
3. Toilet Seat Cover Dispenser.
4. Sanitary Napkin Disposal Container.
5. Paper Towel Dispenser.
6. Waste Receptacle.
7. Soap Dispenser.
8. Mirror.
9. Coat Hook.
10. Mop Holder.
11. Utility Shelf.
12. Corner Guards.

B. Related Work Described Elsewhere:

1. Installation shall be under Section 06200 - FINISH CARPENTRY.

1.03 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish inserts and anchoring devices for toilet accessories. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

B. Products:

1. Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas, wherever possible.

2. Coordinate with the Engineer for acceptable designs and finishes.

3. Stamped names of labels on exposed faces of units will not be permitted, except where otherwise specified.

4. Provide locks where specified. One key shall fit all locks of one brand.

C. Mounting heights, and accessory operation and controls shall conform to the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) Section 4.27.

1.04 SUBMITTALS

A. Shop Drawings and Product Data:

1. Submit manufacturer's product data and installation instructions.

2. Submit shop drawings showing locations, installation heights and details of all accessories for approval of the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stainless Steel: AISI, Type 302/304. Provide satin finish, unless otherwise specified.

B. Galvanized Steel Mounting Devices: Hot-dip galvanized after fabrication ASTM A 386.

2.02 TOILET AND BATH ACCESSORIES

A. To establish type and standard of quality, the specified product is by Bobrick. Products of Bradley, American Specialties, Inc. or other manufacturers may be considered provided they meet the materials, construction and the standard of quality specified.

B. Grab Bars (one set for each accessible toilet)

Bobrick B-6806. 1-1/2" O.D. Grab bar shall be fabricated of type 304 satin finish stainless steel with concealed mounting flanges in sizes and configurations as shown on the Drawings.

C. Toilet Tissue Dispensers (surface mounted). (one per each toilet stall)

Bobrick B-2888, surface-mounted multi-roll toilet tissue dispenser shall be Type 304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of toilet tissue dispenser door shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other washroom accessories. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4 inch diameter (1800 sheets). Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS spindles.

D. Toilet Seat Cover Dispensers (surface mounted). (one per each toilet stall)

Bobrick B-221. Satin finish stainless steel. Holds 250 single- or half-fold toilet seat covers. Fills from bottom.

E. Sanitary Napkin Disposal Containers (surface-mounted). (one per each Women toilet stall)

Bobrick B-270. Satin finish stainless steel. Cover is drawn, one-piece construction; secured to cabinet with full-length stainless steel piano-hinge.

F. Paper Towel Dispenser (surface-mounted). (one per each restroom)

Bobrick B-262. Satin-finish stainless steel. Dispenses 400 C-fold or 525 multifold towels. Door has tumbler lock and piano-hinge. Cabinet slots indicate refill time.

G. Waste Receptacle (floor standing). (one per each restroom)

Bobrick B-2280, waste receptacle shall be constructed from 22 gauge stainless steel. Exposed surfaces shall have satin finish. Waste receptacle shall be equipped with vinyl bumper strip and rubber feet. Capacity shall be 21 gallon.

H. Soap Dispenser (surface-mounted). (one per each restroom)

Bobrick B-2112. Corrosion-resistant valve. Container is satin-finish stainless steel. Capacity: 40 fl. Ox. Unbreakable refill window. Concealed wall fastening. Hinged filler-top requires special key to open. Vandal-resistant.

I. Mirror. (one per each lavatory)

Bobrick B-290. Mirror shall be framed with type 304 (18-8), one-piece roll-formed 3/4" x 3/4" stainless steel angle with double-strength continuous integral stiffener. Welded corners shall be polished to a uniform satin finish. Mirror shall be of first quality 1/4" float glass and protected by a shock absorbing, neoprene tubing with Poly-Glaze protective finish. Back of unit shall be 20 gauge galvanized steel secured to frame with concealed screws, equipped with integral horizontal hanging brackets and separate wall hanger for concealed mounting.

J. Coat Hook. (one per each toilet stall)

Bobrick B-212 Clothes hook and bumper. Solid aluminum casting, matte finish. Rubber bumper protects wall or partition surfaces.

K. Mop Holder. (one per each janitor sink)

Bobrick B-223. Type 304 stainless steel, satin finish. Anti-slip mop holders have spring-loaded rubber cam that grips handles 7/8" to 1-1/4" diameter. Holds mops 3-1/4" from wall. 24" length Height 5".

L. Utility Shelf. (one per each janitor sink)

Bobrick B-298. 8" wide, 18-gauge, type-304 stainless steel, satin finish. 3/4" return edge; front edge is hemmed for safety. Brackets are 16 gauge. 36" length.

M. Corner Guards (where indicated)

Bobrick B-633. 18-gauge, type 304 stainless steel, satin finish. No sharp edges. 3-1/2" X 3-1/2" X 48" long.

2.03 FASTENERS

A. Toilet and bath accessories shall be mounted with one-way tamper-proof stainless steel fasteners. Stainless steel shields shall be provided as required to suit the mounting conditions.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Location and installed heights of all accessory items shall be in strict compliance with the American With Disabilities Act Accessibility Guidelines for barrier-free washroom.

B. Installation shall follow the manufacturer's published instructions, recommendations and shop drawings.

C. Installer must examine the areas and conditions under which toilet accessories are to be installed. Notify the CONTRACTOR in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

D. Use concealed fastenings wherever possible.

E. Provide anchors, bolts and other necessary fasteners, and attach accessories securely to walls and partitions in locations as shown or directed.

F. Install concealed mounting devices and fasteners fabricated of the same material as the accessories or of galvanized steel.

G. Install exposed mounting devices and fasteners finished to match the accessories.

H. Provide theft-resistant fasteners for all accessory mountings.

I. Secure toilet room accessories to adjacent walls and partitions complying with the manufacturer's instructions for each item and each type of substrate construction.

2.02 CLEANING

A. All items shall have a protective wrap to prevent damage to the finish, for removal by the CONTRACTOR upon final completion of the project.

B. All finishes shall be cleaned using mild, non-abrasive, and non-corrosive cleaners as recommended by the manufacturer. Finger marks, smudges, paint spots, etc., shall be removed and all finishes cleaned to the satisfaction of the Engineer.

C. Replace any damaged and/or defective item.

END OF SECTION

SECTION 13850 - FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: As specified in Section 00700.

1.02 SECTION INCLUDES

Furnish all labor, tools, equipment, materials and accessories required to provide and install a complete, electrically supervised, closed circuit fire alarm system as specified herein and as shown on the plans.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Power Wiring. All power wiring including wiring to disconnect switches and breakers and wiring to all equipment specified in the ELECTRICAL Section.

B. Painting. Painting of all conduits, raceways, ducts, cabinets, junction boxes, etc. specified in PAINTING Section.

1.04 PAYMENT PROCEDURES

Permits, Tests and Inspections: Apply, secure and pay for all required permits, fees, licenses, tests, inspections and royalties necessary to accomplish the work.

1.05 SYSTEM DESCRIPTION

A. Fire Alarm System: The operations, functions, and displays of the fire alarm system shall be as follows:

1. Audible Alarm Devices: All audible alarm devices shall sound a march time patter until silenced by the alarm silence switch at the control panel. The time pattern shall be march time pattern which consists of 120 pulses per minute.

2. Visual Alarm Devices: All visual devices shall flash the candela-second specified herein until reset by the alarm switch, a silence switch or an initial step for silence or reset procedure at the control panel.

3. Annunciator Display: Appropriate visual displays to activate and display zone information on the annunciator panel.

4. General Alarm: The fire alarm control panel shall activate an "alarm mode" and activate all audio and visual device circuits.

B. Fire Alarm System Supervision: The system shall be electrically supervised as follows:

1. Open Circuit Or Ground Trouble Signal: An open circuit or ground in the system shall cause a separately mounted trouble signal to sound continuously until the system has been restored to normal or until the signal has been silenced by a cut-off switch.

2. Trouble Alarm Silence And Display: When the cut-off switch has silenced the trouble signal, a display shall activate to indicate such action. Upon restoration of the system to normal working order, should the trouble still exist, the trouble signal

shall again sound until the cut-off switch has been restored to its normal position and thereby also deactivating the display.

3. Open Circuit And Ground False Alarm Prevention: Any open circuit or ground in the system shall not cause the sounding of a General Alarm (false alarm).

4. System Circuits Supervision: The system shall be electrically supervised for:

   a. Initiating And Signaling Circuits.

   b. Alarm Signal Notification Circuits: Audio and visual circuits, including circuits powering flashing warning lights.

   c. Annunciation And Other Wiring: From the main fire alarm control panel to the annunciator.

   d. Battery Supply Circuits: Including low and no voltage across the standby battery terminals.

C. System Interface And Reset For System With Two or More Fire Alarm Control Panels:

1. Interface: The panels shall be interconnected for general alarm with supervised control circuits.

2. System Reset: Panels shall be reset by activating a single switch.

D. System Power Requirements:

1. Supervised Input Power, And Audible And Visual Power Indications: The input power to the system shall be continually supervised so that any power failure must be audibly and visually indicated at the control panel and the remote annunciator. A colored, usually green, "power on" LED shall be displayed continuously while incoming power is present.

2. System Batteries: The system batteries shall continue to be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel and the remote annunciator.

3. Supervised Cables and Wires For Internal Panel Connections: The system modules connected by ribbon cables or wires shall be continually supervised for module placement. Should a module become disconnected from the Central Processing Unit (CPU) the system trouble indicator shall illuminate and the audible trouble device shall sound.

4. System Battery Capacity Requirements: The fire alarm system shall include sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with five (5) minutes of alarm operation at the end of this period.

1.06 SUBMITTALS

A. Quality of Work/Submittals:

1. Drawings: The following applies to all drawings called for herein, such as field-posted as-built information, Modular Systems Wiring and Point-To-Point Wiring

Diagrams.

a. All work shall be in accordance with acceptable architectural and/or engineering standards. Workmanship shall be neat with all lines clean and sharp and lettering uniform in height and not less than 1/8" high.

b. Drawings shall be prepared and signed by the manufacturer or fire alarm equipment supplier's representative.

c. If feasible and more economical, reproduced prints of the contract drawings, marked-up with the proposed revisions may be submitted instead completely new drawings showing the proposed changes.

The proposed revisions shall be clouded and noted as Revision 1, "CONTRACTOR proposed revisions", in the revisions section of the title block and dated.

d. Where a new drawing is prepared, it shall be prepared using CAD.

The preparer (equipment manufacturer or supplier) of the diagram(s) shall include the drawing title, their firm's name, the preparer's signature and reviewers' initials, dates, etc. in the appropriate location in the title block.

2. Manufacturer's printed literature: Original published manufacturers' catalog cuts shall be provided. Facsimile or "Xerox" copies are not acceptable.

B. Submittal Quantities: Unless otherwise specified herein, submit for approval six (6) sets of the shop drawings, test plans, and manufacturer's catalog cuts of equipment and devices and resubmit until approval is received before placing order.

C. The following drawings, data and/or information, complete in all respects, shall be submitted to the Engineer for approval:

1. Fire Alarm Equipment, Devices and Components Data: Manufacturer's brochures which include descriptions and technical information.

2. Point-To-Point Wiring Diagrams: The diagrams shall include but not be limited to the following:

a. Locations Of All System's Elements: Indicate all devices, junction boxes, and pass-through devices and entities where the cables and conductors can be accessed by personnel. Also indicate the locations of all cable and conductor terminations and intermediate connections showing where they pass through without terminations/connections from and to equipment panels and/or devices.

b. Labeling Of All Elements: All devices junction boxes, etc. shall be labeled by functional designations, locations and numbers such as building alphabet, room function and room number, hand hole number, and manhole number.

c. Fire Alarm Wiring And Color Codes: All cable and conductor color codes, the wire marking system and marker designation as specified herein shall be shown.

d. Cable and Conductor Marking/Labeling Requirements: The description of

the marking designation system and designation of cable and/or conductor used shall be as specified herein.

e. Installation Notes: Provide the Installation Notes appended to this Section and other information that may be required by installation and maintenance personnel.

3. Equipment And/Or Modular Systems Wiring Diagram: Wiring diagrams showing all equipment (control panel and annunciator in separate panel) modules, components and key internal cabinet wiring that should be accessed for tests and maintenance. Drawings shall include but not be limited to the following:

   a. Equipment Modules and Components: The equipment modules and components layout (relative locations in proportion to the modules, components and cabinet/enclosure sizes) including the fire alarm control panel(s), annunciators, battery cabinets, etc. The drawings shall also show the locations of modules, components, wiring and expansion space within the FACP cabinet.

   b. Input And Output Circuits Labeling: Label the input and output circuits by circuit designations specified herein.

   c. Internal - External Circuits Interface Information: Only information that interfaces with external circuits and internal equipment wiring need be shown. All external wiring and circuits shall be shown in the riser diagram and the CONTRACTOR furnished Point-To-Point Wiring Diagrams when required as specified herein. Changes in or deletion of the modular system wiring diagrams shall not require changes to the riser diagrams and the CONTRACTOR furnished Point-To-Point Wiring Diagrams and vice versa except for the panel deletion or change.

      The modular system wiring diagrams shall be drawn on mylar reproducible sheets with the E-__ drawing number reserved for them.

4. Information For Maintaining Existing System Operations: When the existing fire alarm system will be permanently retained, shop drawings shall include wiring and/or circuit diagrams showing how the existing fire alarm system will be kept in operation during the construction period.

5. Listing of Fire Alarm System Equipment: A complete listing of the equipment proposed providing detailed descriptions, photographs and drawings thereof, showing compliance with this specifications,

6. Schedule showing the specified color coding and wire marking to be used.

7. Spare Parts Data.

8. Fire Alarm Systems Test Plans: Provide test plans as follows:

   a. Test Plan: Develop the test plan in accordance with industry standards and include the following:

      (1) Test information applicable for the project.

      (2) A short resume of the qualified representative and alternate representatives.

b. Supplemental Test Plan: When requested by the Engineer, supplement the test plan at no additional cost to the STATE showing simulated terminations and test procedures which will confirm that the CONTRACTOR-installed portion of the fire alarm system will operate as intended when the existing system is repaired and restored to normal operation.
Provide measured data and/or system circuit or operations data which the Engineer determines are necessary for system testing and maintenance.

9. Guaranty.

10. Operations and Maintenance Manual: Provide five (5) bound copies of the Operations and Maintenance Manuals in three (3) hole binders with hard covers. The manuals shall be submitted to the Engineer a minimum of four weeks prior to prefinal inspection and testing.

a. The manual may be provided in several volumes if so approved by the Engineer.

b. All drawings shall be folded to letter size by individual sheets so they can be retained in the manual or kept in a letter size envelope as part of the manual.

c. The manual shall contain the following:

(1) Manufacturer's Printed Equipment /System Operations And Maintenance Manual, And Devices Brochures:

(a) Start-up, operating, preventative maintenance, adjustment and troubleshooting procedures, and parts list.

(b) System Control Diagrams.

(c) Internal equipment wiring diagrams.

(2) Manufacturer's Equipment Brochures: Manufacturer's printed brochures of the fire alarm system components, modules, devices, and equipment.

(3) Test Plan And Data: After completion of the final inspection and tests, submit five (5) copies of the test plan with the recorded measured data in the designated spaces of the test plan data sheets.

Provide a printout of the program to the Engineer and include a copy of the printout in each Maintenance and Operations Manual.

(4) Training Materials: Three (3) sets of the training material that will be used to instruct the user's operating and maintenance staff.

(5) Manufacturer's Representatives: The names and addresses of the fire alarm system manufacturer, the nearest manufacturer's representative, and the nearest supplier of the manufacturer's equipment and parts.

(6) Fire Alarm Panel/Equipment Program Printout: The program printout obtained during testing of the new and/or the existing fire alarm panel/equipment panel.

(7) Field-Posted As-Built Fire Alarm System Drawings: Provide the field-posted as-built information. Drawings shall include:

(a) Site Plan: Plan shall show fire alarm system and conduit layout.

(b) Point-to-Point Wiring Diagrams.

(c) Modular Wiring Diagrams: Modular Wiring Diagrams of the Fire Alarm Control Panels, and other Equipment, including power panel location and breaker assignment information.

(d) Devices Wiring Diagrams: Specific fire alarm system devices wiring connections.

(e) Fire Alarm Devices Layout Drawings.

(f) Riser Diagrams.

(g) Legend: Showing all fire alarm system symbols used.

1.07 QUALITY ASSURANCE

A. Codes, Standards and Regulations: Perform the entire installation in strict accordance with the applicable provisions of the latest edition of the National Electrical Code, other NFPA Standards for fire alarm systems, local ordinances, and rules and regulations of the applicable County Honolulu and applicable utility companies.

B. Underwriters' Laboratories Listing And Cross-Listings: Each and all items of the fire alarm system shall be a standard and listed product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc.(UL) or appropriately cross-listed, and shall bear the "U.L." label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.

C. Underwriters' Laboratories Listing And Marking For Systems Controls: In addition to the UL-UOJZ requirement mentioned above, the system controls shall be UL listed for power limited applications per NEC 760. All circuits shall be marked in accordance with NEC article 760-22, circuit marking.

Accordingly, markings shall be as shown in the contract drawings /plans or as submitted in the shop drawings and approved by the Engineer.

D. Duration Of Doing Business In State: Prior to the time of bidding, the supplier's office shall have supplied fire alarm systems and provided repair service for those systems in the State of Hawaii for a minimum period of one year.

E. Local Representative Personnel: The local representative or supplier shall:

1. Have direct access to a fire alarm repairman, either on his own staff or in a manufacturer's service center, which can respond to a service call, isolate the cause of system failure and restore the fire alarm system equipment to normal operations.

2. Maintain a stock of replacement parts in Honolulu, including but not limited to modules, line resistors and relays, alarm stations and alarm devices, etc. for the fire alarm system furnished for the contract to allow repair within two days of system failure.

F. The fire alarm equipment supplier's representative preparing drawings required in this specification shall have at least 4 years of current experience in preparing drawings and installing fire protection and detection systems.

G. Acceptable Installers: Installation, adjustments, and testing of the fire alarm system shall be performed under the supervision of a technician or engineer retained by the CONTRACTOR who is qualified with at least two years' experience in the installation and operation of the fire alarm system of the type specified herein.

1.08 GUARANTY AND CERTIFICATE

A. The CONTRACTOR shall guaranty and certify in writing all work in this section for period of two (2) years. Should any equipment or material fail due to defective equipment, material or workmanship within this period, the CONTRACTOR shall replace the item at no cost to the STATE.

B. The two (2) year guaranty shall start at the end of thirty (30) consecutive days of trouble free operation after certification by the Fire Department and acceptance by the STATE whichever date is the latest.

C. If the existing fire alarm system is inoperative or deficient and requires repair, the guaranty shall begin thirty (30) days after trouble free operation after the date the CONTRACTOR installed portion of the fire alarm system is tested to confirm that it is operational and meets contract requirements.

1.09 MAINTENANCE

A. During the fire alarm system's two-year guaranty period, the CONTRACTOR shall supply complete maintenance and testing services for the entire fire alarm system. Reports prepared on the CONTRACTOR-furnished standardized forms shall be submitted each time a test and/or maintenance action occurs.

B. During the two (2) year guaranty period, the CONTRACTOR shall, upon the receipt of notice from the STATE's representative, promptly make all repairs arising out of defective material, workmanship or equipment.

It is understood that the STATE will undertake repairs if, following two (2) working days after receipt of such notice, the CONTRACTOR fails to make or undertake the repairs with due diligence. The expense in connection therewith shall be charged to the CONTRACTOR.

PART 2 - PRODUCTS

2.01 FIRE ALARM SYSTEM EQUIPMENT, COMPONENTS AND MATERIALS

A. Fire Alarm Control Panel (FACP): The Fire Alarm Control Panel (FACP) shall be modular with solid-STATE microprocessor based electronics, installed in a single

enclosure or group of enclosures mounted at a single location (installed within two feet or less from each other). The FACP shall be UL listed for NFPA 72 and power limited applications per NEC article 760 and shall also be fully field configurable, programmable, and editable to minimize delay due to last minute operational changes.

1. FACP Initiating Circuit Quantities: The FACP shall contain 12 Class `B' initiating circuits. The FACP shall have the capacity to expand to 24 initiating circuits with the installation of initiating circuit expansion boards.

2. FACP Signaling Circuit Quantities: The FACP shall contain 12 independently fused signaling (indicating appliance) circuits and shall have the capacity to expand to 24 signaling circuits by installation of signaling circuit expansion boards.

3. FACP Primary Controls And Displays: The FACP shall contain the following primary controls and displays which shall be visible and accessible through the front access panel:

   a. Local Alarm/Trouble Audible Device: The device shall sound during alarm, trouble, or supervisory conditions. This audible device shall sound differently during each of the above conditions to distinguish one condition from another without having to view the panel.

   b. LCD Display: Dual line with forty characters per line liquid crystal alpha-numeric display (Other alternatives to the liquid crystal display that provide the same functional requirements, serve the same purpose and are as readable are acceptable). The characters shall be backlit for easy readability and shall be a minimum height of three-sixteenths of an inch (3/16").

   c. LED Display Colors For Various Functions: Individual alarm, trouble, supervisory service and "power on" LED's (Other alternatives to the LED's that provide the same functional requirements, serve the same purpose and are as readable are acceptable). The LEDs shall be colored and differentiated as follow:

      (1) Alarm LED - red.

      (2) Trouble LED - yellow.

      (3) Supervisory service LED - yellow.

      (4) "Power On" LED - green.

   d. Functions Keys (single action controls):

      (1) Alarm, trouble and supervisory service acknowledge keys: When the acknowledge keys are activated the display shall respond/display the location and type of alarm, trouble, or supervisory service.

      (2) Alarm silence key: When activated, the alarm audible device shall silence and the alarm indicators shall remain illuminated until the system is returned to normal conditions.

      (3) System reset key: When pressed, the entire system shall return to

normal operating mode. If an alarm condition continues to exist, then the system shall remain in an alarmed state.

4. Panel Modules and Expansion Cards: The following panel modules, expansion cards and/or a combination thereof shall be provided in the FACP:

   a. Master Controller Central Processing Unit: One (1) master controller central processing unit with audio, power supply and charger.

   b. Auxiliary Control Relay Module: Provide four (4) Auxiliary Control Relay Module containing four (4) DPDT, positive feedback auxiliary control relays to determine the operational status of remote devices.

5. FACP Functional and Operational Requirements: The FACP shall provide the following functional and operational requirements:

   a. Date and Time: The FACP shall display the current date and time and provide for the setting and resetting of the time and date.

   b. Disable and Enable Control: The FACP shall have the capability to disable /enable a device or a circuit at its point so the system will not alarm during repair and/or maintenance of the device or circuit.

   c. Operational, Alarm and Trouble Relay Status: The FACP shall have the capability to check the operational, alarm and trouble status of the four (4) DPDT auxiliary control relays.

   d. Supervision: The incoming power, system battery power, all devices and LED's (or equivalent alternatives as described herein) in the system shall be supervised and accomplished as follows:

      (1) Incoming power shall be supervised so that any power failure shall be visibly and audibly indicated at the FACP. A "power on" LED, shall be displayed continuously while incoming power is present.

      (2) System batteries shall be supervised so that a low battery condition shall be visibly and audibly indicated.

      (3) The alarm initiating circuits specified herein shall be independently supervised so that a fault in any one circuit shall not affect the subsequent alarm operation of any other initiating circuit within the system.

      (4) The alarm signaling (indicating appliance) circuits specified herein shall be independently supervised so that faults or disarrangement in any one alarm signaling circuit shall not effect the operation of any other alarm signaling circuit within the system.

      (5) All devices shall be individually annunciated at the FACP Annunciator. Annunciation shall include the following conditions for each point:

         (a) Alarm.

(b) Trouble.

(c) Open.

(d) Short.

(e) Device missing/failed.

(6) All LED's (or equivalent alternative as described herein) shall be supervised for burnout or disarrangement. A complete and operable circuit for an LED (lamp) test shall be included. For any problem(s) that should occur during testing, the FACP annunciator shall display the location of the problem.

