Bold Underlined – New Section

Bold Italicized – Revised Section

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SECTION 02900 – PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Labor, equipment, materials, plants, soil preparation, planting, and maintenance requirements for all landscaping work as indicated on Drawings.

1.02 RELATED SECTIONS

A. Section 02300 - EARTHWORK

B. Section 02360 –VEGETATION CONTROL

C. Section 02810 – IRRIGATION SYSTEM

1.03 DEFINITIONS

A. Injury; defined, without limitation, as any bruising, scarring, tearing, or breaking of roots, trunk, bark, branches or foliage which may lend to or result in permanent damage to plant health or significantly alter the desired aesthetics of the plant for which it was selected.

B. Dead Tree; is a tree that has died or that has been damaged or stressed to an advanced state of decline and has been determined to be so by the Architect's Certified Arborist.

C. Drip Line; defined as the outer most limits of the tree canopy.

D. Certified Arborist; an individual with a current certification from the International Society of Arboriculture (ISA) or member of the American Society of Consulting Arborists trained and experienced in all aspects of proper tree care.

1.04 REFERENCES

A. International Society of Arboriculture (ISA) "Guide for Plant Appraisal 8th Edition 1992," prepared by the Council of Tree and Landscape Appraisers (CTLA).

B. Standardized Plant Names; as established by Hortus III.

C. ANSI A 300 - American National Standards for Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices: 1995.

D. ANSI Z 60.1 - American Standards for Nursery Stock: 2004., as approved by the American Association of Nurseryman.

E. Cabling, Bracing, and Guying Standards for Shade Trees, as published by the National Arborist Association (NAA), 174 Rt. 101, Bedford, NH 03102.

1.05 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Division 01.

B. Unit prices apply to authorized work covered by quantity allowance.

C. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.06 QUALITY ASSURANCE

A. In accord with Section 01440 - QUALITY ASSURANCE AND QUALITY CONTROL.

B. Qualifications of workmen:

1. Contractor to be licensed by the State of Hawaii and a member in good standing of the Landscape Industry Council of Hawaii (LICH).

2. Contractor shall have a minimum of 5 years of documented experience with successful landscape installations similar to the size and scope of work for this project.

3. Contractor shall maintain a competent supervisor or foreman on site who is fluent in English and satisfactory to the Architect. Supervisor shall not be changed, except with prior consent of the Architect. Supervisor shall be present on-site during all operations and specified work in progress.

4. Provide at least one person who is a Certified Arborist, to direct and be present during all tree pruning operations.

C. Tests and Inspections:

1. Plant Material:

a. All plant material shall be received in a healthy condition, free from pests and disease. Plants delivered to Contractor that are found to be damaged, root bound, diseased or distressed shall be brought to the Architect's attention prior to accepting delivery.

b. Plants shall be subject to inspection and approval by the Architect at nursery, growing grounds and upon delivery to site, for conformity to Specifications. Such approval shall not impair the right of further inspection or rejection during progress of work.

c. Pre-selection and tagging of plant material by the Architect or Landscape Architect is to meet design intent only and does not constitute any guarantee by the Architect of the selected plants. Health and vigor of plant material shall remain the sole responsibility of Contractor.

d. The Architect reserves the right to have plant samples analyzed at any time to verify plant health and conformity to Specifications. Furnish samples upon request. Testing to be done by the Architect's designated laboratory.

1) Cost of testing plant samples will be responsibility of Contractor. Lab fees for testing found to be negative will be reimbursed by Change Order to the Contract.

2) Rejected material shall be promptly removed and replaced at no cost to the Architect.