(7) Exceptions No.'s 10 and 11 of NFPA 72 Section 4-2.1 notwithstanding, all fire alarm system panels and equipment internal modules, ribbon cables and wires shall be continuously supervised.

Should modules, ribbon cables and wiring become disconnected and/or severed, the fire alarm system trouble LED shall illuminate and the audible trouble device shall sound.

e. Historical Alarm Log: The log shall record and display chronological information which includes alarm events by date and time and a brief description of the event.

f. Historical Trouble Log:

(1) The log shall record and display chronological trouble information which includes trouble events by date and time and a brief description of the event.

(2) The log shall also record and display walk tests to check for problems that may have occurred during testing.

g. Walk Test:

(1) A zone-by-zone test of the fire alarm system that can be done by one (1) person.

(2) During testing, the system shall pulse the signal for alarm conditions and sound steady for trouble conditions.

(3) There shall be an option for a silent test (Silent Walk Test).

(4) After the walk test has been logged into the Historical Trouble Log the system shall automatically reset itself to normal operation mode.

h. Primary Operator Interface:

(1) Interface shall be via a simplified operator's panel with indicators and interaction keys required for operation during both normal and emergency situations.

(2) Simplified operating instructions shall be imprinted on the panel face in a manner that is durable and readable.

i. System Operational Functions: System operational functions shall be restricted via categories or access levels with pass codes. The categories or access levels shall deter unauthorized access to various system software procedures.

(1) The first or lowest category/level (Category 1/Level 1) of access shall be reserved for routine actions for normal operation and shall consist of the following functions:

(a) Alarm Silence.

(b) System Reset.

(c) Use of the acknowledge keys.

(d) Access to system data such as: View Historical Logs and View Point Status.

(2) The highest category or access level shall be reserved for access to sensitive functions by an authorized technician and shall consist of the following functions:

(a) The use of the Walk Test function.

(3) Pass codes shall consist of a number with a minimum of three (3) digits.

A pass code shall not be required to access Category 1/Level 1 functions.

(4) If the programs or functions are not used within a category or access level for a period of ten (10) minutes the FACP shall return to normal operation (Category 1/Level 1).

j. Other Functions: All other functions shall be placed in their respective categories or access levels as determined by the manufacturer.

k. FACP 120 VAC Power Source: The FACP shall be energized through a single pole 20A breaker.

l. Battery Capacity Requirements: The fire alarm panel shall include sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with five (5) minutes of alarm operation at the end of this period.

(1) The system shall automatically transfer to the standby batteries upon power failure.

(2) All battery charging and recharging operations shall be automatic. When required, provide separate enclosure for mounting batteries adjacent to the existing control panel.

(3) Provide calculations that both new and existing equipment and device loads do not exceed the battery capacity for the twenty four (24) hour operation with five (5) minutes of alarm operation.

(4) All new circuits requiring system operating power shall be 24 VDC and shall be individually fused at the new and existing control panel.

m. Circuit Terminal Identification: All circuit terminals shall be identified by letters and numerals imprinted on alarm initiating and signal circuits modules or cards in a manner that is durable and readable.

n. Operation: The operation of the FACP shall be as follows:

(1) During normal operation the front panel shall display "SYSTEM IS NORMAL" or an equivalent message stating that the system is in a normal operation mode with no problems.

(2) The system alarm operation subsequent to alarm activation by any initiating device shall be as follows:

(a) All audible alarm devices shall sound a march time pattern (or other pattern as specified herein until silenced by the alarm silence switch.

(b) All visual alarm indicating appliances shall flash at a 15/75 and/or one-hundred (100) candela-second output until reset by the alarm silence switch.

(c) Appropriate LED's shall illuminate and the corresponding zone/device information shall be displayed on the FACP display.

(d) Alarm conditions shall be immediately displayed by the fire alarm panel.

(e) Existing Radionics panel shall be activated.

(3). Should the alarm silence button be pressed, all alarm signals shall be silenced, but the alarm LED's shall remain illuminated until all conditions return to normal.

(4) Should the "System Reset" button be pressed, the system shall return to its normal state after an alarm condition has been remedied. If an alarm condition remains then the system shall remain in an alarmed state.

(5) The system trouble operation shall be as follows:

(a) An open or ground in the system shall cause a separately mounted trouble signal to sound continuously until the system has been restored to normal.

(b) Any open circuit or ground in the system shall not cause a false alarm.

(c) All trouble conditions shall be immediately displayed by the FACP.

(d) When the cut-off switch has silenced the trouble signal, a red pilot light shall be illuminated to indicate such action. Upon restoration of the system to normal working order, the trouble signal shall again sound until the cut-off switch has been restored to its normal position and thereby also extinguishing the pilot light.

(e) Should a trouble condition be present within the system and the audible trouble signal is silenced, the trouble signal shall resound at preprogrammed time intervals to act as a reminder that the fire alarm system is not 100% operational.

6. The FACP shall be compatible with the existing Radionics fire alarm panel.

C. FACP And Other Panel Cabinets:

1. General Requirements:

a. Type: Surface mounted wall cabinets with a hinged door and cylinder lock.

b. Construction: Sixteen (16) gauge steel.

c. Color: Red.

d. Keying: Cabinets shall be keyed-alike.

2. FACP Cabinet:

a. Equipped with an auxiliary door for access to normally used switches and meters without exposing wire terminals.

b. Size:

(1) Provide a minimum of four inches (4") of top and side gutters and a minimum of six inches (6") of bottom gutter for wiring.

(2) Sufficient to provide space reserved for additional modules and cards for system expansion.

D. Peripheral Devices:

1. Manual Stations:

a. Hardwired single-action type initiating stations with cast-in operating directions. Switch shall be normally open.

b. Wall mounted over flush outlet boxes.

(1) For surface mounted manual stations provide factory manufactured surface back box with same base size as the manual station or to suit enclosure.

(2) When exposed to weather, outlet box shall be of cast metal with watertight gasket between box and station.

c. Case shall be equipped with fool-proof latch which may be opened for testing or resetting after station has been operated for fire drills.

d. Keys for stations and the fire alarm control panel shall be keyed alike.

e. The fire alarm pull stations shall not utilize glass rods and/or break-glass windows. When the station is operated, the handle shall lock in a protruding manner to facilitate quick visual identification of the activated station.

f. Stations which utilize screw drivers, Allen wrenches or other commonly available tools will not be permitted.

g. Pull stations shall have screw terminals.

2. Horns:

a. 24 VCD.

b. Semi-flush, grill vibrating type suitable for use in electrically-supervised circuits.

c. Screw type terminals for separate wire leads to in/out wiring for each leg of the associated signal circuit.

d. Min. sound output rating: 87 db at 10 feet.

3. Visual Alarm Devices:

a. Hardwired visible flasher complying with ADA requirements.

b. 75 candela-second xenon flash output.

c. 24 VDC.

d. Able to accommodate either a front mounted horn.

e. Tamper resistant lens and polarized in/out wiring.

E. Above Grade Cables And Conductors: Cables and conductors shall be 14AWG minimum.

1. Conductor Color Code: Conductors shall be provided with insulation color coded

as follows:

a. Power Branch Circuit Conductors: Red (+), White (-) for 120 VAC. Black (+), Red (-), and White (neutral) for 240 VAC.

b. Initiating Device Circuit: Red (+), Black (-).

c. Audible Signal Device Circuit: Blue (+), Orange (-).

d. Visual Signal Circuit: Brown (+), Yellow (-).

e. Tie Circuit:

(1) *Red (+), Black (-) if used as an initiating circuit.

(2) *Blue (+), White (-) if used as a signaling circuit.

F. Raceways: Raceways shall be steel, installed as specified in Electrical Section. Conceal all raceways unless otherwise noted on the drawings.

G. Conductor Markers:

1. Taped-band type of permanent material permanently stamped or legibly hand printed with proper identification.

2. The marker shall be white and the markings black in color so that the identification can be easily read.

H. Conduit Markers: Heavy duty vinyl white/red indoor/outdoor pipe marking tape.

I. Cable and Conductor Ties: One-piece, self-locking nylon ties having a minimum loop tensile strength of 175 pounds and resistance to the same conditions as cable marker.

J. Ground Rods:

1. Sectional type copper-encased steel.

2. Minimum diameter of 3/4 inch and a minimum length of 10 feet.

3. Rods shall have a hard, clean, smooth, continuous copper surface, and the proportion of copper shall be uniform throughout the length of the rod. Copper shall have a minimum wall thickness of 0.013 inch at any point of the rod.

4. Rods shall comply with the requirements of UL 467.

K. Locks and Keys:

1. Locks: Tamper-proof and keyed-alike.

2. Each key and lock shall be furnished with a non-corrosive metal tag stamped with an identification number.

L. Nameplates: Provide metallic and/or phenolic noncorrosive and non-heat sensitive nameplates for:

1. Fire Alarm Control Panel And Other Support Equipment: The nameplates shall be securely mounted inside the fire alarm panel with machine screws or glue, and be accessible and visible. Information on the nameplates shall be 1/8" or larger lettering stamped or engraved with the following:

    a. Panel Name.

    b. Manufacturer's name and address.

    c. Model Number.

    d. Serial Number.

    e. Date of Manufacture.

    f. Input power information, for example, 120 VAC, single phase, 10 amperes and 0.95 Power Factor.

    g. Signaling circuit information. for example, 24, VDC, 1.75 amperes maximum.

    h. Manufacturer's drawing number (if available).

2. Subpanels And Modules: The nameplates shall be securely mounted on the Subpanels and/or module with machine screws or glue and include the following information:

    a. Subpanel and/or module model and/or type number.

    b. Catalog number.

M. Panel Layout And Circuit Connections Diagram: Laminated diagram no smaller than 8 inches by 12 inches. Securely mount the diagram inside the fire alarm control panel and support equipment with machine screws or glue.

N. Factory And Field Paint:

1. Factory paint fire alarm panels and boxes, devices, and gongs with a primer coat and not less than two coats of a hard, durable weatherproof enamel.

2. Steel and other exterior work shall have a suitable primer coat and not less than two coats of approved enamel with finish color as specified herein.

3. Touch-up painted surfaces and fire alarm system components damaged during installation to match the existing or specified paint and color.

PART 3 - EXECUTION

3.01 EXAMINATION OF THE DRAWINGS AND SPECIFICATIONS

Confirm and coordinate voltages and requirements of equipment furnished by other trades

which will be connected to the fire alarm system. Include the above information on the field-post as-built drawings.

3.02 EXAMINATION OF EXISTING SITE CONDITIONS

A. Cabinets, panels, annunciators, outlets, pull stations, audio / visual devices and other equipment and devices shall be installed in the locations and heights shown on the drawings and/or as specified herein.

1. The location of the equipment and devices shown on the plans are approximate. Before installing, the CONTRACTOR shall study adjacent construction, verify all dimensions and sizes of equipment at the job site and perform installation in what he considers the most logical manner.

2. Any changes from the locations shown on the drawings must be approved by the Engineer and shown on the "field-posted as-built" drawings.

3. Any device may be relocated within 10'-0" before installation at direction of Engineer without additional charge to STATE.

B. The CONTRACTOR shall determine the location of existing cables and record their route on the field-posted as-built drawings.

3.03 INSTALLATION

A. Construction, Installation And Workmanship: Conform to requirements, practices and recommendations of the following:

1. American Electricians Handbook by Croft (latest edition), McGraw-Hill;

2. Practical Electrical Wiring by Herbert P. Richter and W. Creighton Schwan, McGraw-Hill;

3. Copper Development, Inc.'s "Copper Building Wire Handbook";

4. National Electrical Code;

5. National Electrical Safety Code:

6. NFPA Codes and Standards for Fire Alarm and Fire Protection Systems;

7. Local ordinances and regulations of the County;

8. International Municipal Signal Association Inc. Specification No. 19-1 1991, polyethylene insulated, polyvinyl chloride jacket signal cable; and

9. Applicable instructions of the manufacturer for equipment and materials supplied for the project.

B. Panels Mounting Height: The FACP and all additional panels shall be mounted such that the top of the cabinet does not exceed six feet (6') above the finished floor.

C. Cables and Conductors:

1. Conductor Installation:

a. Conductors shall not be installed in the same conduits, ducts, junction boxes, etc. with non-fire alarm circuits. 120 volt AC fire alarm circuit conductors shall not be in the same cable nor installed with cables and other conductors in the same conduits, ducts, enclosures, junction boxes, etc. with 24 volt DC fire alarm circuits.

b. Conductors shall be installed in continuous lengths. Splices shall be made in above ground junction boxes by terminating wires with wire nut connections.

c. Conductor pulling tensions shall not exceed manufacturers' recommended pulling tensions.

d. Wire-nut connectors: Permitted for connections in above grade locations only, in junction boxes and equipment and to devices that are not available or manufactured with screw-type connections.

All connections shall be accessible without moving any of the wire-nut connectors and wires more than two to three inches for removal and reconnection of wire-nuts and wires.

e. Pressure Type Lug Connections: Shall be used to connect wires to terminal blocks or equipment terminals.

f. Taped Connections: Shall be scotch #33 vinyl tape or equal.

D. Cable and Conductor Terminations And Dress:

1. Electric equipment shall be installed in a neat and workmanlike manner in accordance with NEC 373-7, Space in Enclosures.

2. Cable conductors or individual conductors shall be bundled, dressed and held together with cable straps, ties or lace and fanned in a manner that equipment terminals are visible and accessible, and allow the connections to be removed and reconnected without moving a large number of wires.

a. Conductors to screw type connectors shall be terminated with wire lugs or with approved cable termination connectors compatible with the specific termination.

b. A minimum of 6 inch excess length shall be provided for conductors from the bundles to the connectors using a vibration loop as described by NEC 300-14.

c. Conductors shall be labeled as specified herein.

3. Cross-connected conductor pairs in junction boxes or cabinets will not require bundling and cable straps, ties or lace but shall be neatly installed with a minimum of 6 inches of excess length so conductors can be easily traced between terminals. Label all conductors as specified herein.

4. Cabinets, junction boxes, cutout boxes, other boxes, shall have sufficient space to accommodate all conductors installed in them without crowding.

5. Completed work shall be uncrowded and uncluttered and shall allow accessibility

without cutting and/or removing of any straps, ties, laces, cables, components, devices, brackets, modules, equipment and like items.

6. Cables shall be secured to junction boxes, equipment cabinet backboards, and console members or to other system components using cable clamps and wraps.

   Provide cable support posts as required to facilitate system installation.

7. All cables and/or conductors entering the facility shall be equipped with a gas tube type of lightning protection or approved equal located at the first cabinet through which the cable or conductor passes upon entering the building.

8. All electrical circuits supplying power to the system components shall be equipped with surge protectors.

E. Cable and Conductor Identification System

1. Cable Markers:

   a. Provide markers at both ends of the cables and at all intermediate locations where the cables are accessible and visible.

   b. Each marker shall be secured with two (2) nylon ties.

2. Conductor Markers:

   a. Provide markers at both ends of each conductor connected to the panels or other terminations and at all accessible locations that conductors pass through.

   b. Attach markers a minimum of four (4) inches from the ends of conductors in a manner that will not permit accidental detachment.

3. Conduit Markers for Exposed Locations:

   a. Conduits shall be labeled at eight foot intervals.

   b. Labels shall be applied after painting of conduits is completed.

   c. Include alarm label at both ends of the conduit if longer than 50 feet or at one end if the conduit is 50 feet or shorter.

4. Identifications Slabs (Markers): Provide markers where cables change direction, over the ends of ducts or conduits that are installed under paved areas and roadways and at other critical locations.

5. Initiating Circuits: Initiating circuits (hardwired systems) shall be labeled by zone number, i.e., ICZ1 I/ICZ1 O (I = in, O = out) for initiating circuit zone 1. Conductors shall be labeled in fire alarm panels and building's main fire alarm junction box or termination cabinet.

6. Audible And Visual Signaling Circuits: Signaling circuits shall be labeled by signaling circuit number, i.e., SC1 I/SC1 O for signaling circuit number 1. For audible signaling circuits, add the prefix "A" to the above e.g., ACS1 I/ASC1 O. For visual

signaling circuits, add the prefix "V" to the above, e.g., VSC1 I/VSC1 O. Conductors shall be labeled in fire alarm panels and in building's main fire alarm junction box or termination cabinet.

F. Corrosion And Fungus Protection:

1. Protect metallic materials against corrosion.

2. Protect components against corrosion and fungus.

3. Protect dissimilar metals with approved fittings and treatment.

4. Coat outdoor equipment with a rust inhibiting treatment and standard finish by the manufacturer.

5. Coat steel conduits installed underground with an approved asphaltic paint or plastic coating, or wrap with a shingled layer of a pressure sensitive plastic tape, half-lapped.

6. Coat printed circuit boards with epoxy.

7. Do not use aluminum in contact with the earth.

G. Integration of New Panels Into The Existing System:

1. Integrate new panels into the existing fire alarm system as specified herein.

2. The integrated fire alarm panels shall operate as a single fire alarm system per Codes and Standards.

3. Reprogram the new and existing FACP's for system integration-operations.

H. Reprogramming of Existing Equipment: Existing fire alarm control panels and any other panels shall be reprogrammed to accommodate new circuits and/or modified to provide an integrated fire alarm system.

3.04 TESTING

A. Testing Of The Existing Fire Alarm System:

1. Prior to working on an existing fire alarm system, arrange with the Engineer for a test to be performed by the user to assure that all components of the existing system are in proper order.

2. Should any defect or malfunction be discovered during the test, no new work on the existing fire alarm system shall be done until the defect is corrected and the existing system is restored to operation and so demonstrated by the responsible maintenance agency or the user.

3. Unless the CONTRACTOR complies with the above, the CONTRACTOR shall

be held responsible for any deficiency and shall restore the existing/modified fire alarm system to fully operational condition. Expected or normal operating parameters such as, but not limited to, the voltages and currents for the various circuits and functions of the system shall be provided.

4. If any malfunction occurs after contract work completion, the CONTRACTOR shall show evidence why the CONTRACTOR's work did not cause the fire alarm system to fail.

B. Testing Of The New Fire Alarm Systems:

1. After completion of the fire alarm system's installation, turn on and leave the system on for a minimum of three (3) consecutive weeks to demonstrate that contract work operates, meets the requirements of the specifications and does not affect the operation of the entire fire alarm system.

2. Upon successful completion of the three (3) week operational period, arrange with the Engineer for a prefinal fire alarm system test and inspection. The test and inspection shall demonstrate that all the CONTRACTOR installed fire alarm system equipment, devices cables and conductors are operating acceptably. Accordingly, the test demonstrates that the system is ready for a final test of the overall fire alarm system.

3. Fire Alarm Panel And Equipment Tests: Test all equipment by disconnecting modules, ribbon cables and wiring to verify that the system/equipments are supervised. Demonstrate both normal and abnormal modes of operation and the required responses of each mode.

4. Cable And Conductor Tests: Use the main fire alarm panel, other equipment panels and an ohmmeter for the conductor tests. The ohmmeter shall be used to test spare and other conductors which are not supervised and monitored by the main fire alarm panel. Test the system conductors to confirm that the system is free from grounded or open circuits.

5. Ground Resistance Tests For New Grounding Systems: Ground resistance shall not exceed 10 ohms. Ensure that the new grounds are not connected to fire alarm or any other equipment when tests are made. The foregoing will ensure that test ground currents are not conducted through equipment and equipment circuitry, and prevent damage.

   a. For the purpose of this test, the testing instrument shall be connected between each conductor and ground at the control panel end of the line, with the other extremity open circuited and all series-connected devices in place.

   b. The system shall withstand the test without breakdown and shall indicate a resistance of not less than 500,000 ohms, the measurement being taken after not more than one (1) minute and electrification of with a DC potential of not less than 100 volts nor more than 550 volts.

c. Arrange with the Engineer for an inspector to witness this test.

d. A copy of the Manufacturer's instructions for the test instrument used shall be available during the test for review by the Engineer.

6. Power Supply: Conduct a complete test of the power supply including rectifier, charging rates, and automatic controls.

Record operating input and output AC and DC voltages and currents (load) at the time of the tests and provide the data as part of the test and maintenance documentation submission requirements as specified herein.

7. Detailed Circuit Tests: Make detailed tests of supervisory features and trouble alarm circuits and relays.

8. Trouble Line Operations Test: Simulate line trouble by removing circuit wires from terminals or applying grounds to these terminals in fire alarm panels and system.

9. Audio Tests:

a. Provide test equipment and conduct audio test for the fire alarm system in and around the building and in areas where new audio alarm devices have been installed.

b. Audio measurements shall be made in classrooms and other rooms with the doors in the open and closed position.

c. The audio test plan and proposed test equipment shall be submitted for review and approval with the test plans submittal specified herein.

d. The measured data shall be recorded on data sheets provided by the CONTRACTOR and shall be part of the test plan submission and records.

e. At the request of the Engineer, the CONTRACTOR shall provide proof of instrument calibration and date of calibration.

10. In addition to satisfactory acceptance tests of the CONTRACTOR portion of the fire alarm system, the entire fire alarm system must be accepted and certified by the County Fire Department before commencement of the specified two-year system warranty period with full maintenance responsibility.

a. The tests must demonstrate that the entire campus (or facility) fire alarm system is operating in order to receive the Fire Department Certification.

b. Representatives at the prefinal test should include the user, the user's facility maintenance agency personnel and the Engineer. Representatives at the Final test shall include all the foregoing representatives and the County Fire Department Inspector.

11. If requested by the Engineer, isolate the contract work from the overall system and demonstrate that the contract work does not affect the operation of the overall fire alarm system and shall repeat tests at no additional cost to the STATE.

3.05 CHANGED CONDITIONS: Changes in the condition of the existing fire alarm system shall be reported in writing to the Engineer with a request for approval and/or direction for

the installation of new fire alarm components and circuits if so affected.

3.06 REPAIR AND RESTORATION

A. Concealed Work: Concealed work re-opened and re-closed at random during the formal inspection as requested by the Engineer shall be done at no additional cost to the STATE.

3.07 TRAINING:

A. Conduct training and instruction for the operating and maintenance staff, as designated by the Engineer, on the operation of the fire alarm panel and system.

B. The training sessions shall be a minimum of one (1) hour and not more than two (2) hours per day, during normal business hours. The number of the training sessions required shall be determined by the amount of material that must be covered to complete instruction of the specified system.

C. Instruction shall include training materials and on-hands training in routine operations and queries (reading of normal status and trouble status) of the fire alarm system.

D. Training shall be provided for the existing fire alarm system and new fire alarm system and additional circuits and devices.

E. If the main control panel and annunciator panel are of the central processing unit (CPU) type system, instruction shall include operations and query of system status, etc.; and hands-on training in the procedures and process for operations and obtaining system status, trouble and other functional information to determine when to call for repairs and how to report the type of trouble encountered.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15300 - AUTOMATIC FIRE SPRINKLER

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

Provide an automatic fire sprinkler system, complete and operating and as indicated on the drawings. Provide shall mean "furnish and install" when used herein.

1. Electrical: Provide all temperature, pressure, flow and indicating controls for this work. Mount control devices. Control wiring and conduit provided under Electrical section of these specifications.

2. Provide flow switches and gate valves with tamper switches where indicated on the drawings. Connect to central fire alarm annunciator panel.

3. Water system connection to fire sprinkler riser assembly shall be included in this section.

1.02 COORDINATION WITH OTHER SECTIONS

Mounting of fused or non-fused disconnect switches, circuit protection and power wiring and conduit are under ELECTRICAL WORK Section.

1.03 SUBMITTALS

Automatic Fire Sprinkler Systems:

1. Drawings: The plans of the system are to be used as the basis for working plans. Coordinate shop drawings with lighting fixtures, ducts and air inlets of finished areas, to minimize interference before installation. The CONTRACTOR shall in his shop drawings, indicate all information required for a complete sprinkler system working drawing in accordance with NFPA Standard 13. The CONTRACTOR shall coordinate with the Hawaii Fire Insurance Rating Bureau to insure proper compliance with their requirements. Shop drawings of details required for installation shall be prepared by the CONTRACTOR and submitted to the Hawaii Fire Insurance Rating Bureau, Fire Department and Building Department. When stamped with the Hawaii Fire Rating Bureau approval, the plans shall be submitted to the Engineer for review, prior to fabrication.