2. On-site Soils:

a. Pre-Construction Testing: Preconstruction testing of existing on-site soil shall be performed on native soil not previously impacted by prior

construction. Native soil boundaries are defined in “Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii” by United States Department of Agriculture, Soil Conservation Service, Issued August 1972.

b. After rough grading has been completed and prior to planting operations, on-site soils are to be tested for agronomic suitability, biological function, and chemical characteristics. Soils report shall include amending requirements in order for on-site disturbed soils to be restored to optimal biological function and chemical characteristics. Contractor shall make all adjustments to improve the soils’ characteristics and comply with final soils analysis recommendations as directed by soils report.

c. In the event that soil amendment recommendations are substantially different than those described for base bid, adjustments will be made by Change Order to Contract as agreed upon by the Architect.

d. The Contractor shall engage the services of a qualified agricultural soils testing laboratory to perform soil testing services of all areas to be planted.

    1) Soils testing shall be performed by Crop Nutrient Solutions, Inc., Post Office Box 40, Waimanalo, Hawai‘i, 96795; Phone: (808) 386-4120.

e. Laboratory services shall include the following:

    1) A minimum of six samples or one sample per every 5,000 sq. ft. (whatever quantity is greater) of base soil after completion of rough grading in landscape areas as directed by the Architect.

    2) Chemical analysis and written report of each individual sample to cover the following:

        a) Soil structure and percentage of organic matter.

        b) pH, Salinity and Lime content

        c) Mineral nutrients, including concentrations of nitrogen, phosphorus, potassium, calcium, magnesium, iron, manganese, zinc, copper, sulfur, and molybdenum.

        d) Potential hazards to healthy plant growth such as high salinity, sodium chloride, boron, impaired soil structure, or drainage.

    3) Recommendations for types, quantities, and application schedule for organic materials, fertilizers, and other materials found necessary to amend base soil for optimum plant growth.

    4) Recommendations for backfill mix or mix as appropriate to be utilized in installation of all plants for the project.

    5) Testing laboratory shall follow standards set forth in the USDA Agricultural Suitability Test in accord with Handbook-60 and in accord with the Methods of Soil Analysis by the Soil Science Society of America, Inc.

f. Testing laboratory may be employed by the Architect to provide additional periodic sampling and testing of amended landscape planting areas to ensure compliance with recommendations.

3. Imported Soil Amendment Material:

    a. The Contractor shall be responsible for submitting a soils analysis of the amended and restored soils at the end of the project for review and approval by the Architect in order to demonstrate that restored soils have optimum biological function and chemical characteristics and meet recommendations provided by soil analysis report. Types, quantities, and application schedule of required organic materials, fertilizers, and other amendments required to mitigate soil deficiencies identified in the soil analysis report shall be included for review by the Architect.

    b. All proposed imported soil amendments for planting areas shall meet specified requirements and be pre-approved by the Architect based on soil test results.

    c. Cost for soils tests for this purpose shall be paid by Contractor. Provide chemical analysis report, written recommendation, and intended source of imported soil amendments for each individual sample to the Architect.

    d. In the event that the initial proposed imported soil amendment is found unsuitable, additional sources shall be found and tested at Contractor's expense.

4. Imported Screened Soil Material:

    a. The Contractor shall be responsible for submitting a soils analysis of the imported screen soil material at the beginning of the project for review and approval by the Architect in order to demonstrate adherence to recommendations provided by soils report.

    b. All proposed imported soils for planting areas shall meet specified requirements and be pre-approved by the Architect based on soil analysis results.

    c. Cost for soils tests for this purpose shall be paid by Contractor. Provide chemical analysis report, written recommendation, and intended source of imported soil for each individual sample to the Architect.

    d. In the event that the initial proposed import soil is found unsuitable, additional sources shall be found and tested at Contractor's expense.

5. Observation Schedule

    a. Observation and inspection of the work will be made on an ongoing basis and at the following stages of the work. Provide Architect prior notification to of the following with the advanced times indicated:

        1) Pre-installation conference: 10 working days.

        2) Completion of finish grading and soil preparation: 10 working days.

        3) Plant delivery to site: 10 working days.

        4) Tree locations prior to excavation of pits: 10 working days.

        5) Shrub layout prior to excavation pits: 10 working days.