2. Pipe sizing shall be by pipe schedule for Ordinary Hazard (Group 2) for areas designated in NFPA 13. At the CONTRACTOR's option, the sprinkler system may be hydraulically designed in accordance with NFPA 13. Flow test shall be performed by the CONTRACTOR at no additional cost to the STATE. Flow data, and calculations shall be submitted by the CONTRACTOR with the shop drawings for review by the Engineer. The CONTRACTOR shall submit two (2) sets of drawings and calculations to the STATE.

3. As-Built Drawings and Instruction Manuals: The CONTRACTOR shall record all changes and prepare one set of vellum as-built drawings. CONTRACTOR

shall furnish instruction manuals containing complete instructions for the specific make and model of the equipment furnished. Six copies of instruction manual shall be furnished to the STATE. Indicate location of isolating valves and items requiring maintenance or inspection. Dimension underground piping from a visible point on the structure. Submit as-built drawings for review prior to final inspection.

4. Certificates: The CONTRACTOR shall submit a written certificate, dated and signed by a responsible employee of the CONTRACTOR, and also signed by the CONTRACTOR, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any portion of the work, that the inspection or test was satisfactorily passed.

1.04 QUALITY ASSURANCE

A. Comply with all the requirements of the State of Hawaii, City and County of Honolulu, and Hawaii Insurance Rating Bureau and NFPA 13.

B. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this work.

C. Comply with the recommendations and requirement of the Codes and Standards listed hereinafter in addition to the detailed requirements of this specification. In the event of conflicting requirements, this specification shall prevail.

1. National Fire Protection Association (NFPA) Standards:

13 Installation of Automatic Sprinklers

70 National Electrical Code

D. The CONTRACTOR shall submit data for the Engineer's review which will show that he has successfully installed systems of the same type and design as specified herein. The data shall include the names and locations of at least two installations where the CONTRACTOR has installed such systems. The CONTRACTOR shall indicate the type of design of these systems and certify that these systems have performed satisfactorily in the manner intended for a period of less than 18 months.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

Furnish all new fixtures, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interference or construction delays. Protect products during delivery, storage, installation and the remainder of the construction period after installation.

1.06 GUARANTEE

All work in this section shall be guaranteed for a period of one (1) year from the date of acceptance of the work as a whole by the STATE. Should any fixture or material

fail within this period, the CONTRACTOR shall be responsible for all damage to any part of the premises caused by the failure and shall repair or replace the defects at no cost to the STATE.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND COMPONENTS

A. Requirements of manufacturer's equipment that is a component of a system provided under this work is included with the systems specification hereinafter. See electrical drawings for voltage and phase requirements of all equipment furnished under this work.

B. Automatic Fire Sprinkler System

1. All system components shall conform to Chapter 3 of NFPA Standard 13 and shall be UL listed or FM approved.

2. Sprinkler Heads: Heads shall be upright or pendant type bronze or brass in exposed ceilings. Heads shall be recessed type in areas with finished ceilings. Heads shall be of the standard type conforming to Section 3-15 of NFPA Standard 13. Temperature ratings shall conform to Section 3-15.6 of NFPA Standard 134, 165 degrees F (sprinkler) and 135 degrees F (cover plate), unless otherwise noted. Pendant and upright sprinkler heads at exposed ceiling areas, Grinnell Duraspeed with SSP-1 or SSU-3 deflector. Recessed heads for finished ceilings Grinnell Duraspeed with SSP-1-C deflector and recessed cup, chrome finish. All sprinkler heads in finished ceilings shall be located within 50 percent of ceiling tile. Reliable, Chemtron or Star equal.

3. Sprinkler Cabinet: A sprinkler cabinet containing extra sprinkler heads of each style and sprinkler wrenches as required by NFPA Standard 13 shall be clearly labeled to indicate the type and quantity of sprinkler equipment which it contains.

4. Piping: Pipe above ground shall be seamless Schedule 40, black steel pipe ASTM A 53A, ASTM A135 and standard black malleable (300 lb. w.o.g.) or cast iron (175 lb. w.o.g.) fittings. Joints in ferrous piping shall be screwed or "Victaulic" type joints. Allied XL threadable lightwall pipe acceptable. Copper piping in lieu of steel and Schedule 10 with roll-groove coupling are acceptable.

PART 3 - EXECUTION

3.01 PREPARATION

Fire sprinkler as shown on drawings. Study entire contract drawings and become fully aware of all conditions. Investigate the Agreement Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route to each pipe. Make off-sets and changes in direction required to maintain clearance between structure, ducts, lights or other interferences. Provide all hangers, inserts and supports in accordance with NFPA Standard 13 required for this work. Provide

additional materials and labor for a complete and operable system at no extra cost to the STATE. Coordinate connection to existing piping.

Flow switches and tamper switches on shut-off valves at riser assembly shall be interlocked with the fire annunciator panel. Supervisory switches at riser assembly shall also be interlocked with the annunciator panel.

3.02 INSTALLATION OF THREADED PIPE

A. All pipe shall be cut accurately to measurements established by the CONTRACTOR, then threaded, reamed, and cleaned of all extraneous matter before being worked into place without springing or forcing. Compound shall be applied to the male thread only. Hanger type and spacing, and pitch of pipe, shall conform to NFPA Standard 13 for each respective system, and to the drawings.

B. Spacing of sprinklers shall be for occupancy in accordance with Chapter 4 of NFPA 13. Location of sprinklers shall conform to all details of that chapter.

C. Inspector Test Valves shall be installed in accordance with the requirements of NFPA 13 and shall discharge outside of the building.

D. Drain valves shall be installed in accordance with NFPA 13.

E. All ferrous piping exposed to view shall be painted "Fire Department Red" oil based enamel as specified under the PAINTING Section. Due care shall be exercised to avoid painting nozzles, protective devices or sprinkler heads. All materials used for this protection shall be removed upon completion of painting. The CONTRACTOR shall remove and replace all nozzles, sprinkler heads and protective devices which are painted with new items at no additional expense to the STATE.

3.03 TESTS

On completion of the work, the CONTRACTOR shall make all standard tests required under NFPA 13, thereby proving the system is in satisfactory working order. Hydrostatic tests shall be conducted on all piping. Such tests shall be at 200 psi pressure for a period of not less than two hours. Notify Engineer in writing 15 days prior to testing. Upon completing tests, and when satisfactory results have been obtained, a signed and dated statement setting forth the tests which were made and certifying that all required tests have been satisfactorily completed shall be presented by the CONTRACTOR to the Engineer.

3.04 VALVE TAG AND VALVE LOCATION LOG

Provide identification tags on all valves. The CONTRACTOR shall provide a complete log of all valves to include: valve number, valve type, valve size, valve service and location.

END OF SECTION

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Provide a complete plumbing system including water and waste. "Provide" shall mean "furnish and install" when used herein. Connect to utility systems as shown on drawings.

1. Electrical: Provide all temperature, pressure, flow and indicating controls for this work. Mount control devices and provide control wiring and conduit.

2. Provide all temperature, pressure, flow and indicating controls for this work. Mount control devices and provide control wiring and conduit. All switches shall be ADA heights (44" max above finished floor). Equipment selection and locations shall be coordinated with Electrical subcontractor for compatibility with the fire alarm system prior to equipment submittal.

3. Connect to plumbing system all fixtures and equipment, including any furnished by the STATE under another section of these specifications.

4. Coordinate with furniture and equipment shop drawings, locations of gas, water and waste connections to equipment and laboratory fixtures.

1.02 SUBMITTALS

A. Equipment Submittal: Before beginning work, submit for review six (6) sets of certified literature showing ratings and dimensions of equipment, of a list indicating manufacturer and model of fixtures and trim, and a list indicating all materials and items that are of a different manufacturer or model than those specified.

B. Shop Drawings: After review of equipment, contract documents and field conditions, submit for review six (6) sets of dimensioned installation shop drawings to scale. Drawings shall include details where space requirements present problems, proposed departures from the Agreement Documents due to field conditions, and requirements for the concrete work, access panels, inserts in slabs and openings in structure. No reproductions (of any kind) of the Agreement documents shall be acceptable as shop drawings. The Engineer shall have the right to require additional dimensions and/or details as he deems necessary to assure proper installation and service clearances of the equipment that have been substituted (pre-approved or approved by substitution request) with equipment described in the Agreement documents.

C. As-Built Drawings: Record all changes from the Agreement and shop drawings. Indicate location of concealed piping and isolating valves and items requiring maintenance or inspection. Dimension underground piping from a visible point on the structure. Indicate invert and slope of drainage piping at sufficient locations so that the invert can be calculated for any point in the system. Submit one (1) set of as-built drawings for review prior to final inspection.

D. Operation and Maintenance Manuals: Furnish 4 sets of operating and maintenance manuals on all equipment, bound between hard covers. Include for each piece of equipment the manufacturer's name, model, and serial number, operation and

maintenance manual including control diagrams and source of service and replacement parts. Provide tabs separating each piece of equipment. Manual should indicate location of each piece of equipment by model number in the facility. When using published manuals covering several equipment items or several model options, identify which data and instructions apply to the equipment furnished for this project. Submit one copy of the complete manual for review and approval prior to final inspection.

1.03 CERTIFICATES

The CONTRACTOR shall submit a written certificate, dated and signed by a responsible employee of the CONTRACTOR, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the CONTRACTOR that the inspection or test was satisfactorily passed. Submit five (5) copies of the certificates stating that the solder and fluxes used are lead free.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

Furnish new equipment, fixtures, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interferences or construction delays. Protect products during delivery, storage, installation, and the remainder of the construction period after installation.

1.05 COORDINATION WITH OTHER SECTIONS

A. Mounting of starters and providing of fused or non-fused disconnect switches, circuit protection and power wiring and conduit are specified under ELECTRICAL Section.

B. Excavating, trenching and backfilling shall follow standard industry practices and the Uniform Plumbing Code, latest edition.

1.06 QUALITY ASSURANCE

A. Comply with all the requirements of the State of Hawaii, City and County of Honolulu and applicable utility companies, and all recommendations of manufacturers.

B. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this work.

C. Substitution of another manufacturer's product for equipment specified hereinafter and for items with "acceptable equal" after the brand name requires written permission by the Engineer prior to bidding. No substitutions shall be considered after the bid opening. Acceptable equal products of the following manufacturers are acceptable in lieu of those specified hereinafter by the manufacturer and model number.

1. Valves: Dezurick, Hammond, Lukenheimer Nibco, Stockham or Walworth.

2. Fixtures: American Standard, Eljer, Elkay, Just or Kohler.

3. Drainage System Specialties: Josam, Smith, Wade or Zurn.
4. Pipe Supports: Elcen, Fee and Mason, Grinnell or Unistrut.

2. Fixture Trim: Bradley, Chicago, Elkay, Speakman, Symmons, or T & S.

3. Fire Extinguishers: Elkhart, Potter-Roemer, Standard, Wilkirk.

4. Toilet Seats: Bemis, Beneke, Kohler, Olsonite.

5. Flush Valves: Sloan, Zurn or Wade.

D. Comply with the recommendations and requirement of the latest edition Codes and Standards listed hereinafter in addition to the detailed requirements of this specification. In the event of conflicting requirements, this specification shall prevail.

1. American Society for Testing and Materials Publications (ASTM):

A 74	Cast Iron Soil Pipe and Fittings
A 53	Pipe, Steel, Black and Hot-Dipped Zinc Coated Welded and Seamless
B 88	Seamless Copper Water Tube
B 306	Copper Drainage Tube (DWV)
C 564	Rubber Gaskets for Cast Iron Soil (R 82) Pipe and Fittings

2. American National Standards Institute Publications (ANSI):

B16.18	Cast Copper Alloy Solder-Joint Pressure Fittings
B16.22	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
B16.23	Cast Copper Alloy Solder Joint Drainage Fittings - DMV
B16.26	Cast Copper Alloy Fittings for Flared Copper Tubes
B16.29	Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings

3. Cast-Iron Soil Pipe Institute Publication (CISPI):

Standard No. 301	Hubless Cast-Iron Sanitary System with Cast-Iron No Hub Pipe and Fittings	
Pamphlet Fittings	Installation Suggestions for "No Hub" Pipe	100

4. National Fire Protection Agency (NFPA):

70	National Electrical Code

5. ADAAG Americans with Disabilities Act Accessibility Guidelines

1.06 GUARANTEE

All work in this section to be guaranteed for a period of one (1) year from date of acceptance of the work as a whole by the STATE. Should any equipment, fixture or material fail within this period, the CONTRACTOR shall be responsible for all damage to any part of the premises caused by the failure and shall repair or replace the defects at no cost to the STATE.

1.07 ACCESSIBILITY REQUIREMENTS

Furnishing and installation of all items in this section shall comply with Americans with Disabilities Act Accessibility Guidelines (ADAAG), 36 CFR Part 1191.

PART 2 - PRODUCTS

2.01 MATERIALS

Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The CONTRACTOR shall ensure that all materials and equipment incorporated in the project are asbestos free.

2.02 EQUIPMENT

Requirements of the manufacturer's equipment that is a component of a system provided under this work is included with the system's specification hereinafter. Capacities and characteristics of the equipment are indicated on the drawings. See electrical drawings for voltage and phase requirements of all equipment furnished under this work.

1. Fire Extinguisher (FE): 10 lb. dry chemical fire extinguisher, U/L rated 4A:60B:C. Potter Roemer Inc. Fig. No. 3010 or equal. Provide wall mounting carrier.

2.03 FIXTURES

Provide chrome plated all brass faucets, flush valves, angle stops, tube risers, chrome plated P-traps, escutcheons and cover plates. Provide connecting fittings, china bolt caps, wall support brackets as required. Furnish masonry and concrete subcontractor with wall sleeves and inserts required for fixture installation. All valves bronze and brass with chrome plating. All sinks and lavatories shall have 2.0 gpm cold water flow restrictors. All water closets shall be maximum 1.6 gallons per flush. All urinals shall be maximum 1.0 gallons per flush. Provide access panels as required for servicing of flush valves, valves, etc. Mount accessible flush valve on wider side of stall. Provide brass closet bolts, nuts, washer, plastic bolt caps, escutcheon plates and water closet flange/seal for all water closets. Toilet seats shall be white, open front, elongated type.

1. Accessible Water Closet (PWC): Wall mounted, wall outlet, vitreous china, elongated bowl, 1.6 gallons per flush maximum, 17-1/2" high. Provide solid plastic open front seat, with integral molded bumper, check hinge and angle stop. Provide chrome plated, 5 lb. push button operation actuator, diaphragm type with screwdriver stop and vacuum breaker (maximum 1.6 gal/flush). Provide sidewall button option for fixture wall location in order for front access button.

Install push button on wider side of toilet stall.

2. Water Closet (WC): Wall mounted, wall outlet, top spud, flush valve, vitreous china, elongated bowl, 1.6 gallons per flush maximum, 14-3/4" high. Provide solid plastic open front seat, with integral molded bumper, check hinge and angle stop. Provide chrome plated, flush valve with screwdriver stop and vacuum breaker, Sloan Royal 111 flush valve.

3. Lavatory (LAV): 21" x 18" overall dimensions, vitreous china, front overflow, back splash, wall hung, 8" faucet centers, Kohler K-2030. Chicago 408A-665CW, ADA type, 4" centers lavatory faucet, self-closing, single metering valve for cold water, 5" spout. Secure push-button faucet caps with set screws installed with setting compounds such as "Lock-Tite." Provide floor mounted concealed arm wall hanger support. Provide p-trap, continuous waste (17-gauge, brass, chrome plated), copper chrome plated water risers with couplings, angle stops and escutcheon.

4. Accessible Urinal (PUR): Kohler K-5024-T vitreous china, washout flush urinal, 3/4" top inlet, 14-1/2" wall to front of flare. Sloan Royal 186-1-ADA valve. Floor mounted carrier support. 1.0 gallon per flush. Provide drain screen.

5. Sink (SK): 18 gauge, Type 302 stainless steel self rim stainless steel sink. Single compartment sink, 25" L x 22" W x 6" D overall dimensions, 3-1/2" drain opening, undercoated underside, Elkay LRAD-2522. Chicago No. 350-CP faucet (cold water only), lever handles, swing spout, Elkay LK-18 perforated grid strainer, angle stop, riser, p-trap, escutcheons.

2.04 PIPE FITTINGS

Only "domestic" piping shall be allowed on this project (made in USA, no foreign products).

1. Waste and Vent Piping Below Grade: Service weight cast iron soil pipe. ASTM A 74, ty-seal gaskets, or no-hub cast iron soil pipe conforming to CISPI 301 with MG or Husky series 4000 heavy duty joint couplings.

2. Waste and Vent Pipes Smaller Than Three Inches Above Grade: Service weight cast-iron soil pipe, ASTM A 74, no-hub cast-iron soil pipe conforming to CISPI 301 with stainless steel bands.

3. Waste and Vent Pipes Three Inches or Larger Above Grade: Schedule 40 galvanized steel pipe, ASTM A 53, with recessed cast-iron screwed drainage fittings or service-weight soil pipe, ASTM A74, no-hub cast-iron soil pipe conforming to CISPI 301 with stainless steel bands.

4. Water Pipes: Type "L" hard drawn copper tube, ASTM B 88 with non-lead soldered (95-5) joint wrought copper pressure fittings for aboveground. All solder shall be non-lead; flux shall be non-corrosive complying with Copper Development Association Standard 1.0.

2.05 VALVES (All Bronze)

A. Gate Valve 2 inches and Smaller ((Shut-Off Valve)): Nibco T-111.

B. Globe Valve 2 inches and Smaller ((Balancing Valve)): Nibco T-235.

C. Domestic line square head cock: Bronze.

2.06 ACCESS PANELS

Milcor access doors; style AP for plaster surfaces, style A for acoustical tile surfaces, style M for masonry and other surfaces. 12" x 12" minimum size in walls and partitions, 24" x 24" for ceiling access.

2.07 PLUMBING SYSTEM SPECIALTIES (All drains with flashing flange and strainers maximum 1/4" openings, tops shall be matching nickel/bronze.)

A. Cleanouts:

1. Floor Cleanout: Smith 4020 series. Provide clamp device when installed in floor with waterproofing membrane. Provide nickel bronze heavy duty cleanout covers.

2. Wall Cleanout: Smith 4530 series with access frame and cover.

3. Cleanout to Grade: Smith 4220 series installed in concrete pad, pad and cover to be flush with grade.

4. Cleanout: Smith 4280 series, coated cast iron, spigot connection, bronze threaded plug.

B. P-traps Installed Below Floor: Deep-seal cast-iron P-trap.

C. Vent Flashing: Prefabricated roof cap/curbing (non-lead). Provide Josam series 26700 vandalproof vent cap.

D. Water Hammer Arrester: J.R. Smith Series 5000, all stainless steel, PDI certified. Provide access panel. Sized to accommodate fixtures on the pipe branch served.

E. Interior Hose Bibb: Chicago No. 952, chrome plated, vacuum breaker, loose key handle with in-line wall mounted stop.

F. Funnel Drain: J.R. Smith 3822 or approved equal, duco cast iron funnel drain with 2 inch outlet and 4 inch diameter funnel, backwater valve and trap primer connection.

G. Plumbing Vent Caps: J.R. Smith 1748 vandal proof cast iron with galvanized finish. Use on all vent thru roof pipe terminations.

PART 3 - EXECUTION

3.01 PREPARATION

Trenching and backfilling shall be in accordance with the Uniform Plumbing Code. Visit the work site and become fully aware of all existing conditions. Investigate the

Agreement Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route of each pipe. Make off-sets and changes in direction required to maintain proper head room and pitch or to accommodate the structure and the work of other trades. Furnish other trades with information to properly locate and size openings in the structure required for this work. Furnish anchor bolts, sleeves, inserts and support required for this work.

3.02 INSTALLATION AND REQUIREMENTS

Perform work using personnel skilled in the trade involved. Provide competent supervision. Furnish new equipment, fixtures, materials and accessories bearing the manufacturer's identification and conforming to recognized commercial standards. Provide guard around all exposed moving machinery parts and around high-temperature equipment and materials. When exposed to weather, provide a weather protected enclosure around electrical equipment, controls and other items that are not satisfactorily protected. Provide all extra materials and labor for a complete operable system at no extra cost to the STATE. Installation shall be in accordance with manufacturer's recommendations. Provide access panels for all items requiring servicing, inspection, maintenance and adjustment.

3.03 UTILITY CONNECTIONS

Existing utility locations were determined from information available at the time of design. Verify the exact location and elevation of all existing utilities. Notify the Engineer immediately in writing of all discrepancies. Be fully responsible for any and all damage resulting from failure to exactly locate and preserve existing ground utilities.

3.04 FIXTURE INSTALLATION

Set fixtures in approved workmanlike manner. Point up all edges against walls and partitions with white grout. Provide adequate supports for wall-mounted fixtures. Provide supplies for all water lines to fixtures; Brasscraft or equivalent, compression joint type with chrome plated brass escutcheon and cover tube, loose-key angle stop valve and drawn copper tube riser. Provide chrome plated brass p-trap, waste fittings and escutcheon as required for fixture. Exposed metal including pipe shall be polished chrome plated. Provide concealed arm wall/floor supports for lavatories and urinals.

3.05 PIPING INSTALLATION

Conform to the requirements of the Uniform Plumbing Code and all manufacturer's recommendations. Inspect all pipes inside and outside. Remove interior obstructions and ream out pipe ends. Tool markings on polished fittings are not acceptable. Cut pipe accurately so that it can be worked into place without springing or forcing. Install pipes parallel to the wall of the structure and plumb. Make changes in direction with fittings. Bushings are not permitted. Pull-tees are not permitted. Install valves with stems above horizontal. Provide proper support and adequate provisions for expansion, contraction, slope and anchorage. Provide dielectric unions at all dissimilar metals. Wrap pipe or tubing with 1/4-inch thick felt, secured with tape, where they contact other materials. Have piping treated, inspected and approved before it is furred in, buried or otherwise hidden. Provide standard weight galvanized steel pipe sleeves for all pipes passing through structure, sufficiently large to provide 1/4-inch clearance around pipe. Caulk watertight around pipes passing through sleeves. Wrap pipe with

polyethylene tape where it passes through sleeve and when it contacts concrete or masonry. Grout with fire proof material around all pipe penetrations through slabs and walls full length of penetrations. Provide chrome plated brass escutcheons, set tight on the pipe and to the wall where pipes are exposed in finished areas. Provide clamping collar or membrane flange where pipe or drains penetrate waterproof membrane. Perform all welding using qualified welders in accordance with American National Standards Institutes Code B31.1 and American Welding Society Standard B3.0. Soil for bedding and backfill shall be tested for soil resistivity. If soil resistivity is less than 20,000 ohms-cm, provide cathodic protection of underground steel (including gas) and copper lines.

3.06 PIPING SYSTEM SUPPORTS

A. Pipe Supports: Factory-fabricated by Elcen, Fee and Mason, Grinnel or Unistrut; no chains or perforated straps permitted. Provide concrete inserts, beam clamps, channel framing, hanger rods and accessories required for proper support. Ramset or explosive type anchors may not be used without written permission by the Engineer. Trenching/backfilling in accordance with the Plumbing Code. Support underground piping on firm soil along its entire length. Where rocks are encountered, have trench excavated to a minimum overdepth of four inches and backfilled with granular moist earth, thoroughly tamped. Materials used for backfilling over piping shall be granular earth, free from debris and stones. The Engineer may reject any materials which he considers unsuitable for fill. Clay and adobe type soil is not allowed. Provide a minimum of two feet of cover for all pipes. Where sewer and water lines are laid in the same trench, place water line on solid shelf with bottom of water line twelve inches above top of sewer. Where sewer and water lines cross, encase sewer in four inch thick concrete envelope. Support steel and copper pipe at maximum spacing of 6 feet for pipes 1-1/2 inches and smaller, 10 feet for pipes 2 inches through 4 inches and 15 feet for pipes larger than 4 inches. Support vertical piping with hanger at base of riser and with pipe clamp at each floor. Provide expansion loops in water piping where pipe crosses structural expansion joints. Loop shall consist of four 90 degree elbows with 10 pipe diameters in between.

B. Pipe Hangers: Steel clevis hanger with adjustable hanger rod; 3/8" for pipe 2" and smaller, 1/2" for pipe 2-1/2" through 3-1/2" and 5/8" for pipe 4" and larger. Groups of lines may be supported from steel channel pipe clamp.

3.07 DRAINAGE, WASTE AND VENT PIPING SYSTEMS

Slope drain lines at 1/4 inch per foot unless otherwise indicated. On drains that occur above the ground floor, provide clamping device with drain. Provide a prefabricated flashing sheet (non-lead) extending eight inches out around drain body and secure with clamping device. On vents through roof, extend vent flashing eight inches out all around base of vent, extending collar up vent and turn in at top. Install hubless cast-iron pipe in accordance with CISPI pamphlet 100-1972. Provide cast-iron and neoprene gasketed no-hub coupling below grade. MG stainless steel clamps and cast-iron no-hub couplings shall be installed in accordance with manufacturer's written instructions. Cleanout to grade shall be encased in concrete, flush with finished grade.

3.08 WATER PIPING SYSTEM

A. Secure each water line where it penetrates partitions to serve fixtures, hose bibbs and

similar items. Wrap all lines passing through concrete with polyethylene tape. Install unions or flanges at all valves, equipment and system specialties. Set hose bibbs 18 inches above finished grade, unless otherwise indicated. Install dielectric unions at connections of copper and ferrous pipes. Provide access panels as required. No flux shall enter inside of piping.

B. Provide water hammer arrester on all cold water lines serving fixtures using flush valves sized in accordance with the PDI Standard WH201 for the total number of fixture units connected to the branch line. Install arrester between last two fixtures served or as shown. Provide access panel for concealed arresters. Provide 12-inch long air chambers line sized at all plumbing fixtures.

C. Provide square head cock on all hose bibbs.

3.09 ELECTRICAL

Provide control wiring and conduit. Conform to the requirements of ANSI C1, National Electric Code, and to the requirements of ELECTRICAL section of these specifications. Obtain equipment manufacturer's control wiring diagram for the equipment furnished. Prepare a control and interlock wiring diagram for the complete system. Indicate terminal points to factory wired equipment. Submit control diagrams for review. Furnish motor starters for all electrically driven plumbing equipment, complete with circuit breaker, one overload relay per phase, 120 volt control circuit and horsepower rating. Provide control wiring for gas heater controls and pumps.

3.10 FIELD QUALITY CONTROL

Test plumbing systems in accordance with the Uniform Plumbing Code. Perform tests in the presence of, and to the satisfaction of inspectors having jurisdiction over the work. Ask for final inspection by the Engineer after tests, adjustments and balancing has been performed.

1. Test drainage systems in accordance with Section 318 of the Plumbing Code.

2. Hydrostatically test the domestic water piping system at 100 psi for 2 hours. Inspect the entire system while under pressure and correct all deficiencies.

3. Test equipment to demonstrate its operation and compliance with the specification.

3.11 BALANCE, ADJUSTING AND CLEAN

Clean up work areas and fixtures. Adjust system for proper operation ready for use. Sterilize water system for 24 hours with 100 ppm chlorine introduced into the lines in an approved manner. Operate all valves during contact period. Flush system until chlorine is less than 0.2 ppm. Automatic control devices shall be adjusted for proper operation. Touch up with matching paint all damaged factory finishes.

3.12 PAINTING AND IDENTIFYING

The following items furnished under this section are to be painted and identified under PAINTING Section. Do not paint over name plates or other identifying labels.

1. Paint exposed black iron work including pipe, fittings, iron body valves, pipe hangers, etc., with two coats of zinc rich paint.

2. Stencil all exposed piping with painted black letters indicating the service and with an arrow indicating the direction of flow. Stencil where pipes enter and leave each area and at not over 30 ft. intervals within an area. Paint color band at stencils; yellow for fuel and green for water systems. Width of color band, size of legend letters, and position of legend shall conform to the requirements of ANSI A13.1, Scheme for the Identification of Piping Systems.

3.13 TESTING AND INSPECTION

A. The CONTRACTOR shall furnish all equipment for tests and any required retests and pay for all cost of repairing any damage resulting from such tests. The CONTRACTOR shall adjust systems until they are approved. Tests shall be performed in the presence of, and to the satisfaction of, an inspector of the official agency involved.

B. Sanitary and water piping shall be tested in accordance with the Plumbing Code. Sanitary drains shall be tested with a minimum of 10 feet of water for 15 minutes. Water piping shall be tested. Valves shall be rated for at least 200 psi working pressure.

C. Defective Work: If inspection of tests show defects, such defective work or material shall be replaced and inspection and tests repeated. Repairs to piping shall be made with new material. No caulking of screwed joints or holes will be accepted.

Installation shall be repaired by skilled mechanics of the trade involved at no extra expense to the STATE.

D. Protection to Fixtures, Materials and Equipment: Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, repainted, adjusted and operated.

E. Chlorination: Domestic water lines shall be sterilized with chlorine before acceptance of work. Sterilize water system for 24 hours with 100 ppm chlorine introduced into the lines in an approved manner. Dosage of chlorine shall not be less than 50 ppm. After a contact period of not less than eight (8) hours, the system shall be flushed with clean water until the residual chlorine content is not greater than 0.2 ppm. All valves in the lines being sterilized shall be opened and closed several times during the contact period. A certificate shall be furnished to the Engineer evidencing proper performance of sterilizations.

3.14 CLEANING AND ADJUSTING

At the completion of the work, all parts of the installation shall be thoroughly cleaned. Equipment, pipe valves, and fittings shall be cleaned of grease and metal cuttings, and sludge that may have accumulated by operation of the system for testing. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishing, due to the CONTRACTORs failure to properly clean the piping system shall be repaired by

the CONTRACTOR without cost to the STATE. Touch up with matching paint all damaged factory finishes.

3.15 FINAL CONNECTIONS TO EQUIPMENT

Plumbing subcontractor through the CONTRACTOR shall obtain all information from the STATE necessary to make final connections to equipment. Final connections shall include hot and cold water individual fixture shut-off valves, pressure reducing valves/regulators, P-traps, vacuum breakers, unions, gas, waste and indirect waste connections, gas regulators, strainers, water hammer arresters, backflow preventers. Provide control wiring and conduit for all items as required. Removal and installation of STATE furnished equipment to facilitate final connections shall be included. Insulate p-traps/risers receiving chilled water/ice water/ice including electric water coolers.

END OF SECTION

SECTION 15800 - AIR CONDITIONING AND VENTILATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Provide all labor and materials necessary for a complete and operating air conditioning and ventilation system. "Provide" shall mean "furnish and install" when used herein. Project drawings show general requirements as to size, arrangement of ducts and piping, and location of equipment. All products shall be made in the United States of America. Manufacturer of equipment shall have Hawaii stocked spare parts, representation and support of a service organization which has services manufacturer's units of comparable type, size and capacity as specified herein. Manufacturer must have other units of comparable type, size and capacity installed and operating satisfactorily in the State of Hawaii for a minimum of two years prior to bid opening.

B. Electrical: Provide all indicating controls for this work. Mount control devices and provide control wiring and conduit. Furnish motor starters for equipment under this section.

1.02 COORDINATION WITH OTHER SECTIONS

A. Electrical: Mounting of starters and providing of fused or non-fused disconnect switches, circuit protection and power wiring conduit are under ELECTRICAL WORK Section.

B. Painting: Painting of equipment and materials under Section 09900.

1.03 SUBMITTALS

A. Shop Drawings and Product Data:

1. Submit shop drawings and product data in one complete package. Piecemeal submittals are not acceptable.

2. Reproductions of Agreement Drawings for the use of shop drawings are not acceptable.

3. Shop Drawings: After review of equipment, Agreement documents and field conditions, submit for review dimensioned installation shop drawings to scale. Show details where space requirements present problems, proposed departures from the Agreement Documents due to field conditions, and requirements for the concrete work, access panels, inserts in slabs and openings in structure. Drawings shall also indicate adequate clearances for operation, maintenance, and replacement of operating equipment. The shop drawing review is confined to arrangement of equipment only and will not relieve the CONTRACTOR from responsibility for proper fit, performance, or construction. Any deviation from Agreement documents including dimensional, performance or material changes shall be clearly noted on shop drawings.

4. Equipment Submittal: Before beginning work, submit for review certified literature showing ratings and dimensions of equipment, and of a list indicating all

materials and items that are of a different manufacturer or model than those specified.

Submittals shall include the following items:

a. Fan coil units with sound data.
b. Exhaust fans with sound data.
c. Air devices, flex duct and duct accessories with sound data.
d. Control wiring, devices and diagrams.
e. Chilled water piping insulation.
f. Chiller with sound data.
g. Pumps (Chilled Water).
h. Chemical and feed systems.
i. Packaged air conditioning unit with sound data.

Submittals shall include the following as a minimum:

a. System design information sheet, dimensions, performance information with sound data.
b. Description of system operation
c. Electrical power and control wiring diagram
d. Catalog information on valves, strainers and control components
e. Packaged system dimension and general arrangement drawing.
f. Pump material and construction drawing.
g. Pump curve showing design point.
h. Chiller performance.

B. Site Maintained Drawings:

1. Maintain an accurate record of all changes made in installation from layout and materials shown on Agreement Drawings and/or approved shop drawings.

2. Indicate location of items requiring maintenance or inspection.

3. Submit three (3) copies of these drawings to Engineer prior to final inspection.

C. As-Built Drawings: Record changes from the Agreement drawings of all ductwork and equipment. Indicate location of dampers and items requiring maintenance or inspection. Submit reproducible copies (contract Mylars) of as-built drawings prior to Agreement Close-out.

D. Operation and Maintenance Manuals: Submit four (4) hard bound copies of the operating and maintenance manuals on all equipment and the system as a whole bound. The manual shall identify project name and number, CONTRACTOR, date and all equipment provided. It shall include the equipment manufacturer's name, model and serial number, tag number, capacity, quantity of units, their location and area (room) served and shall include the manufacturer's operation and maintenance manuals including control and wiring diagrams and source of service and replacement parts. Provide tabs separating each piece of equipment. When standard manufacturer's brochures are used, adequately indicate (highlight, arrow, etc.) the project related information and delete (X or cross-out) the non-applicable information. Include all applicable submittal items and information. Submit complete manuals for review prior to final inspection.

Distribution of Submittal:

1 copy: User
2 copies: User's Facility Maintenance Agency

Operating Instructions in manual shall include:

1. General description of the system and sequence of operations for all equipment.

2. Step by step procedure to follow in putting each piece of equipment in operation and trouble shooting.

3. Provide schematic control diagrams for each separate system. Each diagram shall show locations of start-stop switches and correct operating settings for each control instrument shall be marked on this diagram.

4. Provide diagram for the electrical control system showing the wiring of all related electrical control items and interlocks.

5. Include all air balance and test reports.

E. Provide a laminated copy of the control diagram for each component of the system. Diagrams shall be framed and hung in the (room).

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: For actual fabrication, installation and testing of work under this section, use only thoroughly trained and experienced workmen completely familiar with items required and manufacturer's current recommended methods of installation. In acceptance or rejection of finished installation, no allowance will be made for lack of skill on part of the installer.

B. The Mechanical subcontractor shall provide an independent third party Testing and Balancing Contractor that is NEBB Certified, at his expense to perform testing and balancing data provided under this section of the specifications. Selection of the third party Contractor shall be agreed on by both the Mechanical Contractor through the CONTRACTOR and the STATE.

C. Laws, Regulations and Permits:

1. Comply with all the requirements of the State of Hawaii, the City and County of Honolulu and the latest editions of SMACNA, ASHRAE and NFPA.

2. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this work.

D. Substitution of another manufacturer's product specified hereinafter and for items with "or acceptable equal" after the brand name requires written permission by the Engineer prior to bidding. No substitution will be considered after the bid opening. Acceptable equal products of the following manufacturers are acceptable in lieu of those specified hereinafter by the manufacturer and model number.

1. Chillers, Fan Coil Unit, Packaged Air Conditioning Unit: Carrier, McQuay, Trane.

2. Exhaust Fans: Acme, Barry, Carnes, Chicago, Greenheck, Joy, L.C. Cook, Penn, Twin City Blower Company.

3. Motor Starters: Allen Bradley, Cutler-Hammer, Furnas, General Electric, Westinghouse.

4. Controls: Barber Colman, Honeywell, Johnson Controls, Honeywell, Robert Shaw, Carrier, McQuay, Trane, York.

5. Air Distribution Devices: Anemostat, Barber-Colman, Titus, Tuttle and Bailey.

6. Motors: Allen Bradley, Century, Cutler-Hammer, General Electric, Gould, Reliance, U.S., Westinghouse.

7. Insulation: Certainteed, Owens-Corning, Pittsburgh-Corning, Pro-Tect-T-Kotes Fittings.

8. Pipe Supports: Elcen, Fee and Mason, Grinnell or Unistrut.

9. Flexible Ducts: Jen-Flex, Metal Fab, Inc., Therma-Flex.

10. Pumps: Aurora, Bell and Gossett, Paco, Peabody Barnes, Peerless, Weinman.

11. Valves: Alco, DeZurick, Lukenheimer, Muessco, Nibco, Sporlan, Stockham, Superior, Walworth

12. Fire and Smoke Dampers: Air Balance, Ruskin, Prefco.

13. Thermometers and Pressure Gauges: March, Trerice, Weiss.

E. Comply with the recommendations and requirement of the Codes and Standards listed hereinafter in addition to the detailed requirements of this specification.

1. American National Standards Institute Publications (ANSI):

   A13.1 Scheme for Identification of Piping Standards

   B9.1 Safety Code for Mechanical Refrigeration

   B31.1 Power Piping

   B31.5 Refrigeration Piping

2. National Fire Protection Association (NFPA) Standards:

   70 National Electrical Code

   90A Air Conditioning and Ventilation System

3. Air Conditioning and Refrigeration Institute (ARI) Standards:

410 Forced-Circulation Air Cooling and Heating Coils

433 Sound Rating of Room Fan Coil Air Conditioners

520 Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units

550 Centrifugal and Rotary Water Chilling Packages

4. Air Moving and Conditioning Association (AMCA) Standards:

210 Test Code for Air Moving Devices

300 Test Code for Sound Rating Air Moving Devices

5. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):

Handbook, Applications - latest edition
Equipment - latest edition

15 Safety Code for Mechanical Refrigeration

34 Number Designation and Safety Classification of Refrigerants

6. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

Manual for the Balancing and Adjusting of Air Distribution Systems

Low Velocity Duct Construction Standards, latest edition

Duct Liner Application Standards

7. Anti-Friction Bearing Manufacturers Association (AFBMA):

9 Load Ratings and Fatigue Life for Ball Bearings

11 Load Ratings and Fatigue Life for Roller Bearings

F. Air conditioning equipment to be considered for bid purposes must be of manufacturer that has locally stocked spare parts, representation, and support of a service organization reasonably convenient to the site of installation which has serviced manufacturer's units of comparable type, size and capacity as those specified. The manufacturer must have other units of comparable type, size and capacity installed and operating satisfactorily in the State of Hawaii for a minimum of two years prior to bid opening. The CONTRACTOR shall provide a list of locations in Hawaii with addresses and telephone numbers. All equipment with local manufacturer’s representative shall be purchased through the local distributor.

1.05 PRODUCT HANDLING

A. Protection: Use all means necessary to protect materials and equipment before, during, and after installation and to protect installed work and materials of all other trades. Under no circumstances shall any mechanical equipment be stored outside, unprotected.

B. Replacements: In event of damage, immediately make all repairs and replacements necessary at not cost to the STATE.

1.06 CERTIFICATES:

The CONTRACTOR shall submit a written certificate, dated and signed by a responsible employee of the CONTRACTOR, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the CONTRACTOR that the inspection or test was satisfactorily passed.

1.07 GUARANTEE

A. All work in this section shall be guaranteed for a period of one year from the date of acceptance of the project as a whole, by the Engineer. Start-up and operation of a system component prior to acceptance of the whole system shall not constitute the start of the one year guarantee of that component. Should any equipment, fixture or material fail within this one year period, the CONTRACTOR shall be responsible for all damages to any part of the premises caused by failure and shall repair or replace the defects at no cost to the STATE.

B. All work will produce capacity and performance specified or shown.

PART 2 - PRODUCTS

2.01 MATERIALS

Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The CONTRACTOR shall ensure that all materials and equipment incorporated in the project are asbestos free.

2.02 EQUIPMENT

Capacities and characteristics of equipment are indicated on the drawings. See electrical drawing for all voltage and phase requirements of all equipment furnished under this work. Provide combination magnetic part winding (above 40 HP) and across-the-line starter (below 40 HP), control voltage transformer and circuit breaker for each motor of mechanical equipment unless the equipment is factory-wired to a single power connection or unless otherwise indicated hereinafter. Provide disconnect switch for all mechanical equipment. Exposed to weather starters shall be 4X type. All steel surfaces shall be hot-dipped galvanized. All steel exposed to weather shall be hot-dipped galvanized and shall have an additional two coats of rust-proof paint. Provide vibration isolators as indicated hereinafter. All motors shall be premium efficiency type.

Isolation Equipment	Description*	Minimum Static Deflection
Exhaust Fan	Rubber-in-shear with steel spring isolator	1"
Fan Coil Units	Vertically and laterally restrained spring with steel plate and neoprene pad.	As indicated on schedule.

Chiller, Packaged A/C — Vertically and laterally restrained isolators with minimum 2 inch static deflection with neoprene pad.

Pumps — 1/2" thick neoprene pad.

* Isolator mounting shall be in accordance with manufacturer's dimensioned drawings. Isolators shall be sized specified static deflection from manufacturer's published loading information at each mounting point, based on operating weight. All springs shall be neoprene dipped with hot dipped galvanized housings.

1. Air Cooled Packaged Chiller (CH):

   a. Factory built and assembled and weatherproofed water chilling units complete with hermetic reciprocating compressors, air cooled condenser, shell and tube chiller, electronic expansion valves, microprocessor based control panel with minimum 8-character display and minimum of 24 diagnostic points, and related items, all mounted on a channel iron base assembly.

   b. Unit capacities as indicated in the drawings. Allow for a cooler scale fouling factor of 0.00025 on the water side of the tubes for the overall heat transfer coefficient. Nominal 50 ton chiller shall have a minimum full load EER of 9.6 per ARI Standard 590.92.

   c. Provide units complete with compressors, mufflers, condenser, insulated chiller, high and low pressure cutout, crankcase heaters, safety controls, low oil pressure failure switch, low limit water thermostat, anti-recycle timer, electronic expansion valves, suction and discharge service valves liquid line strainer, sight glass and moisture indicator, and vibration dampeners. Provide vapor proof flow switches in the chilled water line from the chillers to stop the compressors on no flow condition. Compressor in sealed insulated cabinet.

   d. Controls: Chiller must have at least 4 steps of mechanical capacity reduction below 100% with minimum capacity step of 31%. Provide hot gas bypass for the 50 ton chiller to provide capacity reduction to 10%. If the compressors furnished do not have built-in capacity reduction, furnish all items, devices, materials, and related items required for capacity reduction. Provide part winding starters for compressors and control transformer for control voltage. Provide over voltage, under voltage, phase failure and phase reversal protection for each chiller. Controls shall

have complete self-diagnostic feature to indicate any equipment malfunction.

e. Coolers: Shell and tube type with flanged connections welded steel shell design in strict accordance with the requirements of the ASME Code for Unfired Pressure Vessels and bearing the ASME stamp. Non-ferrous tubes with extruded fins.

f. Chiller Insulation: Factory installed, minimum thickness of 3/4" closed cell insulation covered with steel jacket on all cold surfaces. Provide extra 3/4" thick closed cell insulation on factory insulation. All refrigerant suction or cold piping shall be insulated.

g. Air Cooled Condenser: Coil with copper tubes expanded into aluminum fins. Provide coating for the entire fin and coil assembly as specified. Provide, totally enclosed, direct drive axial propeller fans.

h. Control Panel: Weatherproof with suction, discharge, and oil pressure gauges or digital display, condenser fan motor controller, "on-off" switch, 8-character display and keypad, starters and circuit breakers for compressors and condenser fan motors.

i. Casing: Galvanized steel with enamel paint. Provide Polysiloxane coating to inside and outside of cabinet and replace all sheetmetal screws with stainless steel fasteners.

j. Provide head pressure control for low temperature operation.

2. Cabinet Exhaust Fan: Ceiling mounted centrifugal fan set. Capacities, characteristics and configuration shall be as indicated on the drawings. Fan set shall consist of centrifugal fan, housing, insulation, lifetime lubricated motor, backdraft damper and white enameled or chrome plated grille. Provide separate “on-off” switch, thermostat controlled switch or interlock with light switches as indicated on drawings/control diagrams. Maximum sound levels as indicated on equipment schedule.

3. Chilled Water Pumps (CHWP): Close-coupled, foot-mounted single stage end-suction bronze fitted centrifugal pumps with flanged suction and discharge connections. Capacity and characteristics as indicated on drawings. Chilled water pumps shall have mechanical seals. Pump casing shall be designed to withstand a pressure of not less than 125 psi. Pump motor shall have ample capacity to prevent overloading with pump operating at any point on its characteristic curve. Provide properly loaded vibration isolators for units. Furnish combination magnetic across-the-line starter and circuit breaker.

4. Fan Coil Unit (Chilled Water): Vertical, enclosed unit for closet installation, single-zone unit with fan, coil and filter section. Capacity and characteristics of unit shall be equal to or greater than that indicated on the drawings. Unit shall be constructed of galvanized steel with have half-inch thick fiberglass insulation. Drain pan shall be constructed of galvanized steel. Fans shall be direct drive, double width fan wheels with forward curved blades. Motor and drive shall be enclosed, 3 speed fan. Filters shall be disposable filter type. Furnish

combination magnetic across-the-line starter and circuit breaker. Provide extended lubrication lines for fan bearings. Fan coil unit shall be ARI Standard 430-74. Motors shall be equipped with integral, automatic reset thermal overload protection.

5. Packaged Air Conditioning Unit (PAC): Weatherproof cabinet constructed of zinc coated pre-painted steel. Unit shall be complete with fully hermetic reciprocating compressors, service valves, vibration isolation, crankcase heater, sightglass, filter drier. Evaporator fans shall be forward curved centrifugal, direct drive with totally enclosed 2-speed motor. Condenser fans shall be direct driven propeller type with inherently protected motor. Power wires shall be single pointed terminal connections. Compressor in enclosed cabinet. Entire unit casing (inside and outside) shall be coated with polysiloxane corrosion protection. Coil section to be provided with Blygold Polual coating as specified. Fans shall have discharge configuration as shown on the drawings. Provide 1-1/2" thick liner, one pound density and easily removable access for any concealed items requiring periodic access including motor, drive, drain pan valve and cooling coil. Provide filter rack on duct and 2" disposable filters. Capacity and characteristics of unit shall be as indicated on plans. Provide vibration isolation media as recommended by manufacturer. Provide magnetic across-the- line starter with disconnect and control voltage transformer. Provide five year compressor guarantee. Unit designed for inside room air temperature of 50 degrees F

2.03 AIR DISTRIBUTION DEVICES

A. Manufacturer: Barber-Colman, Titus, Kreuger, Anemostat, Airlume, Carnes or approved equal.

B. Construction: Aluminum construction "off-white" color for face plates, frames and grilles; except as noted.

1. Return Register, Exhaust Register, Outside Air Register and Transfer Grille: Fixed blade type, 45 degree angle, 3/4 inch blade spacing with opposed blade volume control damper.

2. Supply Register: Adjustable, double blade type, front blades horizontal, rear blades vertical, 45 degree angle, 1/2 inch blade spacing with opposed blade volume control damper.

3. Supply Diffuser: Square, louvered face diffuser with opposed blade volume damper, 4-way throw unless otherwise indicated, with off-white finish.