        6) Pre-mulch inspection: 10 working days.

7) Premaintenance: 10 working days.

8) Final walk-through: 10 working days.

1.07 SUBMITTALS

A. In accord with Section 01300 – SUBMITTAL PROCEDURES

B. Submit manufacturer's data sheets for all proposed products to be used in work. Indicate specific items and product numbers.

C. Contractor shall furnish all plant material indicated on Drawings. Any and all substitutions due to unavailability shall be requested in writing prior to confirmation of ordering.

1. Submit for Architect's approval within 30 days after award of contract and prior to any start of work:

a. Documentation listing all required plant material by size, source, and quantity. Sort list by construction zone sequence if applicable.

b. Weed control program. Include all product information and schedule of operations.

c. Proposed schedule and sequence of work plan for all planting operations, with start dates and completion dates for planting trees, shrubs and groundcover.

d. List of proposed equipment to be used for tree planting and plan for plant storage on-site.

e. Soil test results and schedule of recommended fertilizers and amendments to correct soil deficiencies. Schedule of fertilizers and amendments shall include applications rates for pre-planting, planting, and post planting operations.

1.08 EXISTING CONDITIONS

A. Protect all existing plant material that is to remain within or directly adjacent to the work to be performed. This shall include installing and maintaining protective barriers and/or temporary fencing.

B. Maintain foliage of existing plants free of dust and debris from all construction operations. Wash plants down daily with potable water if necessary. Ensure water pressure and water stream do not damage plant material nor cause erosion or runoff.

C. Vehicles and equipment shall not be parked, serviced, or operated within the drip line of existing trees or within newly planted areas. Access to all planting areas shall be limited to the personnel required for landscape installation.

1.09 MOCK-UP

A. Provide mock-up samples for all materials as shown on drawings. Construct with all materials, methods, and procedures intended to be used in the final Work, including temporary supports, welded wire mesh support structure, and wire support. Mock-up shall be constructed a minimum of three months prior to

commencement of work and shall be protected from construction. Maintenance service shall be provided for 90 days. At the end of 90 days, provide samples for Architect to review.

B. Supervisors and installers that construct and finish mock-up are to be the same workman that install finish Work.

C. Approved mock-up will be used as basis for judging and approval of final installation.

D. If initial mock-up is not approved by the Architect, prepare subsequent mock-up(s) or provide modifications to initial mock-up until approved.

1.10 WARRANTY

A. Warranty all plant material, smaller than 15-gallon container size, to be in healthy and flourishing condition of active growth for a period of one (1) year from the date of Substantial Completion.

B. Warranty all plant material, 15 gallon or larger, to be in healthy and flourishing condition of active growth for a period of one (1) year from the date of Substantial Completion.

C. Promptly replace all plant material found dead, dying, or damaged during the warranty period.

D. Replacement shall be with material of same variety, size, form and character. Final selection to be approved by the Architect.

E. Replacement shall include cost of plant material, delivery, labor, equipment and materials required for installation.

F. Specimen trees that require replacement shall be removed and replaced in a timely and expedient manner. Coordinate with the Architect for selection of replacement tree and timing of work.

G. Contractor will not be held responsible for failures that are directly attributed to Acts-of-God, vandalism or proven negligent care by Owner. Acts of God do not include diseases, pests, or moisture extremes noted herein.

H. Special Warranty:

1. All plant materials furnished shall be warranted as to the species, hybrid, flower color and/or variety specified.

2. If after acceptance of the project, any warranted plant material proves to be of a different species, hybrid, flower color and/or variety not initially determinable, replace that plant with a new plant of the originally specified species, hybrid, flower color and/or variety. The new plant shall be equal in size to that of the incorrect plant at the time of its removal. The new plant shall meet the quality standards, be subject to the warranty, and be installed according to the specifications.

3. There is no time limit to this warranty, although it does not include plants reverting to the general species. The Architect will determine the nonconformance of plant materials and notify the Owner in writing of the required replacement work. All materials and work shall be at the expense of the Owner.