2.04 PIPE, FITTINGS AND VALVES

A. Aboveground Chilled Water Piping: Schedule 40 black steel pipe ASTM A 53 with cast iron screwed fittings, ASTM A 126 for pipes under 4 inches and welded fittings ASTM A 234 for larger pipes, except any line 2-1/2" or larger may be welded at the CONTRACTOR's option. Provide welded neck flanges at all flanged valves and accessories. Grooved joint couplings may be used at the CONTRACTOR's option (Victaulic or equal). Copper piping in lieu of black steel pipe acceptable at the CONTRACTOR’s option.

B. Condensate Drain Piping: Type “L” hard drawn copper with copper or brass drainage fittings and 95-5 tin antimony (non-lead) solder joints. Use 45 degree elbows and cleanout plugs at all bends. Use non-corrosive flux.

C. Valves: Ratings of not less than 125 psi working pressure.

1. Ball Valves 2-Inches and Smaller: Nibco T-560-BR-Y-20.

2. Globe Valves: Stockham B-22 with Teflon disc, bronze body, stem, disc holder, iron handwheel.

3. Check Valves 2-Inches and Smaller: Stockham G-319.

4. Check Valves Larger Than 2-Inches: Stockham G-932, composition disc for quiet operation.

5. Butterfly Valves: Lug type with iron body, bronze disc, 2-piece stainless steel stem, Buna-N seat with rigid phenolic liner backing, memory type locking infinite position throttling handle with position indicator and extended stem neck. Valves shall be capable of maintaining full pressure with downstream side removed. Valves 6" and larger shall have gear operator and handwheel.

6. Gauge and gauge cocks shall be provided as shown.

7. Strainer: Muessco #751 with “Y” stainless steel screen 1/16 inch opening, iron body, flanged ends.

2.05 PIPE SLEEVES

Piping sleeves through walls and floors shall be steel pipe or 18-gauge galvanized metal. Piping through sleeves of fire rated walls or plenum chambers shall be caulked tight with fiberglass material. Sleeves installed through drilled holes through concrete shall be grouted and finished on both sides. Exterior sleeves shall be caulked watertight.

2.06 PIPE HANGERS AND SUPPORTS

A. Horizontal piping shall be hung as indicated in the drawings or approved equal; vertical piping shall be supported with riser clamps or approved equal.

B. Uninsulated copper pipe shall be supported with copper plated hangers or approved equal.

C. Under no circumstances shall piping be supported from ductwork, equipment or electrical.

2.07 FLEXIBLE CONNECTION

Provide flexible pipe connectors for all mechanical equipment connections rated at 150 psig working pressure, metal reinforced and with restraining rods.

2.08 ACCESS PANELS

Provide access panels for all mechanical equipment requiring adjustment, servicing and routing maintenance. Access panels shall be 12 inch x 12 inch minimum size in walls and partitions, 24 inch x 36 inch minimum size for ceilings. Provide fire rated access panels to match rating of wall/ceiling where required.

2.09 WATER PIPING SYSTEM SPECIALTIES

A. Thermometers: 7-inch, aluminum casing, adjustable angle hinge, brass separable socket, extension neck when required, range as required. Thermometers shall be set in dry wells. Trerice No. AX93403-1/2.

B. Thermometer Test Well: Mueller No. 2750.

C. Pressure and Temperature Test Plug: Brass body with neoprene valve core and body, and closure cap. Provide with one pressure gauge adapter for every two test plugs, 1/4 inch NPT Pete's Plug manufactured by Peterson Engineering Company, Inc. or approved equal. Provide extension neck to clear insulation as required.

D. Flow Limiting Devices: Aqueduct series "F", Griswold or approved equal.

E. Strainer: Y-type strainer with 0.045 perforated stainless steel screen.

F. Expansion Tank: Provide for each closed loop system. Refer to details on the drawings.

G. Pressure Gages: Circular type, cast aluminum casing, accuracy of 1% of scale range, bottom outlet, flanged for surface mounting or plain case, range 0-160 ft. head W.C. required. Trerice No. 615. Mount gage where indicated. Provide gage cock and tubing. Install impulse dampers for all pump gages.

H. Chilled Water Valve: All brass body, two position valve and actuator, 3-way type. Maximum two psi pressure drop at indicated flow.

2.10 INSULATION

Apply in accordance with manufacturer's recommendations by skilled mechanics. Flame spread rating not to exceed 25 and a smoke development rating not to exceed 50.

A. Chilled Water Piping (Aboveground): Insulate chilled water piping with foamglass insulation, Pittsburgh Corning insulation or equal. Apply vapor barrier to seal insulating ends and around valves, fittings, flanges and unions. Vapor barriers shall be provided in long runs of pipe at intervals not to exceed 15 feet. Insulation thickness: 1-1/2 inches thick for pipe sizes 1-1/4 inches and smaller; 2 inches thick for pipe sizes 1-1/2 inches to 4"; 3 inches thick for pipes larger than 4 inches.

B. Insulate chilled water valves, fittings, and couplings with foamglass insulation, Pittsburgh Corning insulation or equal. Insulation thickness and density to match pipe insulation.

C. Condensate Drain Piping: Fiberglass insulation with all service jacket, Owens Corning or equal. Provide vapor barrier and all service jacket. Insulation thickness: 1-inch for pipe sizes 1 inch and smaller; 1-1/2 inches thick for larger pipes. Installation in accordance with manufacturer's latest recommendations.

D. On pipe insulation exposed to weather, apply 16 mil embossed aluminum jacket with 2-inch overlap at longitudinal and circumferential joints, secured in place with 3/4 inch x 0.015 gauge aluminum bands on 18 inch centers. Apply humped aluminum ells or fabricated 16 mil aluminum to fittings and band in place.

E. Saddles: Provide 180 degree galvanized sheetmetal protective saddles at each hanger or support on insulated piping and shall be no less than 16 gauge and no less than 12 inches long. Insulation at saddles shall be 9 pcf density minimum.

F. Shields: An aluminum shield shall be fitted tightly around each piece of pipe covering where exposed to injury in mechanical rooms. On vertical pipes, shield shall extend a height of 6 feet. Longitudinal seams shall be palled 1 inch or more secured with sheet-metal screws spaced 4 inches apart, except on vapor sealed coverings, bands shall be used.

2.11 DUCTWORK AND ASSOCIATED SHEETMETAL WORK

A. All low pressure air conditioning and exhaust ducts shall be galvanized steel with gages and construction in accordance with SMACNA Standards "HVAC Duct Construction Standards".

B. Duct Wrap: 2-inches thick, 1 psf density, flame spread rating not to exceed 25 and smoke development rating not to exceed 50. Provide vapor barrier. Duct wrap shall include top of ceiling supply diffusers.

C. Flexible Duct Connections: Neoprene coated glass fabric prefabricated connections, UL approved. Flexible duct connectors shall be provided at each inlet and discharge of air handling units, fan coil units and exhaust fans.

D. Bell-Mouth Fittings: For use at all round and flexible duct take-offs. Fittings shall be complete with volume damper with locking quadrant and extension rods for wrap insulation.

E. Fire dampers shall be UL listed damper 100% out of air stream. 160 degrees F UL listed fire link. Provide ventlock insulated duct mounted access door for each damper.

F. Splitter Dampers: Provide on all taps, including low pressure branches to diffusers. Shall be adjustable with locking quadrant.

G. Deflectors: Provide fixed deflecting vanes at all branch take-offs and elbows. Shop fabricated blades: fit into side strips and screw or rivet to duct.

H. Flexible Ducts (Low Pressure): Polyester core with galvanized wire helix and 1-1/2 inch thick, 3/4 lb. density fiberglass insulation with flame resistant vapor barrier, UL approved. Flexible ducts not to exceed 6 feet in length and must be supported to maintain laminar flow.

I. Duct Access Doors: Galvanized with hinges and lever locking, catch mechanism, gasket or seals on doors.

J. Damper: Opposed blade type, all aluminum with exterior lever.

2.12 AUTOMATIC CONTROL SYSTEM

A. Electric type, Barber-Coleman, Honeywell, Johnson, or approved equivalent. Provide all necessary accessories as required for a complete operable system.

B. Provide remote "on-off" switches and thermostats as indicated on drawings 44 inches above floor. The CONTRACTOR shall provide all necessary power wiring, conduits and connections for system which is provided.

C. Control Panels:

1. All controllers, relays, switches, etc., for equipment located within equipment rooms shall be mounted in enclosed control panels with hinged locked doors. All control devices for equipment located exposed to weather shall be mounted inside NEMA 4X enclosures. Location of each panel is to be convenient for adjustment service. Nameplate shall be provided beneath each panel mounted control device describing the function of the service. All electrical devices within the panel shall be pre-wired to terminal strips with all inter-device wiring withing panel completed prior to installation of system.

2. All electrical devices within the panel shall be prewired to terminal strips with all inter-device wiring within panel completed prior to installation of system.

D. Duct Smoke Detectors: Duct smoke detectors shall be addressable, photoelectric type. Provide auxiliary contact for fire alarm panel connection.

E. Electric control wiring, wiring connections and conduit required for installation of temperature control system as herein specified, shall be provided by temperature control contractor unless specifically shown on drawings or called for in the specifications to be by the Electrical subcontractor. All wiring shall comply with requirements of local and National Electric Codes. Provide control wiring for electrical power of variable air box dampers and controls. All wiring shall be in conduit. Conduit exposed to weather shall be galvanized steel pipe conduit. No EMT is allowed outside building.

F. Provide remote manual by-pass switches and timeclock system for all new air handling units, fan coil units and interlock of exhaust fans. The CONTRACTOR shall provide all necessary power wiring, conduits and connections for system he provides.

1. Control Valve: Three-way as indicated on drawings, two position valve with valve stem packing, suitable for 100 psi and 240 degrees F service.

2. Flow Switch: UL listed, with segmented paddles, 150 psi maximum pressure rating, brass or monel body.

3. Electric Valve Operator: Two position electric motor with spring return and

sufficient capacity to operate the control device under all conditions. Provide built-in transformer as required.

4. Space Thermostat: 15-90 degrees F temperature range, approximately 3 degrees F throttling range, no thermometer, "warmer-cooler" external adjuster with clear plastic tamper-proof locking guard covers.

G. Timeclock: Electronic, 7-day time clock with multiple schedules and capacitance back-up 10 hour carry over feature for power failure.

H. By-pass Timer: 4 hour adjustable, programmable electronic over-ride switch or push button for off-hour operation.

I. Provide remote on-off switches for operation of exhaust fans. Switches to be mounted 44" above floor unless otherwise indicated. The CONTRACTOR shall provide all necessary power wiring, conduits and connections for systems he provides.

2.13 SPECIAL TOOLS

If any part of equipment furnished under these specifications requires a special tool for assembly, adjustment, setting or maintenance thereof and such tool is not readily available on commercial tool market, furnish necessary tool with equipment as standard accessory.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Space reserved for ducts, piping and necessary lighting above furred ceilings are critical. Install ducts and piping as close as possible to slab or structure above. Location of light fixtures cannot be changed. If space allocated is too small for ducts and piping, make necessary move to fit into general pattern. All duct modifications shall be accomplished using 45 degree fittings; 90 degree fittings shall not be used unless prior approval from the Engineer is obtained. All changes shall be submitted to the Engineer for approval.

B. Do not scale drawings. Check all measurements at building and adjust work to fit into space allotted. Close cooperation between trades will be required. Any work without regard for work of other trades shall be moved without extra charge, if necessary to permit proper installation of other work.

C. Investigate the Agreement Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route of each duct and pipe. Make off-sets and changes in direction required to maintain proper head room and pitch or to accommodate the structure and the work of other trades. When changing the size of ductwork, provide ducts having the same friction loss as the size of the duct shown on the Agreement Documents. Furnish other trades with information to properly locate and size openings in the structure required for the work under this section. Furnish anchor bolts, sleeves, inserts and support required for the work under this section. Provide access panels for concealed items provided under this section that require maintenance, adjustment or inspection.

3.02 INSTALLATION

A. Perform work using personnel skilled in the trade involved. Provide competent supervision. Furnish new equipment, fixtures, materials and accessories bearing the manufacturer's identification and conforming to recognized commercial standards. Provide OSHA approved guard or rails all around exposed moving machinery parts and around high-temperature equipment and materials. No piping, electrical conduit, ceiling supports or similar items shall be supported from equipment or ductwork. Provide additional materials and labor for a complete, operable (including starting, testing, balancing and adjusting), and fully accepted system at no extra cost to the STATE.

B. Equipment: Install equipment in the space allotted with sufficient clearance for proper operation and maintenance. Where equipment differs in arrangement or connections from those shown, provide all required changes in appurtenances. Provide equipment accessories necessary for proper operation and support. Concrete equipment bases and supports are under DIVISION 3 - CONCRETE. Direct trade providing concrete in the proper locations, dimensions, load carrying capacity and anchor bolt locations. Concrete pads shall be not less than four inches beyond the base of the equipment. Provide vibration isolators for all mechanical equipment as indicated hereinbefore. Secure floor mounted isolators to base and to equipment.

1. Install thermometers and gages as recommended by the chiller manufacturer and as shown on the drawings.

C. Piping: Conform to recognized commercial standards. Inspect all pipes inside and outside. Remove interior obstructions and ream out pipe ends. Cut pipe accurately so that it can be worked into place without springing or forcing. Install pipes parallel to the wall of the structure and plumb. Make changes in direction with fittings. Bushings are not permitted. Install valves with stems above horizontal. Provide proper support and adequate provisions for expansion, contraction, slope and anchoring. Provide dielectric unions between dissimilar metals. Have piping tested, inspected and approved before it is furred in, buried or otherwise hidden. Provide 24 gauge galvanized steel sleeves where pipes pass through structure, sufficiently large to provide 1/4-inch clearance around pipe. Caulk watertight around pipes passing through sleeves. Wrap pipe with polyethylene tape where it passes through sleeve and when it contacts concrete and CMU. Provide non-asbestos rope packing around all sleeves and seal with elastomeric caulk. All penetrations through the walls shall be packed with neoprene sponge, closed cell, conforming to ASTM Designation D01056 Grade SCE41. Provide chrome-plated brass escutcheons, set tight on the pipe and to the wall where pipes are exposed in finished areas. Perform all welding using qualified welders in accordance with American National Standards Institute's Code B31.1 and American Welding Society Standard B31.0.

D. Piping System: Pipe Supports - Factory-fabricated by Elcen, Fee and Mason, Grinnel or Unistrut; no chains or straps permitted. Provide concrete inserts, beam clamps, channel framing, hanger rods and accessories required for proper pipe support. Ramset or explosive type anchors are not permitted. Support vertical piping with hanger at base of riser and with pipe clamp at each floor. At each support point on insulated pipe provide Owens-Corning Kaylo pipe insulation (minimum 9 pcf density) or equal around pipe with 18-gauge sheet metal jacket, each two pipe diameters in length. Pipe Hanger

- Steel clevis hanger with adjustable hanger rod; 3/8" for pipe 2" and smaller, 1/2" for pipe 2-1/2" through 3-1/2" and 5/8" for pipe 4" and larger. Groups of lines may be supported from steel channel with pipe clamps.

1. Condensate Drain Piping System: Slope drain lines at 1/4 inch per foot unless otherwise directed. Provide a water seal (P-trap) with water column 1 inch greater than the total static pressure of the fan in inches of water. Terminate condensate drain over nearest plumbing drain when not otherwise indicated. See insulation specified hereinafter. Cleanouts at all changes in directions.

2. Water Piping System: Provide unions or flanges at all connections to equipment and accessories. At all low points in the piping system, provide drain consisting of 1/2 inch gate valve with hose adaptor. Provide air vents at all high points in the piping system; manual type unless otherwise indicated. Extend a discharge line to a drain from each vent. Provide chainwheel with guides on all valves in equipment rooms that are 8 feet or more in height. Provide chains extending to 5 feet above floor.

3.03 ELECTRICAL WORK

A. Conform to the requirements of NFPA-70, National Electrical Code, and to the requirements of DIVISION 16 ELECTRICAL of these specifications. Obtain equipment manufacturer's control wiring diagrams for the equipment furnished. Prepare a control and interlock control diagram for the complete system. Indicate terminal connection points to factory wired equipment. Submit control diagram to the STATE for review. The CONTRACTOR shall supply and mount all motors and provide all control wiring and controls for equipment furnished by him except that shown on the Electrical Drawings. All power wiring, including final connection to the mechanical equipment shall be provided by the Electrical subcontractor. Refer to DIVISION 16 - ELECTRICAL and to the electrical drawings as well as mechanical drawings for requirements and division of work for each application. Should any equipment supplied by the Mechanical subcontractor require electrical service or wiring than as shown on the Electrical Drawings, the CONTRACTOR shall advise the Electrical subcontractor of such changes and pay all costs for any additions or alterations necessary in the wiring or controls. All control devices must be installed to operate within the manufacturer's rated load and voltage. All control circuits must be through the respective equipment disconnect to insure the control circuit being off when the equipment is off. Wiring materials and methods shall conform to DIVISION 16 - ELECTRICAL, to the applicable codes and to ASA, National Electrical Code and NEMA Standards and Specifications.

B. Electric Motor Characteristics and Drive: Motor voltages shall be as indicated, and to be verified with the Electrical Contractor and his drawings. Use high efficiency type motors. Service factor of 1.15 with wick oiled sleeve type bearings or grease packed ball bearings not to exceed 1800 RPM, unless otherwise indicated. V-belt drives designed for 150 percent of motor horsepower with provisions made to adjust belt tension. Where multiple V-belts are used, match the belts. 3/4 HP and larger motors shall have a minimum of two belts. Pulley diameters not smaller than 3 inches O.D. for A-belts, 5 inches for B-belts and 8 inches for C-belts. Drive ration shall not be greater than 1 to 7. All pulley cast iron or steel and properly aligned.

C. Motor Starters and Wiring:

1. Furnish motor starters, disconnect switches, necessary relays, and other devices, including remote push-button stations; deliver to Electrician for installation and wiring.

2. Furnish, install, wire and interconnect panels, relays, timers, and other necessary control devices; integrate with motor starting equipment to produce a complete control system.

3.04 DUCTWORK

A. Duct Connections: Flexible at both discharge and inlet of air moving equipment, applied in accordance with manufacturer's instructions. Allow 2-inches of free space between collars connected. Install 2 lb. density sheet lead band completely around collar at each end of connections and fasten to collars with screws through band and glass fabric, placed no more than 3-inches on centers.

B. Keep ductwork openings closed with sheetmetal during construction to prevent injury, and take all possible precautions to keep interior of ducts, air intake chambers and fan housings free from dirt and dust.

C. Dampers and Deflectors: Provide splitter, butterfly and louver dampers, deflecting vanes for control of air volume and direction, and for balancing system where indicated, specified and directed.

1. Dampers of galvanized steel, at least one gauge heavier than that for duct size in which damper is installed, reinforced where directed; with indicating quadrant in accessible location, and locking device for adjusting locking damper in position.

2. Deflectors: Where fixed deflecting vanes are indicated, provide shop-fabricated blades; fit into side strips and screw or rivet to duct elbow in field.

3. Air Extractors: Provide operable volume extractor at each branch take-off from main duct.

D. Duct Supports: Place hangers at changes in direction. Use strap hangers for ducts up to 30 inches wide; angle hangers for ducts over 30 inches wide. Strap hanger shall be one inch wide of 16 gauge galvanized sheet steel; extend down both sides of duct and turn under bottom at least 4 inches, fasten to side and bottom with sheetmetal screws. Angle hangers may be formed by extending vertical bracing angles or by rods passing through bottom bracing angles.

E. Erect all ducts with necessary elbows, dampers, etc. and all fans, air outlets, filters, dampers, etc., furnished under other articles of this section. Cross-break ducts exposed to weather to shed water.

F. Provide sizes, runs and connections of ducts that adhere to drawings as closely as possible. Install to indicate heights as permitted by structure. Fabricate ductwork in workmanlike manner with air tight joints, presenting smooth surface on inside, neatly finished on outside; construct with curves and bends to ease flow of air.

G. Openings through construction required for ductwork will be provided by others; shop drawings shall locate such duct openings. Obtain approval in ample time to meet building construction schedule. Ductwork shall have rectangular cross section unless otherwise indicated. All exposed to weather ducts shall be cross broken to shed water and top of duct sloped 1/4" per foot.

H. Low Pressure Ductwork:

1. Details of construction and materials not specified herein shall be in accordance with ASHRAE Guide and SMACNA recommended and as approved.

2. Unless otherwise indicated, make inside radius of curves and bends not less than width of ducts. Where square elbows are used, provide fixed double radius turning vanes. Construct, brace and support ducts and air chambers so they will not sag or vibrate when fans are operating.

3. Fabricate, unless other wise indicated or specified, in accordance with SMACNA "Duct Construction Standards", latest edition, for 2-inch pressure class. Ducts 18 inches wide and larger which are not insulated shall be cross broken. Distances between joints on any size duct shall not exceed 8 feet. Seal all ductwork airtight. No leakage permitted. Test ducts to constructed pressure class.

4. Duct Insulation: Insulate all supply air ducts continuously with 2 inch thick duct wrap. Line all supply air ducts exposed to weather continuously with 1 inch thick duct liner. Exhaust ducts do not require insulation unless otherwise indicated. All return air ducts and transfer ducts shall be continuously wrapped with 2 inches thick duct wrap.

3.05 PIPE AND FITTINGS

A. Vertical lines shall be supported by a hanger in the horizontal line near the riser and riser clamp at floor. Groups of lines may be supported with approved hangers, brackets, supports constructed of angles or pipe. Saddles of not less than 13 gauge galvanized steel shall be 6 inches or two pipe diameters in length, whichever is greater.

B. Piping shall be supported to maintain proper grading or pitch, to prevent vibration and to allow for expansion and contraction. Holes where piping passes through partitions, walls, ceiling or floor shall be caulked sleeves, and in finished areas, shall be covered with escutcheons to minimize sound travel.

1. Chilled Water Piping: Piping systems shall be hydrostatically tested to 150 psi before branch lines are insulated or enclosed. All piping connected to equipment shall have a union to equivalent shut-off valve. Gage cocks and pressure gages shall be installed at the suction and discharge of pumps. Air vents shall be provided on all high points and drain valves provided on all low points of water piping system.

2. Condensate Drain Piping: Shall slope in the direction of flow at 1/4 inch per foot unless otherwise approved.

C. Spacing of hangers for steel pipe shall not exceed eight feet on pipe 1-1/2 inches or smaller and not greater than 10 feet on larger pipes.

3.06 CORROSION PROTECTION COATINGS

A. Since the coating specified herein are of a specialized nature, it is essential that only qualified and experienced applicators be acceptable for this type of work.

B. A clean area, specialized equipment, techniques, including fog spray, are required to apply the coating properly, and without defects.

C. Proper surface preparation is necessary. Surfaces shall be thoroughly cleaned and if there is evidence of rust or scaling on ferrous steel surfaces, they must be wire brushed, shot blasted or sandblasted, and primed with rust inhibitive primer. Non-ferrous surfaces shall be cleaned in preparation for the coating system.

D. The most critical area in coating this type of equipment is the non-ferrous, extended surface heat exchanger (finned coils). It is essential that the coatings be sprayed uniformly and completely over all surfaces of the fins and tubes. This will require several passes through each side of the coil in order to gain effective penetration through the inner coil rows without excessive build-up of fins edges. Care should be taken not to coat too quickly inasmuch as heat exchange will be impaired if the coating is not applied in the thicknesses specified hereafter. Material viscosity must be adjusted to compensate for temperature and humidity conditions. Coat inside and outside of unit.

E. In order to coat effectively, the entire apparatus being coated should be disassembled to the maximum degree without disturbing wiring or piping. Upon completion of the coating, the apparatus should be reassembled with care so that the coating surface is not damaged.

F. Surfaces to be coated shall receive multiple passes of Siloxane coating with a total volume solids of 21.7%. Total dry film thickness shall not exceed 6 mils. All materials shall be applied in strict accordance with manufacturer's recommendations.

G. The coating shall offer protection from all concentrations of salt solutions, fumes, splash, or spillage of dilute acids, alkalies, and other corrosive chemicals, as well as water, weathering, abrasion and radiation.

H. Finned Tube Heat Exchangers

1. Condenser finned tube coils shall be protected with Blygold Polual polyurethane aluminum pigmented coating. The coating product and process shall be performed only by a qualified applicator.