1.11 PRODUCT HANDLING

A. Procedures: In accord with Section 01660 – PRODUCT STORAGE AND HANDLING REQUIREMENTS.

B. Delivery:

1. Deliver fertilizers to site in original unopened packages and containers, bearing manufacturer's name, trademark, guaranteed chemical analysis and conformance to State Law. Deliver bulk materials to site with certificate that includes manufacturer name, trademark, guaranteed chemical analysis, conformance to State Law and quantity delivered.
2. Furnish delivery receipts for all amendments to the Architect.
3. Notify Architect seven (7) days in advance of plant material deliveries.
4. Submit an itemized list of plants included in each delivery.

C. Deliver all plants with legible identification labels.

1. Label trees, bundles, or containers of like shrubs or ground cover plants.
2. State correct botanical name and container size.
3. Use durable waterproof labels with UV and water-resistant inks. Do not remove labels until so directed by the Architect.
4. Protect plant material from damage during delivery. Plants loaded for delivery from nurseries should not be double stacked or vertically layered in any way to cause damage or stress.
5. Inspect all plant material for injury, disease and insect infestation. Evaluate trees and shrubs for improper pruning. In the event such conditions are found, bring to the Architect's attention for direction and remedial action to be taken.

D. Handling:

1. Exercise care in handling, loading, unloading, and storing of plant material. Plants that have been damaged prior to or during installation shall be replaced at Contractor's expense.
2. Provide equipment of suitable size and capacity to safely off-load, transport and plant all trees.
3. The "choke" strapping method of lifting trees is strictly forbidden (except for single trunk palms); any trees hoisted in this manner will be rejected.

E. Storage:

1. Plant materials shall be maintained in a healthy growing condition. Protect plants from physical damage by construction operations as well as inclement weather conditions such as high winds, excessive heat or dust.
2. Plants stored on-site shall be spaced to allow clearance for light and air and not be spaced tightly together such that limbs are crowded.
3. Maintain root balls with adequate moisture at all times.
4. Plants grown in shade conditions shall be stored and maintained in equivalent shade conditions.

5. Do not store plants directly on asphalt paving.

1.12 VERIFICATION OF DIMENSIONS AND QUANTITIES

A. All scaled dimensions are approximate. Before proceeding with any work, carefully check and verify all dimensions and quantities. Immediately inform Architect of all discrepancies between Drawings, Specifications, and actual conditions. Do not do work in any area where there is a discrepancy until approval to proceed has been given by the Architect.

1.13 REGULATORY REQUIREMENTS

A. Provide for all inspections and permits required by federal, state, and local authorities for furnishing and transporting plant materials.

B. Perform work in accord with all applicable laws, codes, and regulations including licensing and training requirements for pesticide and herbicide applications.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Contractor shall provide imported screened soil as source of soil material or imported amendments for amendments to existing soil. Source and location to be approved by the Architect. Contractor to submit soils reports for Architect's approval.

B. Soil shall meet the following requirements.

1. General: Free of roots, clods, and stones larger than 1/2 inch in the greatest dimension, pockets of coarse sand, noxious weeds, sticks, brush, and other litter. It shall not be infested with nematodes or other undesirable disease organisms such as insects and plant pathogens. Soil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil. Total pore space content on a volume/volume basis shall be at least 15% when moisture is present at field capacity. Soil shall have a field capacity of at least 15% by weight.

2. Gradation: Soil shall be a sandy loam, or loam, and similar to the native site soil. The definition of soil texture shall be in accord with USDA classification scheme. Obtain Architect's approval prior to grading operations.

Class	**Particle Size Range**	**Maximum Percentage**	**Minimum Percentage**
Coarse Sand	0.5-2.0 mm	40%	0%
Clay	<0.05 mm	20%	10%
Silt	<0.05 mm	40%	10%
Gravel	2-13 mm	20%	0%
Rock	13-25 mm		10% volume
Organic		15%	0%

3. Permeability: Hydraulic conductivity rate shall be not less than 1 inch per hour or more than 20 inches per hour when tested in accord with USDA Handbook No. 60, Method 34b or other Owner-approved methods.
4. Acidity: Soil pH range measured in the saturation extract (USDA Handbook No. 60, Method 21a) shall be 6.0 to 7.9.
5. Salinity: Salinity range measured in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 0.5 to 2.0 dS/m. If calcium ions and sulfate tons both exceed 20 milliequivalents per liter in the saturation extract, the max salinity shall be 4.0 dS/m.
6. Chloride: Maximum concentration of soluble chloride in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 150 mg/l (parts per million).
7. Boron: Maximum concentration of soluble boron in the saturation extract (USDA Handbook No. 60, Method 3a) shall be 1 mg/l (parts per million).
8. Sodium Absorption Ratio (SAR): Maximum SAR shall be 6 measured in accord with USDA Handbook No. 60, Method 20b.
9. Organic Matter Content: Sufficient soil organic matter shall be present to impart good physical soil properties, but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. Soils shall have a minimum 5% Organic Matter as Humus content, utilizing Walkley-Black soil testing method.
10. Heavy metals: Maximum permissible elemental concentration in soil shall not exceed the following:

Metal	**Parts per million (mg/kg)[1]**
Arsenic	3
Cadmium	2
Chromium	10
Cobalt	2
Lead	30
Mercury	1
Nickel	5
Selenium	3
Silver	0.5
Vanadium	3

[1] Ammonium Bicarbonate/DTPA Extractable, dry weight basis.

11. Fertility - Range of essential elemental concentration in soil shall be as follows:

Element	Low[1]	High[1]
Phosphorus	2	40
Potassium	40	220
Iron	2	35
Manganese	0.3	6
Zinc	0.6	8
Copper	0.1	5
Boron	0.2	1
Magnesium	50	150
Sodium	0	100
Sulfur	25	500
Molybdenum	0.1	30

[1] Ammonium Bicarbonate/DTPA Extractable, parts per million) (mg/kilogram), dry weight basis.

a. If soil pH is between 6 and 7, maximum permissible elemental concentration shall be reduced 50%. If soil pH is less than 6.0, maximum permissible elemental concentration -12. Phytotoxic constituent, herbicides, hydrocarbons, and similar materials: Germination and growth of plant shall not be restricted more than 10% compared to standard controls. Standard controls shall be both monocots and dicots. Total petroleum hydrocarbons shall not exceed 100 mg/kg dry soil measured in accord with modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, zylene, and ethylbenzene) shall not exceed 2 mg/kg dry soil measured in accord with EPA Method No. 8020.

12. Red Humic latasol soils, or types known as “Palolo Clay” or “Lualualei Clay” or similar materials shall not be accepted.

13. Screened to pass through 1/2-nch screen.

C. Contractor responsible for providing imported screened soil over all planting areas. Refer to Drawings for locations of various soil depths.