2. Prior to coating, the coil shall be rinsed using a high pressure warm water spray system and bent fins shall be adjusted using a properly spaced fin comb. The coil shall then be degreased with a pH neutral detergent to remove manufacturing oils and soiling and again rinsed using a high-pressure warm water spray system. The coil must be completely dry prior to coating.

3. A chromate-free conversion layer shall then be applied to the coil using an air assisted spray gun, achieving total coverage and penetration. The coil shall again be completely dry prior to proceeding to the next step. An aluminum-impregnated polyurethane topcoat shall be applied using air assisted spray

equipment, ensuring total penetration and coverage without bridging or significantly affecting the heat transfer ability of the coil. The total dry thickness of the topcoat shall be 20 to 25 microns (0.020 to 0.025). The coating shall provide inherent protection against ultraviolet radiation and be temperature resistant up to 365 F (180 C).

4. The coating manufacturer shall be able to document the successful completion of accelerated product testing of a minimum 3000 hours in both salt spray (ASTM B117) and acetic salt spry tests (ASTM B287) and shall be able to provide a 3 year conditional warranty for the coating within the contiguous United States and Hawaii.

I. Cabinet and Exterior Surfaces

1. Unit cabinet shall be coated with Ameron PSX 700 Engineered Siloxane. Metal preparation to provide a surface profile that shall include degreasing and etching.
2. The coating shall be applied to all exterior surfaces until a total of 6-8 mils D.F.T. is achieved. Coating shall be applied in strict accordance with coating manufacturer's recommendations.

3. After the coating has totally cured, the equipment shall be assembled using care not to damage the coating during assembly. Fasteners shall be stainless steel with bonderized rubber washer attached. Any touch up required shall be performed in accordance with the manufacturer's recommendations.

4. The coating shall be performed by a qualified and experienced applicator.

3.07 PIPE INSULATION SYSTEM

Install insulation system in accordance with manufacturer's recommendations using tradesmen skilled in this trade and approved by the insulation manufacturer. Provide insulation products with a composite (insulation, jacket and adhesive) fire and smoke hazard rating as tested under ASTM E84, NFPA 255 and UL 723, not exceeding a Flame Spread of 25 and Smoke Development of 50. Owens-Corning, Johns-Manville, Certainteed, Armstrong, Pittsburgh Corning Corp, equal.

1. Insulate chilled water piping with Pittsburgh Corning Foamglass insulation or equal. Apply vapor barrier to seal insulating ends and around valves, fittings, flanges and unions. Vapor barriers shall be provided in long runs of pipe at intervals not to exceed 15 feet. Insulation thickness: 1-1/2 inches for pipe sizes 1-1/4" and smaller; 2 inches thick for pipes sizes 1-1/2 inches to 4 inches; and 3 inches for pipes larger than 4".

2. Insulate chilled water pumps, expansion tanks, valves and fittings with cut and fitted pieces of cellular glass insulation, Pittsburgh Corning Foamglass insulation or equal. Thickness shall match pipe size insulation, minimum 1-1/2 inches thick.

3. Insulate condensate drain piping with 1" thick fiberglass with all service jacket for pipe sizes 1 inch and smaller and 1-1/2" thick for larger pipes. Seal all joints with insulation manufacturer's approved adhesive.

4. On pipe insulation exposed to weather apply 16 mil embossed aluminum jacket with 2" overlap at longitudinal and circumferential joints, secured in place with 3/4" x 0.015 aluminum bands on 18 inch centers. Apply humped aluminum ells or fabricated 16 mil aluminum to fittings and band in place.

3.08 AUTOMATIC CONTROL SYSTEM

A. Automatic control system shall be electric and shall be furnished and installed by a qualified controls contractor specifically in this field. Controls contractor shall have proven experience in design, installation, calibration and service of equipment. Provide relays, control dampers, switches, control wiring and conduit and other items necessary to perform the functions specified or required for proper sequencing and operation of system. Direct the mechanical contractor in the proper location and installation of control valves, control dampers, wells, flow switches and similar items installed by that trade. Provide identifying labels on all controls. Provide waterproof enclosure around controls installed outdoors. Mount fan "on-off" switch 44 inches above floor unless otherwise indicated in accordance with ADA requirements. Provide tamper proof clear plastic thermostat covers.

1. Provide smoke detector in air handling systems as required by NFPA Standard 90A; one located in the main supply air duct on the downstream side of the filters (for systems 2000 cfm and above). Wire devices to stop fan on actuation. Provide open contact for wiring to fire alarm system.

2. Control and Interlock Wiring: Provide all control and interlock wiring. Obtain wiring diagrams for all equipment and prepare a complete control-wiring shop drawing. Submit to Engineer for his comments. Conform to National Electrical Code requirements. All wiring shall be in pipe conduit. All exposed wiring shall be in galvanized pipe conduit, no EMT allowed for conduit exposed to weather. Provide PVC for conduit below grade.

3. Two position three way chilled water valve to shut-off chilled water when fan or air handler is "off".

4. Mount flow switches in upright position in a horizontal run of pipe; a minimum of ten pipe diameters from any fittings, valves or other obstruction. Locate switches in outlet piping of equipment.

5. Timeclock and Control Cabinet: Provide seven day timer with capacitance back-up, minimum 10 hour operation, skip-a-day feature with a separate 4-hour override programmable electronic selector switch all as indicated on drawings. Provide control cabinet for switches and timeclock.

6. Set, test, calibrate, adjust and place in operation all equipment furnished by the control contractor. Upon completion of the operational test, inform the Engineer in writing that the system is installed in accordance with the drawings and specifications and that the system has been calibrated and tested and is ready for use. Correct deficiencies observed after the facility is occupied.

B. Sequence of Operation: Air conditioning contractor shall provide all necessary controls sequence as described herein. Chilled water to air handling units and fan coil units respectively shall be controlled by three-way modulating valve, operating from a space

or supply air duct thermostat for single zone air handlers (setting at 75 degrees F). Fans shall be interlocked with smoke detectors to shut-down air handler during a fire. Interlock smoke detectors with building alarm system and annunciator panel. Coordinate interlock and connections with building alarm and annunciator. Chilled water valve shall be in full closed position with the fan "off". Air handling and fan coil unit operations shall be controlled by timeclock.

3.09 WATER TREATMENT

A. Provide water treatment for chilled water system to inhibit rust, scale, and algae. Provide an automatic chemical feed system to be located at the chiller enclosure. Provide test coupon rack and test coupons for steel and copper tests (pitting and corrosion) and six month analysis.

B. Provide a by-pass pot-feeder, having five gallon capacity, constructed from seamless steel. Provide a 30 gallon initial supply of borate-nitrate based corrosion inhibitor.

C. Before final filling of system with fresh water, thoroughly clean and flush systems using a pre-start-up cleaner to remove oil and foreign matter in the piping and equipment. Immediately after flushing, refill with fresh water.

3.10 BALANCE, ADJUST AND TESTING

A. Scope: The CONTRACTOR shall obtain the services of an independent, qualified test and balance agency (NEBB Certified) that specializes in, and whose business is the testing and balancing of air conditioning and ventilation systems, to test mechanical systems to determine quantitative performance. Compare observed quantities with design quantities. Adjust systems to produce observed quantities that will conform to design quantities within +/-10% of design quantities specified. Balance the flow to conform to design, lock and mark adjustments, and leave systems in balance. Complete preliminary balancing, adjusting and testing prior to final inspection by the Engineer and also make necessary adjustments to meet User requirements after building is occupied during the One Year Maintenance Contract period.

B. Job Conditions: Ventilation and air conditioning equipment shall have been completely installed and shall be put into continuous operation as required to accomplish the test adjustment and balance work specified. Test, adjust and balance shall be performed when outside conditions approximate design conditions indicated for cooling functions.

C. Certified Reports: Submit test reports on approved forms with certification by the testing engineer that the methods used and the results are as specified. Reports shall be on forms as approved by the Engineer.

D. Procedures: Air Systems - Test and balance systems in accordance with SMACNA manual for the Balancing and Adjustment of Air Distribution Systems.

1. Preliminary: Size, type and manufacturer of air terminals and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations unless field tests show ratings to be impractical.

2. Check each thermostat at 75 degrees F or at set temperature for proper

operation. Readings an tests shall be made and recorded on all of the fan coil units. With thermostat in full cooling position compute average air velocity out of each diffuser and check against appropriate curve to determine airflow. Adjust all air diffusers to minimize drafts in all areas.

3. Verification: Prepare summation of readings of observed CFM for each system, compare with required CFM and verify that duct, coil, and filter losses are within specified allowable range.

4. Central System: Test and adjust air handler and fan coil units fan rpm to design requirements within the limits of mechanical equipment provided. Record motor name, plate data and starter ratings. Make pilot tube traverse of main supply ducts and return ducts and obtain design cfm at fans with air conditioned space fully loaded. Test and record system static pressure, suction and discharge. Test and adjust system for design recirculated air, CFM. Test and adjust system at design outside air CFM and record entering air temperatures (DB/WB cooling). Test and record leaving air temperatures (DB/WB), from cooling coil.
5. Testing and balancing of chiller shall be performed in complete accordance with NEBB Standards.

6. Six copies of the complete test report shall be submitted to the Engineer prior to final acceptance of the project.

7. Balancing: Water piping systems shall be balanced to produce water quantities as indicated with all manual and automatic control valves open.

E. Test Data: The CONTRACTOR shall provide the Engineer with typewritten schedules of readings taken during the balancing and testing operations indicating the required or specified reading, the first reading taken, and final balanced reading for the following items:

1. Pump (for each unit):
   a. Manufacturer and Model.
   b. Size
   c. Type Drive
   d. Motor H.P., Voltage, Phase, and Full Load Amps.
   e. G.P.M.
   f. Suction and discharge pressures.
   g. R.P.M.
   h. Motor Operating Amps during test.

2. Water Chilling Unit

   a. Manufacturer and Model.
   b. Motor H.P., Voltage, Cycles, Phase and Full Load Amps
   c. Part Load Amperes (measured during tests)
   d. G.P.M. - Chilled Water.
   e. Water Pressure Drop - Chilled Water.
   f. Entering and Leaving Water Temperatures - Cooler.

F. Automatic Control System: In accordance with the control manufacturer's

representative, set and adjust automatically operated devices to achieve required sequence of operations. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer. Permanently mark set-point.

1. Submission of Reports: Fill in test results on approved report forms. Submit three certified copies of required test reports to the Engineer for review.

2. Adjust factory set pressure controller for inlet guide vanes in accordance with design conditions.

G. System Performance Report: (Provide chiller pump and air handler operational tests reports.) After conclusion of balancing operations, make temporary installation of portable recorders and simultaneously record summer temperatures and humidity at representative locations in each system and outdoors. Test location shall be as approved by the Engineer. Recordings shall be made summer for a 5-day period, continuous over a weekend, and including at least one period of operation conditions within 2 F DB of maximum summer design condition. Provide rebalancing within one year guaranteed to satisfy users requirements.

1. Submission of Reports: Fill in test results on approved report forms. Submit three certified copies of required test reports to the Engineer for review.

H. Refrigeration Capacity Test:

1. Perform refrigeration capacity test: Conduct test during a period of stable operation and record readings or refrigerant temperatures to 1F. Power input readings of volts and amperes in each phase, accurate to nearest 100 VA.

2. Performance Report: Use readings to calculate tons of refrigeration capacity along with power input required for that capacity and compare to manufacturer's ratings to determine percent effectiveness.

I. Instructing Operating Personnel: Upon completion of the work and at a time designated by the STATE, provide the services of a competent technician regularly employed by the manufacturer of the controls for the operation and maintenance of each control system. The period of instruction shall be for not less than one eight (8) hour working day.

3.11 FIELD QUALITY CONTROL

Pressure test ductwork at no less than 2 inch W.G. not sooner than 24 hours after sealer was applied to joints. Test system with high pressure blower, calibrated metering orifice and water gauge. Overall leakage shall not exceed 1 percent of total air quality.

3.13 CLEAN UP

Clean up the work provided under this section. Touch up with matching paint all damaged factory finishes. Adjust for quiet and effective operation.

3.14 PAINTING AND IDENTIFYING

The following items furnished under this section are to be painted and identified under PAINTING 09900: Painting. Do not paint over name plates or other identifying labels.

1. Painting of exposed bare metal surfaces in finished and exposed areas shall be provided herein if it is not specified under Section 09900: PAINTING. Included in this work shall be bare metal registers, louvers, access panels for mechanical equipment, control covers and thermostat covers, sheetmetal ductwork jacket, piping, hangers, etc. Prepare surface as required in paint schedule. Provide two final coats matching adjoining surface finish.

2. Provide piping identification and flow arrows.

3.15 VALVE TAG AND VALVE LOCATION LOG

Provide identification tags on all valves. The CONTRACTOR shall provide a complete log of all valves to include: valve number, valve type, valve size, valve service and location.

3.16 INSTRUCTIONS

Instruct the STATE in the proper operation and maintenance of the system. Review the maintenance manuals with the STATE's representative. Post starting and stopping instructions adjacent to the equipment, mounted in frame with glass cover plate. Submit a list of manufacturer's warranties for the equipment furnished.

3.17 ONE YEAR GUARANTEE AND MAINTENANCE SERVICE CONTRACT

A. In addition to the Guarantee on material and workmanship, the Installer shall submit four (4) copies of the Maintenance Service Contract, countersigned by the CONTRACTOR, that will validate said Guarantee.

B. The guarantee and maintenance services shall extend for a period of one (1) year commencing after 30 consecutive days of trouble free operation after the Project Acceptance Date or the air conditioning equipment acceptance date, if earlier than the Project Acceptance Date, and shall include all labor, materials, equipment and parts to necessary to service the complete system, in accordance with the attached Schedule of Maintenance Service (see ATTACHMENT NO.1), so as to secure proper operation and function of the system. All costs for the periodic maintenance, including emergency calls, shall be borne by the CONTRACTOR. This maintenance period and the guarantee period shall run concurrently (same start and end dates).

Trouble-free operation is defined as a non-disabling condition or a non-recurring failure or disruption and the following:

1. The system shall be free of all discrepancies, contamination and debris which requires correction in excess to those described for the monthly service which is included in the Schedule of Maintenance.

2. The system is maintaining operational conditions and other parameters as measured during acceptance tests.

C. The Installer shall include a listing of the following items along with the Maintenance

Service Contract:

1. Name of servicing contractor.

2. Air conditioning and ventilation system acceptance date.

3. Service contract expiration date.

4. Monthly inspection schedule for the maintenance period.

5. Itemized listing of the equipment covered under the service contract, including a description of the equipment identified, its serial number(s) and manufacturer's name(s).

D. The Maintenance Service Contract shall be submitted along with the Operations and Maintenance Manual on/or before the Project Acceptance Date.

Distribution of Submittal:

1 copy:	Contractor
1 copy:	User Files
2 copies:	User's Facility Maintenance Agency

3.18 OPERATION AND MAINTENANCE MANUAL

Refer to paragraph entitled "SUBMITTALS", subparagraph "Operations and Maintenance Manuals" in PART 1 - GENERAL.

ATTACHMENT NO.1

SCHEDULE OF MAINTENANCE SERVICE

1. All services performed by the CONTRACTOR shall include applicable items listed, but not be limited to, the following maintenance tasks:

A. Fan Coil Unit (all units including units that replaced existing units)

Monthly Service:

1. Clean and clear all drip pans and flush all related condensate drain lines with nitrogen. (Note: The CONTRACTOR may be liable for water damage due to clogged drains). Install pan tablets if necessary to control algae growth.

2. Change all disposable air filters at least once a month; use Farr 30/30 or equal.

3. Lubricate and oil all fan and motor bearings and connections of dampers and vanes.

4. Check all drives for wear; adjust belt tension. Replace belt as required.

5. Operate equipment to check for proper operation, unusual noise and vibration; adjust or repair all equipment and controls as required; clean up all equipment.

6. Check time clock for proper operation and time settings.

7. Certify performance of monthly services and that all discrepancies are reported and corrected.

Annual Service

1. Adjust alignment of bearings and sheaves; lubricate fan and motor bearings. Replace worn or noisy bearings or sheaves.

2. Clean cooling coils of dirt accumulation using nitrogen, high pressure air/water, steam, or chemical coil cleaner solution.

3. Check pressure and temperature differential across cooling coils and log readings. Clean strainers, check vents and drains on all chilled water coils.

4. Clean supply and return air grilles, registers and diffusers and fresh air intake grilles and dampers and repair or replace deteriorated bird screens.

5. Secure all loose housing, seal leaks and touch-up paint after cleaning all rust.

6. Check and calibrate all electric temperature controls.

7. Certify performance of annual service and correct and report all discrepancies.

B. Air Cooled Chillers

Monthly Service

1. Check and record entering and leaving water temperatures and pressures of chiller in "maintenance log book".

2. Check and record refrigerant compressor suction and discharge and oil pressures.

3. Visual check for water, refrigerant and oil leakage; correct or repair as required. Check vibration isolator mounts.

4. Check compressor, fan and motor bearings for abnormal temperature and unusual noise; lubricate and/or replace as required.

5. Adjust chilled water temperature setting for seasonal change.

F. Check air cooled condenser belt and tension, adjust or replace as required.

G. Adjust alignment of bearings and sheaves for fans, motors, and compressors, and replace worn or noisy bearings and sheaves.

H. Note and run system operation through complete cycle and adjust for proper operation. Certify performance of monthly maintenance service and correct and report all discrepancies.

Quarterly Service

1. Check chiller response at various cooling load conditions for proper operation and calibration of capacity control system.

2. Check operation of freezestat and oil failure switch; record settings.

3. Test adjust “make-up” water and expansion tank.

4. Certify performance of quarterly maintenance service and correct and report all discrepancies.

Annual Service

1. Test compressor crankcase oil and replace if contaminated or submit oil test results; clean or replace strainer and oil filter.

2. Clean condenser coils with compressed air, nitrogen, water, steam or chemical coil cleaning solution (air cooled).

3. Megger (electrical test to measure wire insulation resistance, i.e. condition) chiller/compressor motor; check starter relay and control contacts and electrical connections for tightness and clean as required.

4. Test operate control switches, compressor unloading and safeties; calibrate and record settings. Adjust as required.

5. Submit and certify performance of annual maintenance service and correct and report in writing to Manager-in Charge all discrepancies.

C. Ventilating Fans (Exhaust)

Quarterly Service

1. Check motor controlled and backdraft dampers for proper operation; lubricate linkage for free movement.

2. Lubricate fan motors and bearings.

3. Check belt wear and tension; adjust or replace as needed.

4. Check sheaves for wear, replace as needed.

5. Check fan collar, bearings and shaft for wear, repair or replace as needed.

6. Replace air filters where installed; remove and wash intake grilles.

7. Certify performance of quarterly fan maintenance service and correct and report all discrepancies.

Semi-Annual Service

1. Check and clean all fan wheels and housings of dust, dirt, and grease.

2. Remove and wash all intake grilles and dampers and repair or replace deteriorated bird screens.

3. Certify performance of semi-annual fan maintenance service and correct and report all discrepancies.

D. Temperature Controls

Quarterly Service

1. Check control devices for proper operation, sticking stems and calibrations; repair/replace weak or broken springs and all other parts.

2. Check automatic dampers for tightness in closing, bent blades and defective linkage; lubricate connections for free movement and repair as required.

3. Adjust thermostat to maintain 75 degrees F room temperature.

4. Certify performance of quarterly maintenance service and that all discrepancies are reported and corrected.

E. Timeclocks

1. Monthly - clean contacts, replace if necessary; check and adjust time settings as directed or required.

2. Certify that all discrepancies are reported and corrected.

G. Chemical Feed System

1. Check adequate chemical supply available for upcoming month. Report work and findings.

2. Check for leaks. Repair as required to stop leaks. Report findings.

3. Test and analyze sample of chilled water. Report findings in written report. The report shall include the present concentrations, biological growth, total dissolved solids and conductivity readings, and recommendations or adjustments to setpoints.

4. Add chemicals to increase concentration as required.

H. Pumps

Quarterly Service

A. Lubricate and check pump and motor bearings for abnormal temperature and unusual noise or vibration and repair as needed.

B. Check packing glands and seals for excessive leakage. Adjust, tighten or replace as required.

C. Certify performance of quarterly service and correct and report all discrepancies.

Semi-Annual Service

1. Check and blow down strainer to chilled water pumps. Remove and clean strainer if excessive debris is noted.

2. Check condition of insulation, reinsulate as necessary.

3. Log suction and discharge pressures.

4. Clean and remove all dust and foreign matter. Clean all rust spots and scratches and touch up paint with matching color.

5. Check motor coupling for alignment; mounting bolts are secure.

6. Certify performance of semi-annual service and correct and report all discrepancies.

I. Valves, Equipment and Supports

1. The CONTRACTOR shall exercise all equipment shut off valves annually for proper operation and tightness.

2. Wirebrush, prime and paint rust from equipment and support surface to prevent further rusting.

3. Certify that all discrepancies are reported and corrected.

2. WORK SCHEDULE

All maintenance work shall be performed between the hours of 7:30 a.m. and 4:00 p.m., on normal working days, Monday through Friday, excluding State holidays.

A. TROUBLE CALLS

Emergency service and repairs required between regular service calls shall be rendered within 24 hours after the CONTRACTOR is notified, non-work days excluded.

The CONTRACTOR shall call the user's facility maintenance agency the next working day after being notified of the problem and report the status of repairs.

B. MAINTENANCE REPORT/CHECKLIST

The CONTRACTOR shall prepare and maintain a maintenance service report/checklist which shall include the following:

1. Date maintenance service was performed.

2. The name of the mechanic who performed said maintenance.

3. The type and cost (labor, materials, parts, and equipment) of repair work performed on the unit, if any.

4. Documents and other data pertaining to the maintenance performed.

It will be the responsibility of the CONTRACTOR to maintain the report/checklist by recording the above noted data after each scheduled maintenance and emergency repair, and have the checklist available for inspection at the building site. The report shall be sufficiently detailed to properly reflect the past maintenance history of the equipment.

Reports/Checklists shall be prepared on CONTRACTOR furnished standardized forms and certified by a representative of the facility being served. A copy of the report/checklist shall be submitted after each visit to the user's representative at the facility being served and the user's facility maintenance agency.

C. CLEANUP AND WORK PRACTICES

The CONTRACTOR shall keep the job site free of debris, litter, discarded parts, etc. and shall clean all oil drippings during the daily progress of work. The CONTRACTOR shall remove all tools, parts, and equipment from the service areas upon completion of the work.

The CONTRACTOR shall exercise caution during the progress of his maintenance and repair work to prevent damage to the ceilings, roofing, and other building structure. The CONTRACTOR shall restore all damages caused by his negligence to its original condition at his own expense.

END OF SECTION

SECTION 16010 - ELECTRICAL WORK

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: As specified in Section 00700.

1.02 GENERAL: Furnish all labor and materials required to complete all electrical work as indicated on the drawings and/or specified herein.

A. In general, the following work is included:

1. Power and lighting systems; including branch circuits, outlets, wiring devices, panels and wiring.

2. Empty raceways for telephone and data.

3. Equipment and wiring for a complete, operable fire alarm system.

4. Installation of equipment furnished by the STATE or by others, including the furnishing of disconnects.

5. Include work for coordinating and scheduling for electric service charges as specified herein.

6. Power wiring for air conditioning system including furnishing of disconnects and mounting of motor starters furnished by air conditioning subcontractor.

7. Include allowance for electric service charges as specified in the GENERAL SPECIFICATIONS.

8. Demolition work as required.

9. Relocation work as required.

10. Submittal of shop drawings.

11. Preparation of "as-built" drawings.

B. The term "wiring" shall include raceways, outlets, conductors, fixtures, devices, and panelboards.

C. Wiring and connecting all electrical equipment supplied for installation and use in this Agreement and not specifically listed as work by others.

1.03 RULES, STANDARDS AND PERMITS

A. The entire work shall comply with applicable laws of the local electric bureau, the Standards of NEMA and ANSI and National Electrical Safety Code, and the regulations of the local utility companies.

B. The CONTRACTOR shall obtain and pay for the electrical permits required, and shall give notice for inspections as the work progresses. Upon completion, he shall deliver certificates of completion and inspection to the Engineer.

1.04 DRAWINGS

A. These specifications are accompanied by floor plans of the building, and diagrammatic electrical layouts showing the approximate location of the outlets, switches, devices and other equipment.

B. The wiring layouts and schedules show the approximate locations of all outlets, switch control, service runs and other electrical apparatus. These locations are approximate and before installing the CONTRACTOR shall study adjacent architectural details and make installation in most logical manner. Any device may be relocated within 10'-0" before installation at the direction of the Engineer, whose decision shall be final.

C. The CONTRACTOR shall maintain in his field office one set of electrical drawings for the sole purpose of recording changes and field deviations as they occur. Each change with explanatory notes shall be entered before the close of the work day, and shall be initialed by the representative of the Engineer.

Above reference to deviations shall not be construed to allow deviations without prior approval. Upon completion of the electrical work, the CONTRACTOR shall transfer all changes posted on the field set to a set of transparencies to be furnished by the Engineer. The final set shall be certified to show "as-built" conditions and both sets delivered to the Engineer. This is mandatory.

1.05 SUBMITTALS

A. Submit for approval six (6) copies of shop drawings or catalog cuts of following equipment and resubmit until approval is received before placing order:

1. Panelboards, transformers, circuit breakers, starters, and safety switches.

2. Lighting fixtures and lamp schedule.

3. Wiring devices.

4. Wathom Meters.

5. Any other special or built-to-order equipment.

PART 2 - PRODUCTS

2.01 ASBESTOS PROHIBITION: No asbestos containing materials or equipment shall be used under this section. The CONTRACTOR shall ensure that all materials and equipment incorporated in the project are asbestos-free.

2.02 MATERIALS: Materials and equipment shall be new and those 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 may be used if qualified by written permission from Engineer. List of substitute materials together with qualifying data shall be submitted for approval as provided in the GENERAL SPECIFICATIONS. Failure to obtain approval of substitute materials prior to bidding shall mean that materials as specified shall be provided.

Example

Item	Manufacturer and Catalog No. Specified	Substitute Manufacturer and Catalog Number
Cable	Joe Doe - No. 3020	King - No. 2200

Qualifying data shall include cuts, shop drawings, and specifications to show equality with material specified herein and in drawings.

A. Ground rods shall be copperclad 5/8" x 8' long minimum.

B. Panelboards shall be 3-phase, 4WSN application, voltage and mounting as indicated, with doors and trims, copper bussed with bolted molded case thermal magnetic breakers, complement as shown on the drawings, circuit directory, lock and 2 keys. Breakers shall be interchangeable trip type when such is available. All panels shall be keyed alike.

C. Raceways:

1. Rigid Steel, zinc-coated, 3/4 inch minimum diameter, except as noted. Other sizes to conform to NEC Chapter 9, Table 3A, based on RHW wires.

2. Electric metallic tubing (EMT) galvanized round bore with compression connectors, 3/4" minimum diameter, other sizes to conform to NEC Chapter 9, Table 3A, based on RHW wires.

3. Flexible conduit - galvanized steel, neoprene jacketed for wet locations.

D. Conductors shall be delivered to site in original factory packages or reels. Conductors shall be copper, #12 AWG minimum.

1. Interior locations - Branch circuits, Type RHW, TW, THW or THWN.

2. Fluorescent fixture channels - Type THHN or RHH.

3. In gutters and feeders - #6 AWG and larger. Type THW or XHHW.

E. Boxes:

1. Outlet and small junction boxes shall be zinc-coated pressed steel of ample size. Light outlets shall be fitted with no-bolt type fixture studs as necessary for fixture support. Utility boxes ("Handy", Type OA, etc.) shall not be used. Minimum size of outlet boxes, 4" square of octagon.

2. Large junction boxes and covers shall be zinc-coated. Screws for cover shall be brass.

3. Telephone and data outlets, to be 4-11/16" square boxes minimum.

4. Exposed boxes and weather exposed boxes - galvanized cast steel or alloyed aluminum prime painted, enamel finished, all with threaded hubs for conduits.

F. Terminal Cabinets: Terminal cabinet construction, lock and finish shall match panelboard cabinets. Provide 3/4" wolmanized plywood backboard. Locks shall match panelboard cabinet.

G. Wiring Devices: Specification grade unless otherwise noted.

1. Receptacles, bakelite body, flush, nylon face, ivory: Duplex, grounding type, 20A, 125V., 3-wire, specification grade, spring bronze contacts, bronze mounting strap and ground contacts, Hubbell, Bryant, Leviton or equal.

2. Switches, tumbler, bakelite body, flush, ivory, 20-ampere, 277-volts, quiet operating, poles as indicated, Bryant #490X Series, Hubbell 122X Series, Arrow #1991X-SL Series or equal.

3. Special receptacles shall be of the type and size indicated on the drawings. Provide matching cap for each special receptacle. Arrow, Hubbell, Bryant or equal. Provide one matching plug for each receptacle.

4. Equivalent grade and type of wiring devices manufactured by General Electric Company, Sierra or Leviton are approved.

5. Plates shall be 0.040-inch thick, 18-8 stainless steel, except where other metals are noted or specified. Telephone and data outlets shall have plates with 3/8" diameter, grommetted hole.

H. Lighting Fixtures:

1. Provide all lighting fixtures and lamps as indicated including lamps, ballasts, stems and accessories.

2. Fluorescent ballast shall be high power-factor electronic type, and ETL/CBM certified Class P, A sound rated, UL listed.

3. Fixtures shall be manufactured from sheet metal protected by "Bonderite" or "Cryscoat" process and baked white finished, 80% minimum reflectance, to resist 300 hours salt spray test. Anodize all aluminum, galvanize or chrome all steel. All ferrous metal surfaces, including edges shall be plated or primed and painted.

4. Provide swivel ball aligners for stem mounted fixtures.

I. Circuit breakers and safety switches shall be of the rating and type indicated. Circuit breakers shall be of the interchangeable trip type when available. Safety switches shall be heavy duty for indoor locations, enclosures shall be NEMA 1 enclosure and for exterior locations enclosures shall be NEMA 3R.

J. Motor Starters shall be across the line, manual or magnetic type as required with overload protection in each phase in NEMA enclosure. Motor starters installed in exterior locations

shall have NEMA 3R enclosures.

K. Dry Transformers shall be general-purpose dry-type transformers, UL listed, size as indicated. Audible-sound-levels tests shall be made in accordance with NEMA standard ST 1. All transformers shall have standard NEMA taps except when taps are not required by NEMA, four 2-1/2 per cent taps (two above and two below rated voltage) shall be provided. All transformers shall be furnished with sound isolation mountings. Transformers shall be General Electric, Westinghouse, Hevi-Duty or Cutler Hammer.

L. Hardware, Supports, Backing, Etc.: Provide all hardware, supports, backing and other accessories necessary to install electrical equipment. Wood materials to be termite resistant. Ferrous material shall be galvanized for corrosion protection. Non-ferrous materials shall be brass or bronze.

M. Kilowatt Hour Meters: Meters shall be fully electronic with digital LCD display for Kilowatt hour readings. Meters shall provide rate of consumption indication and segment test button Meter shall provide load indicator to indicate real time power consumption levels. Meter shall be U.L. listed CSA Approved and Certified by an independent test facility to ANSI C12.1 and C12.16. Meter shall have self contained back-up. Provide all meters in a stand alone multiple meter unit. EMON D-MON 208100KIT.

PART 3 - EXECUTION

3.01 CONSTRUCTION METHODS

A. Workmanship shall be subject to the approval of the Engineer, who shall be afforded every facility to determine the skill and competency of labor.

B. Outlet locations are shown approximately only. The CONTRACTOR shall check architectural drawings and details and center or space the outlets to obtain neat symmetrical appearance. Provided change is ordered before outlets are installed, there shall be no additional cost to the STATE for reasonable change of outlet locations.

C. Building wiring shall be in concealed raceways, except as shown. Interior conduit for future extension shall be terminated in couplings set flush with finish surface and closed by means of recessed pipe plugs. Provide expansion fittings in conduit runs at all building expansion joints. Electrical metallic tubing may be used only in dry ceilings and walls. Electrical metallic tubing may not be used in exposed locations or embedded in concrete slabs.

D. Provide all necessary foundations, supports and backing for enclosures, conduit, and equipment. Fixture support shall be capable of 300-pound loading, and shall be made to building structure.

E. Perform all cutting, drilling and patching necessary for installation of conduit and equipment. Repair any surface damaged or marred during the installation. Cutting, repairs and finish shall be subject to the approval of the Engineer.

F. Minimum wire size for branch circuit shall be #12 AWG. Larger sizes may be used as necessary.

G. Homeruns shall mean that portion of a branch circuit from outlet nearest panel, to the panel.

H. Crimp or pressure-connect all splices #10 AWG or smaller. Leave no sharp points that can pierce taping. Use no-solder pressure connectors for #8 AWG and larger. Use highest grade insulating and friction tape, applied in accordance with best practice of trade. Connections of light fixture wires to building wires may be made with approved wire-nuts.

I. Form wires neatly in all enclosures. Cable together and lace with waxed strings branch circuit conductors at panelboards.

J. Lubricants used for wire-pulling in all areas except as noted, shall be such that lubricant will not damage conductor insulation or sheathing. For neoprene jacketed and plastic-sheathed conductors, use powdered soapstone.

K. Where ducts pass through structural wall, provide openings with minimum of 1" mastic fill between duct envelope and structure to eliminate transfer of stresses from one to another. Through each duct, pull a test mandrel 10" long and 1/4" less than nominal size of duct. Clean duct with compressed air on "mouse". Provide duct "combs", or supports for all multiple duct runs.

L. All exposed riser shall be rigid steel conduit. Plug risers during construction with approved wood plugs or sealing bushings. Swab all conduits dry before pulling wires.

M. Conduit runs under floor slab to be heavily coated with 2 coats of asphaltum paint and shall be encased in 3 inches of concrete.

N. Attach conduit to concrete and masonry with expansion anchors. Attach to wood by means of wood or lag screws.

O. Set all enclosures plumb and exactly flush with finish surface.

P. All cable splices shall be made in accordance with manufacturer's instructions. In underground locations, all splices shall be cast type using thermo-setting epoxy resin insulation.

Q. Install all lamps. Provide lamp extensions where necessary to position filament.

R. Balance feeder loading on all three phases as closely as practicable. Furnish necessary test equipment and make all tests necessary to check for unspecified grounding, shorts and wrong connections. Correct faulty conditions, if any. Attach to the inside surface of panel door a card indicating recorded load of each phase.

S. Except as indicated in this section, the subcontractor shall be responsible for the proper wiring of the electrical equipment pertaining to this project whether furnished by him or by others and shall install and connect whatever control equipment which may be furnished to him by the equipment subcontractor or the STATE. He shall also furnish whatever raceways, disconnect switches, motor starters, boxes, fittings, wires and devices that he may need for proper and adequate installation of such electrical equipment.

T. Label all panels and service equipment. Signs by competent craftsmen. Letters to be 1" high minimum, black paint. Panels: Label designation, as directed. Tag all empty conduits in terminal cabinets and boxes giving destination. Use fiber disc tags in bushing.

U. Provide typewritten circuit directory for each panel.

V. Fixtures to be safely, positively and securely supported to structure by means of fixture studs in outlet boxes or other approved methods. Fixtures shall not be hung from outlet box "ears" or ceilings. Plumb and align fixtures shall be provided with swivel ball aligners. All suspended fixtures shall be positively supported from structural frame of building and shall not be supported from ceiling system. Provide independent suspensions wires and channels to support fixtures mounted on suspended ceilings.

W. Grounding:

1. Provide grounding for entire electric installation as indicated and specified herein. Following are included as requiring grounding:

   Electric service, its equipment and enclosures.

Conduits, other conductor enclosures and panelboards.

Neutral or identified conductor of interior wiring system.

Non-current carrying metal parts of fixed equipment, such as, motors, starter and controller cabinets, lighting fixtures, etc.

2. Grounding Electrodes:

Where underground water piping is available, and ground connection can be made to it at a point which will be accessible for future inspection, it shall serve as grounding electrode. Make connection to such water piping inside buildings, on street side of main shut-off valve.

Where such water piping is not available, use copper clad ground rods. Resistance to ground shall be 10 ohms maximum. Ground rods shall be 5/8" x 8' minimum. Bond ground rods with #1/0 bare copper wires.

3. Manner of Grounding:

Sizes and types of ground conductors, ground clamps, bonding jumpers, conduit, fittings, also methods of securing same to obtain electric continuity and effective grounding, when not indicated: as per NEC Article 250.

4. Install ground wire in all non-metallic conduits. Size in accordance with NEC.

X. 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 Engineer.

2. Attach electrical equipment to wood by wood screws, and attach to concrete by embedded or expansion inserts and bolts. Use powdered-driven charge with approval only. Close unused knock-outs on boxes or enclosures with metal cap. Powder actuated fasteners shall not be used on precast concrete. Do not use powder activated fasteners to attach enclosures and boxes to the building.

3. Wipe clean all exposed raceways and enclosures with rag and solvent. Prime painting and finishing of unfinished raceways and enclosures shall conform to PAINTING Section. Factory finished enclosures shall not be painted.

Y. Dry Transformer: Mount on vibration isolation mounting. Install 18" minimum length of flexible conduits at connections to transformer to isolate transformer noise from structure.

Z. Ductlines: Ductlines shall be polyvinyl cloride (PVC) ducts in concrete jackets and and shall be installed by qualified electrician.

1. Exterior Trenching and Backfilling for Ductlines shall be according to SITEWORK Section. Depths of trenches on slope shall be measured from fnished grade of lower edge.

2. Lay ducts and/or conduits in trenches on plastic saddles treated against termite or on concrete spacers. Spacing between ducts shall be as indicated. After laying, bind cuts with #12 steel tie wire and anchor to prevent movement during concrete pouring. Coat tapered ends of ducts or conduits with sealing compound before coupling is applied to insure weather-tight joint. Reinforcing steel, shoring and forming where required, shall be installed according to CONCRETE WORK Section. Concrete shall be poured without use of mechanical vibrators. Tamp concrete manually with wooden rods.

   Thickness of concrete encasement is minimum and may be increased to fit actual shape of trench. Changes in direction of runs exceeding 5 degrees shall be accomplished by using special couplings or bends manufactured for this purpose. When it is necessary to cut tapered end on piece of conduit at site, cut shall be made with saw and tapered with lathe designed to match original taper. After ductline is installed pull a mandrel not less than 12" long having diameter 1/4" less than inside diameter of conduit through each conduit. Afte this, pull brush with stiff bristles through to make certain that no particles of earth, sand or gravel have been left in line.

3. After cables have been installed, seal all ducts with mastic compound to prevent entry of water from ductline to termination of ducts in areas below grade.

4. Plug all spare ducts.

3.02 TESTING AND COMPLETION:

A. Final inspection of electrical work will be made by the Engineer.

B. Test all wiring and systems for proper operation. Measure insulation resistance of all wires

#4 and larger, using Biddle Co. 500 volt megger. Record readings and submit four (4) copies to Engineer. Measure ground resistance at service and furnish four (4) copies of readings to Engineer. All test shall be made in the presence of the Engineer.

3.03 OUTAGES: Outages will not be permitted unless absolutely necessary. Outages will be scheduled to suit the schedule of the STATE. The CONTRACTOR shall request for outages in writing at least three weeks prior to desired outages and shall state desired length of outage. Request for outage shall be submitted to the Engineer, who shall not conduct an outage until written approval is obtained from the State's Designated Representative. All desired outages shall be kept to a minimum and the outage time shall be kept as short in duration as possible. At the beginning of the project, the CONTRACTOR shall submit a tentative schedule of outages to the Engineer. Tentative schedule shall indicate approximate date of outage, duration of outage and purpose of the outage. The CONTRACTOR shall provide temporary power and connections if necessary at no additional expense to the STATE.

3.04 GUARANTEE: Installation shall be complete in every detail and ready for use. Any item supplied by the CONTRACTOR developing defects within one (1) year of final acceptance by Engineer, except lamps which shall be guaranteed for fifty percent (50% of rated life as published by manufacturer, shall be replaced by such materials, `apparatus or parts including installation labor to make such defective portion of complete system conform to true intent and meaning of Drawings and Specifications, at no additional charge to the STATE.

END OF SECTION

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
FOREIGN TRADE ZONE NO. 9

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB-04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

SPECIAL PROVISIONS

SPECIAL PROVISIONS

A. SPECIFICATIONS, PLANS/DRAWINGS, SPECIAL PROVISIONS, "GENERAL CONDITIONS"

The CONTRACTOR shall not make alterations in the drawings and specifications. In the event the CONTRACTOR discovers any errors or discrepancies, the CONTRACTOR shall immediately notify the Project Contact Person. In case of a conflict between the project specifications and the DBEDT's Interim General Conditions for Construction Projects "General Conditions" dated April 1, 1996, the project specifications shall govern. In case of a conflict between the project specifications and the project drawings the project drawings shall govern.

B. OFFICIAL CONTACT PERSON

For the purpose of this solicitation, the official contact person for this solicitation is Eileen Harada, Departmental Contracts Specialist, 586-9312.

C. SCOPE

The CONTRACTOR shall provide services related to but not limited to the construction of a mezzanine space addition for offices, utility room and toilet rooms, a warehouse space at ground level for work shops and wine storage, and a stairway; construction of new chiller units, equipment pad and chain link fence; installation of an air conditioning system; modification of existing air duct and water piping system; replacement of existing fan coil units; addition of new fan coil units and fire sprinkling system and related incidental works. Said services shall be in accordance with this Invitation for Bids, these Special Provisions, any attached Specifications and the "General Conditions," incorporated herein.

D. PRE-BID CONFERENCE

<u>A non-mandatory</u> pre-bid conference shall be held at the Foreign Trade Zone No. 9 administrative office conference room at 9:30 A.M., HST, January 9, 2004. Drawings and Plans shall be available at the conference.

Costs relating to attending this meeting shall be the responsibility of the bidder and shall not be reimbursed by the STATE.

E. TERM OF CONTRACT

The CONTRACTOR shall enter into an Agreement with the STATE on or about March 1, 2004 for work related to, but not limited to the construction and installation of a mezzanine space addition for offices, utility room and toilet rooms, a warehouse space at ground level for work shop and wine storage, and a stairway; construction of new chiller units, equipment pad and chain link fence; installation of an air conditioning system; modification of existing air duct and water piping system; replacement of existing fan coil units; addition of new fan coil units and fire sprinkling system. All work must be completed within four hundred thirty (430) calendar days from the Notice to Proceed.

F. PREFERENCES

The following preferences shall apply to this solicitation. The bid price shall be adjusted for evaluation purposes only based on application of these preferences in the order specified below:

1. In-State CONTRACTOR. Preference shall be given to bidders within the State of Hawaii. Whenever a bidder selects and qualifies for an in-state CONTRACTOR preference, all prices from bidders who do not select or qualify under the in-state CONTRACTOR preference shall be increased by 5% for evaluation purposes. Bidders claiming this preference shall submit a tax clearance certified from the State of Hawaii, Department of Taxation with their proposal and must indicate a State of Hawaii business address.

2. Tax adjustment for out-of-state and tax exempt bidders. Where the bidder is an out-of-state Contractor not doing business in the State or is a person exempted from paying the applicable general excise tax, the bid price, for the purpose of determining the lowest price bid, shall be increased by the applicable retail rate of general excise tax and the applicable use tax.

3. Hawaii Products. In accordance with Subchapter 1, Chapter 3-124, Hawaii Administrative Rules (HAR), the purpose of the Hawaii Products List is to promote the use of products mined, excavated, produced, manufactured, raised or grown in Hawaii. This subchapter provides the procedures for qualifying and registering products on the Hawaii Products list. The Hawaii products preference shall apply to solicitations issued pursuant to sections 103D-302 (IFB) and 103D-303 (RFP), HRS.

The manufacturing cost of a Hawaii Product shall constitute no less than twenty-five percent of Hawaii input. Depending on the amount of Hawaii input, the product shall be classified as Class I, Class II, or Class III. For evaluation purposes, the price of the Hawaii product shall be decreased by its applicable 3% (Class I), 5% (Class II), or 10% (Class III) percentage of preference.

Products/Description	**Manufacturer**	**Island**	**Class**
Portland Cement – Bagged, Type I/II, Masonry Cement (Super Mortar)	Bonded Materials Company	Oahu	II
Quikrete	Hawaiian Cement	Oahu	I
Signs – Traffic, regulatory and construction	Safety Systems Hawaii, Inc.	O/M/H.K	II
	Sun Industries, Inc.	O/M/.H/K	II

G. STATE DESIGNATED REPRESENTATIVE OR OFFICER-IN-CHARGE

For the purposes of this contract, the Foreign Trade Zone No. 9 Business Manager or his/her authorized representative is the STATE designated representative or Officer-In-Charge (OIC).

H. BIDDER QUALIFICATION

In addition to meeting the legal and other requirements of this IFB, bidder must meet these bidder qualification requirements to be considered for award.

References. Bidder shall provide three references for similar work performed on the bid form. The State reserves the right to use all available resources to seek additional references in addition to those submitted in this bid. Unfavorable references may be justification for rejection of a bid.

I. CERTIFICATION OF INDEPENDENT COST DETERMINATION

By submission of a bid in response to this IFB, bidder certifies as follows:

1. The costs in this IFB have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such costs with any other bidder.

2. Unless otherwise required by law, the costs which have been quoted in this IFB have not been knowingly disclosed by the bidder prior to award, directly or indirectly, to any other bidder or competitor prior to the award of the contract.

3. No other attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

J. BID PREPARATION

1. Bidder's Legal Name. Bidder is requested to submit its bid under its exact legal name as registered with the Department of Commerce and Consumer Affairs and as licensed by the Board of Private Detectives and Guards. Bidder shall indicate the exact legal name in the appropriate space(s) on the Bid Form page B-3.

2. Tax Liability. Work to be performed under this bid solicitation is a business activity taxable under chapter 237, Hawaii Revised Statutes (HRS), and Chapter 238, HRS, where applicable. Contractors are advised that the gross receipts derived from this bid solicitation are subject to the general excise tax imposed by Chapter 237 HRS, at the current rate of 4 percent, and where applicable to tangible property imported into the State of Hawaii for resale, subject to the ½ percent use tax imposed by Chapter 28, HRS.

3. Hawaii General Excise Tax License. Bidder shall submit his/her current Hawaii General Excise Tax I.D. number in the space provided on Bid Form page B-4.

4. References. Bidder shall list on Bid Form page B-8, at least three references for whom Bidder has performed similar construction services and who can, if necessary, attest to the Bidder's performance. It is expressly understood that the State reserves the right to seek additional references and that unfavorable references may be grounds for the rejection of any bid.

5. Offer Guaranty. A bid security deposit is required for this bid.

6. Submission of Bids. Bidders shall complete all pages of Bid Form pages B-2 – B-10 and submit in a sealed envelope to:

   Department of Business, Economic Development, and Tourism
   Administrative Services Office/Contracts
   No. 1 Capitol District
   250 South Hotel Street, 5th Floor, Room 510D
   Honolulu, HI 96813

"Solicitation No. IFB-04-04-FTZ" shall be referenced on the outside of the sealed bid. Facsimiles shall not be accepted.

Sealed bids must be received in the Administrative Services Office/Contracts, no later than 12:00 p.m., (noon) HST, Friday, February 6, 2004. Bids shall be time-stamped with the Administrative Services Office/Contracts time clock upon receipt. Late bids shall not be accepted. The Administrative Services Office/Contracts' time clock shall serve as the official time.

Bidders are cautioned that Fed Ex and UPS deliveries are guaranteed up to 5:00 p.m. of the designated delivery date. Bidders are cautioned to make prior arrangements to ensure delivery by 12:00 P.M. (noon) of the bid due date.

K. STATUTORY REQUIREMENTS OF SECTION 104-2, HRS

Bidders are advised that the requirements of Section 104-2, HRS, which apply, to various classes of laborers and mechanics, apply to this solicitation.

The CONTRACTOR shall list all wage classes (i.e., laborer, equipment operator, etc.) required for the completion of services on the required Bid Form.