D. Backfill Mix for Trees and Shrubs and Groundcovers: Mix thoroughly prior to placing:

60% screened soil

25% 3/8 inch minus black cinder

15% “Menehune Magic”/organic composted soil amendment

1 lb. Sustane Fertilizer per cubic yard of mix

E. Backfill Mix for Palms: Mix thoroughly prior to placing:

85% washed beach sand

15% “Menehune Magic”/organic composted soil amendment

2 lb. Sustane Fertilizer per cubic yard of mix

2.02 AMENDMENTS

A. Organic Amendments:

1. Types of acceptable products are composts low in salts and heavy metals, free from weed seeds, pathogens and other deleterious materials meeting U.S. Composting Council specifications.
2. Composted wood products are conditionally acceptable (stable humus shall be present). Wood based products which are based on red wood or cedar are not acceptable.
3. Sludge-based materials are not acceptable.
4. The compost shall be aerobic without malodorous presence of decomposition products.
5. Humus material with an ash content of not less than 8% and not more than 50%.
6. The pH shall be between 6 and 7.5.
7. Salt content shall be less than 10 milliohm/cm at 25 degrees Celsius (ECe less than 10) in a saturated paste extract. The maximum rate of application shall not exceed 15% by volume unless the salinity is lower than 10 milliohm/cm at 25 degrees Celsius.
8. Boron content of the saturated extract shall be less than 1.0 parts per million.
9. Silicon content (acid-insoluble ash) shall be less than 20%.
10. Calcium carbonate shall not be present.
11. Carbon: nitrogen ratio shall be less than 20:1.
12. Approved organic amendments and suppliers include Ferto (6-4-2) or Gro-Power Plus (5-3-1) or Architect approved equal.

B. Sand: Washed, No 16 granite.

Sieve No. (US Standard)	Percent Dry Weight Passing
10	100
16	65-100
20	0-20
35	0-5
40	0-2

C. Perlite: Coarse or No. 2 perlite, free of weeds and impurities.

D. Calcium Carbonate: Minimum 95% calcium carbonate, 100% passing a No. 60 sieve.

E. Single Super Phosphate (0-20-0): Granular commercial grade, minimum 20% P205.

F. Soil Conditioner: Menehune Magic by Hawaiian Earth Products, ph (808) 682-5895.

2.03 FERTILIZER

A. Organic Fertilizer Tablets: N-P-K as recommended by soil analysis, uniform in composition, slow releasing, free-flowing and suitable for application with approved equipment, delivered to the site in unopened containers. Each fully labeled, conforming to the applicable fertilizer laws, and bearing the name or mark of the manufacturer. Sustane Enhanced with Sumicoat Controlled Release Fertilizer in Root Zone Feeder Pack, by Sustane, ph (507) 263-3003, www.sustane.com

B. Organic fertilizer: N-P-K as recommended by soil analysis, uniform in composition, slow-release nitrogen, free-flowing and suitable for application with approved equipment, pathogen and weed free, no sewage, blood or meat products, delivered to the site in unopened packaging. Each fully labeled, conforming to the applicable fertilizer laws, and bearing the name or mark of the manufacturer; apply according to manufacturer's written instructions. Sustane Fertilizer, ph (507) 263-3003, www.sustane.com

2.04 HERBICIDE

A. Pre-emergent Herbicide: Chipco Ronstar-G as manufactured by Bayer.

B. Pre-planting Herbicide: Round-Up or equal

C. Soil Fumigant: Basamid G® Granular Soil Fumigant as manufactured by Cetris USA, Ltd.

2.05 PLANT MATERIALS

A. Nomenclature: Plant names listed on Drawings conform to "Standardized Plant Names" established by Gardens of Hawaii by movie C. Neal and/or Hortus III. Except for changes covered therein, established criteria of horticulture nomenclature is followed.

B. The plant nursery shall certify the native Hawaiian plants are native to Hawaii and true to the species.

C. Plants shall be symmetrical as is typical for their variety and species, in a condition of healthy and vigorous growth with healthy normal root systems well filling their containers, but not to the point of being rootbound. They shall be free from plant disease, insects or their eggs or soil borne pathogens.

D. Height and spread of all plants shall be measured with branches in their normal position. Where specific dimensions of any plant material are omitted from Plant List, plants shall be as approved by the Architect.

E. All liners, plugs, dug sprigs, and flatted material shall be fully rooted. Plants should not be pruned prior to delivery, except as authorized by the Architect.

F. Balled and burlap plant material shall meet standards of American Standards for Nursery Stock. Burlap shall be 100% natural fiber. No leno will be accepted.

G. Palm Trees: Palms shall have square shaped root balls cut a minimum of 30 inches from base of trunk face. Retain a minimum of six fronds on head of palm, or as directed by Architect.