L. PAYMENTS DURING PERFORMANCE OF WORK.

The CONTRACTOR shall immediately after the commencement of its work under the Agreement submit to the Engineer a schedule of values of the various parts of the work, including quantities, aggregating the total sum of the Agreement, made out in such form as the Engineer and the CONTRACTOR may agree upon, and if required, supported by such evidence as to its correctness as the Engineer may direct. The schedule, when approved by the Engineer in consultation with the STATE's representative, shall be used a s a basis for payment under the Agreement.

The Engineer shall, not later than the fifteenth (15th) day of each month during the performance of the Agreement, make an estimate of the amount of work done in accordance with the Agreement during the immediately preceding month, deducting sufficient allowance for incomplete or unprotected work or to provide for any contingency for defects or damage to said work or for the necessity of performing any part of the work over again to cure defects or damage.

Progress payments to the CONTRACTOR shall be for a sum equal to ninety-five percent

(95%) of the above estimate, less previous payments and sums withheld by the STATE pursuant to the Agreement. After fifty percent (50%) of the work to be performed under the Agreement has been completed and progress is satisfactory, progress payments shall be for one hundred per cent (100%) of the above estimate less: (1) Five percent (5%) withheld from the previous payments to the CONTRACTOR during the performance of the first fifty percent (50%) of the work required under the Agreement: (2) other sums withheld by the STATE pursuant to the Agreement; and (3) previous payments; provided further, that if progress is not satisfactory, the STATE's designated representative may continue to make progress payments to the CONTRACTOR for a sum equal to ninety-five percent (95%) of the above estimates, less previous payments and the sums withheld by the STATE pursuant to the Agreement.

In consideration of progress payments made, or to be made, for the amount of work performed up to and including the time period covered by said estimate, the CONTRACTOR shall unconditionally and without reservation release and indemnify the State of Hawaii and the STATE and its employees, authorized representatives and agents from any and all liens, claims, demands, penalties, losses, costs, damages, and liability in any matter whatsoever. This provision shall not, however, be construed as an acceptance of the work nor shall it be construed as relieving the CONTRACTOR from the sole responsibility for all materials and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the STATE to require the fulfillment of all the items of the Agreement.

If the completion of the work under the Agreement if being delayed through no fault of the CONTRACTOR, STATE's designated representative, upon recommendation from the Engineer, may make additional payments from the amount withheld to the extent that such amount withheld is not required for the protection of the STATE.

M. METHOD OF AWARD

Prior to awarding the Agreement, the STATE may require certification of the following insurance coverages: (1) Worker's Compensation, (2) Temporary Disability, (3) Unemployment Insurance and (4) Prepaid Health Care.

Award, if made, shall be to the responsive and responsible bidder submitting the lowest <u>Total Bid Price</u>.

In the event the bid price or any future supplemental Agreement amount exceeds the available funds for the Agreement period, the STATE reserves the right to reduce the scope of work (required hours).

N. EXECUTION OF AGREEMENT

For an Agreement award totaling $25,000 or more, the STATE shall forward a formal Agreement to the successful bidder for execution. The Agreement shall be signed by the successful CONTRACTOR and returned within ten (10) calendar days after receipt by the CONTRACTOR as specified in Section 3.7 of the "General Conditions". **Performance and payment bonds are required.**

O. LIABILITY INSURANCE

The CONTRACTOR shall provide the following minimum insurance limits and coverages, in accordance with the terms of the LIABILITY INSURANCE provision attached hereto and reference made a part hereof:

Coverages	Limits
Commercial Public Liability Insurance	$5,000,000 single limit per occurrence for bodily injury or death
Comprehensive Public Liability Property Damage Insurance	$5,000,000 single limit per occurrence for each accident and $10,000,000 aggregate per policy

The STATE shall retain the right at any time to review the coverage, form, and amount of the insurance required hereby. If, in the opinion of the STATE, the insurance provisions in this Agreement do not provide adequate protection, the STATE may request that CONTRACTOR obtain additional insurance sufficient in coverage, form, and amount to provide the protection required. The request shall be reasonable but shall be designed to assure protection from and against the kind and extent of the risks involved. If the CONTRACTOR is unable to provide the additional coverage as requested, the STATE reserves the right to terminate the Agreement with prior written notice.

Each insurance policy required by this Agreement shall contain the following clauses:

1. "This insurance shall not be canceled, limited in scope of coverage or non-renewed until after 30 days written notice has been given to the State of Hawaii, Department of Business, Economic Development, and Tourism, Administrative Services Office/Contracts, P.O. Box 2359, Honolulu, Hawaii 96804."

2. "The State of Hawaii is added as an additional insured with respect to operations performed for the State of Hawaii."

3. "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contribute with, insurance provided by this policy."

4. "TM Designers, Inc. as the Construction Manager for this project is added as an additional insured."

Each insurance policy shall be written by insurance companies licensed to do business in the State or meet Section 431:8-301 Hawaii Revised Statutes, if utilizing an insurance company not licensed by the State of Hawaii.

The CONTRACTOR agrees to deposit with the State of Hawaii, on or before the effective date of the Notice to Proceed, certificate(s) of insurance necessary to satisfy the STATE that the insurance provisions of this Agreement have been complied with and to keep such insurance in effect and the certificate(s) therefor on deposit with the STATE during the entire term of this Agreement. Upon request by the STATE, CONTRACTOR shall furnish a copy of the policy or policies.

Failure of the CONTRACTOR to provide and keep in force such insurance shall be regarded as material default under this Agreement, entitling the STATE to exercise any or all of the remedies provided in this Agreement for a default of the CONTRACTOR.

The procuring of such required policy or policies of insurance shall not be construed to limit the CONTRACTOR'S liability hereunder nor to fulfill the indemnification provisions and requirements of this Agreement. Notwithstanding said policy or policies of insurance, the CONTRACTOR shall be obliged for the full and total amount of any damage, injury, or loss caused by negligence or neglect connected with this Agreement.

P. INVOICING AND PAYMENT

The CONTRACTOR shall submit invoices for payment in accordance with Paragraphs L and P, "Special Provisions," and this Paragraph P, herein. Invoices shall reference the Agreement number assigned to the Agreement and shall be submitted in original plus three (3) copies to:

Dept. of Business, Economic Development & Tourism
Foreign Trade Zone No. 9
Pier 2, 521 Ala Moana Boulevard
Honolulu HI 96813

Payment shall be in accordance with Section 103-10, HRS, at the price bid herein, upon certification by the STATE that the CONTRACTOR has satisfactorily performed the services specified.

Section 103-10, HRS, provides that the STATE shall have thirty (30) calendar days from receipt of payment request and invoice or satisfactory delivery of goods to make payment. For this reason, the STATE will reject any bid submitted with a condition requiring payment within a shorter period. Further, the STATE will reject any bid submitted with a condition requiring interest payments greater than that allowed by Section 103-10, HRS, as amended.

The STATE will not recognize any requirement established by the CONTRACTOR and communicated to the STATE after award of the Agreement, which requires payment within a shorter period, or interest payment not in conformance with statute.

Q. INDEMNIFICATION

The CONTRACTOR shall indemnify, defend, save, and hold harmless the STATE and TM Designers, Inc. as Construction Manager for this project against any claim or cause of action for personal or property damage caused, directly or indirectly, by the CONTRACTOR and its employees, agents, officers, or assigns, and arising from the CONTRACTOR providing the services described in this IFB and in the Agreement executed by the CONTRACTOR and the STATE.

R. PERFORMANCE REQUIREMENTS

1. REMOVAL OF CONTRACTOR'S EMPLOYEES

   The CONTRACTOR agrees to remove any of its employees from services rendered and to be rendered to the STATE, upon request in writing by the STATE.

2. COOPERATION AND COORDINATION BETWEEN CONTRACTOR AND STATE'S DESIGNATED REPRESENTATIVE OR OFFICER-IN-CHARGE

   The CONTRACTOR shall give the work his/her constant attention and shall cooperate with the STATE's designated representative or Officer-In-Charge in every way.

3. LIQUIDATED DAMAGES

   Liquidated damages are fixed at the sum of ONE THOUSAND AND NO/100 DOLLARS ($1,000.00) for each and every calendar day the CONTRACTOR fails to

perform in whole or in part, any of his/her obligations specified hereunder. Liquidated damages may be deducted from any payments due or to become due to the CONTRACTOR.

In the event the CONTRACTOR fails, refuses or neglects to perform the services in accordance with the requirements of these Special Provisions, the Specifications and the "General Conditions," the STATE reserves the right to purchase in the open market, a corresponding quantity of the services specified herein and to deduct from any moneys due or that may thereafter become due to the CONTRACTOR, the difference between the prices named in the Agreement and the actual cost thereof to the STATE.

In case any money due the CONTRACTOR is insufficient for said purpose, the CONTRACTOR shall pay the difference upon demand by the STATE. The STATE may also utilize all other remedies provided by law.

4. NON-CONFORMANCE AND RE-EXECUTION OF WORK

If any work is not in full compliance with these specifications, the CONTRACTOR shall make all necessary corrections to the full satisfaction of the STATE and at no additional cost to the STATE. The CONTRACTOR shall perform corrective work within the period allowed by the STATE designated representative or Officer-In-Charge.

The CONTRACTOR shall immediately remedy any defects due to negligence on the CONTRACTOR or CONTRACTOR'S employees' part.

S. CONSTRUCTION LINES AND LEVELS

1. The CONTRACTOR shall verify all lines, levels, and elevations indicated on the drawings before any construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer, and any change shall be made in accordance with his instruction. The CONTRACTOR shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.

2. All lines and grades shall be verified and established by a licensed surveyor.

T. CONDITIONS AT SITE

Every person bidding on this project is expected to visit the site and examine the conditions and satisfy himself as to the character and amount of the work to be performed as indicated on the drawings and called for by the specifications. No additional allowance will be granted because of the lack of knowledge of such conditions.

U. DISRUPTION OF UTILITY SERVICES

Upon award of this Agreement, CONTRACTOR shall immediately contact Project Contact Person to schedule said utility's work relative to this project.

V. CONTRACTOR'S OPERATIONS

1. The CONTRACTOR must employ, insofar as possible, such methods and means of carrying out his work so as to cause minimum interruption or interference to the STATE's operations. Where the CONTRACTOR's operations would result in interruptions that would hamper the operations of the STATE, the CONTRACTOR shall rearrange his schedule of work accordingly. The CONTRACTOR shall coordinate all work with the Project Engineer.

2. The CONTRACTOR shall maintain safe passageway along all roadways and pedestrian ways along the site for personnel and public at all times and shall be in compliance with all ADA requirements.

W. PROTECTION OF PROPERTY

The CONTRACTOR shall continually maintain adequate protection of all his work from damage and shall protect all property, including but not limited to buildings, equipment, furniture, grounds, vegetation, material, utility systems located at and adjoining the job site. The CONTRACTOR shall repair, replace or pay the expense of repair of damages resulting from his fault or negligence.

X. USE OF POWER DRIVEN EQUIPMENT

The CONTRACTOR shall take all necessary safety precautions to protect the public whenever power driven equipment is used.

Y. CLEAN UP OF PREMISES

The CONTRACTOR shall clean up and remove from premises all debris accumulated from operations daily and from time to time and as directed.

Z. RESPONSIBILITY

1. The State of Hawaii will hold the CONTRACTOR liable for all the acts of subcontractors and shall deal only with him (the prime CONTRACTOR) in matters pertaining to other subcontractors employed on the job. The CONTRACTOR shall be responsible for coordinating the work of all subcontractors on the job.

2. Should he discover any discrepancy in the plans or specifications, the CONTRACTOR shall immediately notify the Engineer before proceeding any further with the work; otherwise, he will be held responsible for any cost involved in correction of work placed due to such discrepancy.

AA. PLANS AND SPECIFICATIONS

1. The CONTRACTOR shall not make alterations to the drawings and specifications. In the event he discovers any errors or discrepancies, the CONTRACTOR shall immediately notify the Engineer in accordance with the General Conditions.

2. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.

3. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the CONTRACTOR shall", "as shown on the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

BB. KNOWLEDGE OF REGULATIONS

The CONTRACTOR certifies, by submission of the bid, that he has knowledge of, understands and will apply provisions of all Federal, State, and Local laws, codes, regulations, acts and ordinances either cited or made reference to in the plans and specifications.

CC. BIDDER'S RESPONSIBILITY FOR EXAMINATION OF PLANS, SPECIFICATIONS SITE OF WORK, ETC.

The bidder shall examine carefully the scope of work contemplated and the proposal, plans, specifications, General Conditions, and Special Provisions. The submission of a bid shall be considered as a warranty that the bidder has made such examination and is satisfied with the conditions to be encountered in performing the work and with the requirements of the plans, specifications, General Conditions, Special Provisions, and Proposal.

No extra compensation will be given by reason of the CONTRACTOR's misunderstanding or lack of knowledge of the requirements of the work to be accomplished or the conditions to be encountered in performing the project.

Information with respect to the scope of work given on the drawings or specifications has been obtained by the State and is believed to be reasonably correct, however, it is the responsibility of the bidder to verify all such information.

DD. COOPERATION WITH OTHER CONTRACTORS

The State and the respective property STATEs reserves the right at any time to contract for or otherwise perform other or additional work within the Agreement zone limits of this Agreement. The CONTRACTOR of this project shall to the extent ordered by the State, conduct his work so as not to interfere with or hinder the progress or completion of the work performed by other Contractors.

EE. TAX CLEARANCE

The awardee is required to provide a tax clearance from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS) using Form A-6, attached as Exhibit A, prior to entering into an Agreement with the STATE.

It is recommended that the "Tax Clearance Application" Form A-6, attached as Exhibit A, be mailed to a DOTAX district office as soon as possible, as the process may take 21 calendar days before you receive a clearance. We also recommend that extra certified copies be requested, if responding to several competitive solicitations. Extra certified copies may be requested by writing or typing the number of copies next to the checked box 3.c. on the application form. Bidders who repeatedly submit bids or proposals for state or county contracts should file frequently for a tax clearance.

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
FOREIGN TRADE ZONE NO. 9

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB 04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

BID FORM

Bidders shall complete the following bid form, pages, B.2 through B.10, and submit them in a sealed envelope no later than Friday, February 6, 2004 at 12:00 p.m. (noon). Facsimiles are not allowed.

FOREIGN TRADE ZONE NO. 9
BID FOR PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

SOLICITATION NO. 04-04-FTZ

Administrative Services Office/Contracts
Department of Business, Economic Development, and Tourism
No. 1 Capitol District
250 So. Hotel Street, 5th Floor, Room 510D
Honolulu, Hawaii, 96813

The undersigned has carefully read and understands the terms, conditions, and requirements specified in the Specifications, Special Provisions and General Provisions attached hereto and incorporated herein by reference, and hereby submits the following bid to perform the work specified herein, all in accordance with the true intent and meaning thereof:

The undersigned further understands and agrees to the following:

- That by submitting this bid, the undersigned is declaring that this bid is not in violation of Chapter 84, Hawaii Revised Statutes, concerning prohibited State contracts;

- That by submitting this bid, the undersigned is declaring that this bid is being made without collusion with any other person, firm, or corporation;

- Award, if any, will be made to the responsive and responsible bidder submitting the lowest total bid price;

- That liquidated damages for delays in completing the contract beyond the specified time of completion shall be based on the amount specified in the Special Provisions for each and every calendar day of delay; and

- That by submitting this proposal, the undersigned is declaring that if awarded a contract, the undersigned will comply with all wages, hours and working conditions in accordance with Sections 104-2 and 103-55, Hawaii Revised Statutes.

- That this is a time and materials contract and that any items needed which are not covered by this contract will be paid for on a cost plus basis;

- That should this bid exceed $25,000.00, attached is a bid security in the amount of 5% of the undersigned's bid amount, and that failure to execute an awarded contract will result in the forfeiture of said bid security;

- That should this bid exceed $25,000.00, the undersigned shall furnish satisfactory performance, labor, and material bonds within ten (10) days of award in accordance with the General Conditions; and

- That the Director of the Department of Business, Economic Development, and Tourism reserves the right to reject any or all bids and waive any defects when in his opinion, such rejection or waiver is made in the best interest of the public.

- The undersigned acknowledges receipt of any addendum issued by the Department of Business, Economic Development, and Tourism by recording in the space below the date of receipt:

  Addendum No. 1 _____ Addendum No. 2 _____

  Addendum No. 3 _____ Addendum No. 4 _____

The undersigned hereby certifies that the bid prices contained in this bid have been carefully checked and are submitted as correct and final.

Respectfully submitted,

Exact Legal Name of Bidder (Company Name)

_____

Authorized Signature
(Attach evidence of authorization to sign on behalf of the bidder by way of bylaws or corporate resolution)

_____

Title

_____

_____

Street Address

_____

City, STATE, Zip Code

_____

Telephone No.

_____

Mailing Address (if different from street address)

BIDDER INFORMATION:

STATE of Hawaii General Excise Tax (GET) License Number: _____

Federal Taxpayer Identification Number: _____

Contractor's License Number _____

Type of Organization:

_____ Individual _____ Partnership _____ Corporation _____ Joint Venture

If the bidder is a "dba" or a division of a corporation, furnish the exact legal name of the corporation under which the contract, if awarded, will be executed:

_____

STATE of Incorporation: Hawaii _____ Other: _____
(Indicate where)

Insurance Coverage:

	Carrier	Policy No.	Agent
Commercial Public Liability Insurance: ($5,000,000 per Occurrence bodily injury or Death)			
Comprehensive Public Liability Property Damage Insurance: ($5,000,000 per occurrence for each accident and $10,000,000 aggregate per policy)			
Workers' Compensation:			

Temporary Disability: _____

Unemployment Insurance:
STATE of Hawaii Labor No. _____

Prepaid Health Carrier: _____

BID

Bidder shall provide a separate bid amount for each item listed below. Award, if any, will be made to the responsive and responsible bidder submitting the lowest total bid price. A description of each item is listed below. Bid amounts shall be indicated on the lines below the last description. Please note that it appears that the gross income derived by the CONTRACTOR and any subcontractors from the construction of improvements for the Foreign-Trade Zone No. 9 is exempt from the general excise tax. Therefore, please submit two separate bids, one including the general excise tax and the other without the general excise tax.

Base Bid

Item 1: Supply all labor and materials for the construction of a mezzanine space additi offices, utility room and toilet rooms, a warehouse space at ground level for worl and wine storage, and a stairway.

Item 2: Supply all labor and materials for the construction and installation of new chille equipment pad and chain link fence.

Item 3: Supply all labor and materials for the installation of an air conditioning s modification of existing air duct and water piping system; and addition of new f units and fire sprinkling system.

Additive Alternate No. 1

Item 4: Supply all labor and materials for the replacement of existing fan coil units anc required asbestos containing materials in Phase I area.
Supply all labor and materials for the replacement of existing fan coil units anc required asbestos containing materials in Phase II area.

Supply all labor and materials for the replacement of existing fan coil units and required asbestos containing materials in Phase III area and the installation of 1 Dens-Deck and apply fluid-applied roofing material for the existing office building Phase III area.

Additive Alternate No. 2

Item 5: Supply all labor and materials for the roofing of the Phase I, II, and III areas described herein.

Item No.	**Bid Price with General Excise Tax Included**	% of Bid Price that represents Labor
Item 1:	_____	_____
Item 2:	_____	_____
Item 3:	_____	_____
TOTAL BASE BID AMOUNT	_____	_____
Item 1:	_____	_____
Item 2:	_____	_____
Item 3:	_____	_____
Item 4:	_____	_____
TOTAL BASE BID PLUS ALTERNATE NO. 1 AMOUNT	_____	
Item 1:	_____	_____
Item 2:	_____	_____

Item 3: _____ _____

Item 4: _____ _____

Item 5: _____ _____

TOTAL BASE BID PLUS
ALTERNATE NO. 1 AND 2 AMOUNT _____

Item No.	**Bid Price without General Excise Tax Included**	% of Bid Price that represents Labor
Item 1:	_____	_____
Item 2:	_____	_____
Item 3:	_____	_____

TOTAL BASE BID AMOUNT _____

Item 1: _____ _____

Item 2: _____ _____

Item 3: _____ _____

Item 4: _____ _____

TOTAL BASE BID PLUS
ALTERNATE NO. 1 AMOUNT _____

Item 1: _____ _____

Item 2: _____ _____

Item 3: _____ _____

Item 4: _____ _____

Item 5: _____ _____

TOTAL BASE BID PLUS
ALTERNATE NO. 1 AND 2 AMOUNT _____

BIDDER REFERENCE

Listed below are names and addresses of three (3) companies or government agencies for whom the undersigned has provided or is currently providing similar work as described herein. It is expressly understood that the DBEDT reserves the right to seek additional references and that unfavorable references may be grounds for the rejection of any kind.

	Company	Contact Person	Telephone No.
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

_____
Signature of Authorized Representative of Bidder

Preferences:

The following preferences apply to this solicitation. A detailed discussion of each preference is included in the section entitled, "Special Provisions." Indicate which preferences apply.

1. In-STATE CONTRACTOR preference: yes____ no_____

   If yes, indicate STATE of Hawaii business street address: _____
   _____

If yes, attach current (issued within 90 days of bid submittal) tax clearance from the STATE of Hawaii Department of Taxation.
(Note: The bidder may wish to also obtain tax clearance from the Internal Revenue Service at the same time in order to fulfill this requirement if awarded a contract)

2. Tax Adjustment:

Are you an out-of-state business? yes____ no____
Is your organization tax exempt? yes____ no____

3. Hawaii Products.

ALL JOINT CONTRACTORS OR SUBCONTRACTORS TO BE ENGAGED ON THIS PROJECT

The Bidder agrees the following is a complete listing of all joint contractors or subcontractors covered under Chapter 444 HRS, who will be engaged by the Bidder on this project to perform the required work indicated pursuant to Section 103D_302 HRS. The Bidder certifies that it and its listed subcontractors or joint contractors together hold all licenses necessary to complete the Work, and understands that failure to comply with this requirement may be just cause for rejection of the bid.

'A' General Engineering Contractors and 'B' General Building Contractors are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the general contractor to act as a specialty contractor in any area in which the general contractor has no license. Although the 'A' and 'B' Contractor may still bid on and act as the "Prime Contractor" on an 'A' or 'B' project *(See, HRS § 444-7 for the definitions of an "A" and "B" project.)*, respectively, the 'A' and 'B' contractor may only perform work in the areas in which they have the appropriate contractor's license *(An 'A' or 'B' Contractor obtains 'C' specialty contractor's licenses either on its own, or automatically under HAR § 16-77-32)*. The remaining work must be performed by appropriately licensed entities. It is the sole responsibility of the Contractor to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project.

The Bidder shall provide the complete firm name, license number and nature and classification description by each joint contractor or subcontractor.

Bidders shall list only one joint contractor or subcontractor per required specialty contractor's license.

Complete Firm Name and License No Of Joint CONTRACTOR or Subcontractor	Nature and Scope of Work to be Performed

Complete Firm Name and License No Of Joint CONTRACTOR or Subcontractor	Nature and Scope of Work to be Performed

B-10

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

FOREIGN-TRADE ZONE DIVISION

INVITATIONS FOR SEALED BIDS

SOLICITATION NO. IFB 04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

EXHIBITS

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

FOREIGN-TRADE ZONE DIVISION

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB 04-04-FTZ

FOR

TEMPORARY LABOR SERVICES FOR THE FOREIGN-TRADE ZONE DIVISION

EXHIBIT A: TAX CLEARANCE APPLICATION

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

FOREIGN-TRADE ZONE DIVISION

INVITATION FOR SEALED BIDS

SOLICITATION NO. IFB 04-04-FTZ

FOR

TEMPORARY LABOR SERVICES FOR THE FOREIGN-TRADE ZONE DIVISION

EXHIBIT B: MAP OF THE FOREIGN TRADE ZONE

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

FOREIGN-TRADE ZONE DIVISION

INVITATION FOR SEALED BIDS

SOLICITATION NO. 04-04-FTZ

FOR

PIER 2 WAREHOUSE AND OFFICE IMPROVEMENTS

EXHIBIT C: "GENERAL CONDITIONS"