H. Caliper measurement shall be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper, and at a point 12 inches above the natural ground for trees over 4 inches in caliper

I. Hydromulch: Mulch shall be (paper or virgin wood cellulose fiber mulch) 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. 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. 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.

2.06 MISCELLANEOUS MATERIALS

A. Water: Furnished by Owner. Distribution and connections by Contractor.

B. Tree Stakes: Lodgepole Pine wood stakes treated with wood preservative in strict compliance with state and federal regulations 2-inch diameter x length as required per Drawings.

C. Staking Ties: Cinch Ties, 32 inch by V.I.T. Products, Inc., Tel: (760) 735-2450

D. Tree Guys:

1. Type A: #12 ga galvanized iron wire for 15- and 25-gallon trees, #9 ga. Galvanized iron wire for field stock trees, up to 3-inch caliper, or Architect - approved equivalent. Hose shall be 1/2-inch diameter black rubber hose.

2. Type B: Duckbill DTS Guy Kit, Model DTS-88 and Model DTS-138 for trees 10-inch caliper and larger by Forsight Products, Inc., www.earthanchor.com, Tel: (800) 325-5360.

3. Type C: Duckbill DTS Guy Kit, Model RBA-88 and Model RBK-138 for rootball anchoring systems of palm trees. Forsight Products, Inc., www.earthanchor.com, Tel: (800) 325-5360.

E. Rebar: #4 24-inch minimum length for trees 25 gallon and smaller. #7 36-inch minimum length for larger trees.

F. Marker: Plastic surveyor tape. Bright color, minimum 18 inches length. Use same color throughout project.

G. Aluminum Edging: Standard-profile extruded-aluminum edging - 1/8 inch thick by 5-1/2 inches deep, ASTM B221, Alloy 6063-T6, Black anodized, aluminum stakes – ASTM B221, Alloy 6061-T6 approximately 1-1/2 inches wide by 12 inches long. Provide from one of the following manufacturers:

1. Permaloc Corporation, ph (616-399-9600)
2. Sure-loc Edging Corporation

H. Root Control Barriers: DeepRoot Tree Root Barriers, www.deeproot.com, ph (415) 781-9700.

I. Filter Fabric: Style 307, as manufactured by Belton Industries, ph (800) 851-5049.

J. Gravel: No. 3b fine blue rock, 3/4 inch minus.

K. Black Cinder: 3/8 inch minus crushed black cinder.

L. Ili ili Stone: “Tumbled Lava” by Geobunga, blended 50% 1 inch x 2 inches, 50% 2 inches x 3 inches, http://geobunga.com/puka-lava-tumbled-beach-rock , ph (808-422-4567), provide additional 10% in quantity for Owner’s future use.

M. Natural Moss Rock Boulders: Local weathered Field stones, 18 inches – 36 inches diameter, for placement in landscape areas as shown on Drawings.

N. Synthetic Lawn: Style BAREFOOT / SoftLawn (PL960), Camofill infill, as manufactured by NyLawn, ph (808-485-8885).

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Weed Control:

1. Before and during preliminary and finish grading, dig out all noxious or invasive weeds and grasses by roots and dispose of off-site. Any non-perennial type grasses, except for Torpedo and Nut Grass, less than 2-1/2 inches high and not bearing seeds, may be turned under. Prior to planting, eliminate any weeds present in delivered plant stock.
2. Site shall be maintained weed-free throughout planting operations and until final acceptance. Prior to mulching, apply pre-emergent herbicide to all shrub and groundcover areas.
3. Fumigate soil for all sodded or seeded planting areas with Basamid® G granular fumigant. Apply per manufacturer’s directions.

B. Soil Preparation (pre-tillage) for all planted areas on grade:

1. All planting areas that are compacted 85% to 90% are to be cross-ripped to 12 inches depth. Areas with over 90% compaction shall be cross-ripped to 24 inches depth, and all unacceptable materials removed.
2. In areas to receive import soil, scarify top of the existing soil to 4 inches minimum depth prior to backfilling.
3. Soil for planting shall be free of rocks over 1/2 inch in diameter, and any foreign debris, refuse, plant roots, clods, weeds, sticks, solvents, petroleum products, concrete, plaster, or other deleterious, undesirable and unwanted materials.

Such materials shall be removed, including all temporary road bases or pavement already in place.

4. Soil shall be free of soil-borne diseases and capable of sustaining healthy plant life.

C. Landscape Erosion Control:

1. Provide and maintain temporary erosion control for all planting areas. This shall include, but not necessarily limited to; installation of silt fences at top and bottom of slopes and at 10-foot intervals along the face. Do not block irrigation coverage with silt fences.
2. Provide sand bags, sod, and/or erosion control silt fence at drainage swales until planting is established and soil has been stabilized. See Section 02370 for additional requirements.
3. Repair all scars caused by erosion to original grades.

3.02 LAYOUT

A. Confirm locations and depth of all underground utilities and obstructions. If underground construction or utility lines are encountered during excavation for planting, alternate locations for may be selected by Architect.

B. Preliminary layout for trees shall be accomplished with colored flags or wooden stakes, each indicating plant name and container size (or other Architect approved method). Shrub material shall be spotted and approved in place by Architect prior to planting.

3.03 FINISH GRADING

A. Minor grading modifications may be required to establish final grades.

B. Finish grading shall ensure proper drainage of site as indicated on Civil Engineering Drawings.

C. Planting areas shall be graded such that final grades will be 2 inches below adjacent paving, sidewalks, headers and similar conditions unless otherwise indicated on Drawings.

D. Surface drainage shall be away from building foundations at 1/4 inch per foot to aid in water runoff.

E. Remove or redistribute excess soil before application of fertilizer. Make allowances when establishing finish grades for earth excavation from planting pits and mulch.

F. Trenches: If sprinkler system has been installed after grading and fertilizing has been completed, re-till trench backfill and fertilize to depth specified for area, to conform to specified requirements.

G. Eliminate all erosion scars after each erosion event and prior to commencing maintenance period, unless directed otherwise by Owner.

3.04 INSTALLATION

A. General:

1. Ensure that final grades to ±0.10 feet have been established. Provide for inclusion of all amendments, settling, and other preparatory needs. Ensure that finish grading of all planting areas is as indicated on Drawings and as directed by Architect. Ensure all drainage swales and flow lines have been established.
2. Do not commence any planting until completion of all soil import, soil amendment and grading operations have been completed and approved by Architect.
3. Do not commence shrub planting until the landscape irrigation system has been installed and approved for proper coverage. Trees may be planted in advance of final landscape irrigation system provided provisions for adequate interim watering have been made. Interim watering may include providing automatic drip irrigation to all trees. Refer to irrigation Drawings and Specifications for requirements.
4. Actual planting shall be performed only during periods of suitable weather and soil conditions and during daylight hours.
5. Only as many plants as can be planted and watered on that same day shall be distributed in a specific planting area.
6. Relative position of each tree and plant as shown on the Drawings is subject to Architect approval and shall, if necessary to achieve project design objectives, be relocated prior to planting at no additional cost to Owner. Verify exact layout and locations of all plants with Architect prior to planting.

B. Planting:

1. Excavate plant pit sizes as indicated on Drawings.
   a. Auger drain holes in bottom of planting pits.
   b. Excavation for planting shall include stripping and stacking of all acceptable topsoil encountered within areas to be excavated for trenches, tree pits, plant pits, and planting beds.
   c. Excess soil generated from planting pits not used as backfill, water basins, or in establishing final grades shall be removed from site.
2. Handle each plant in such a manner as to not cause injury or damage during placement or planting. Any plants damaged as a result of Contractor's operations shall be rejected and replaced at Contractor's expense.
3. The "choke" strapping method of lifting trees is strictly forbidden (except for single trunk palms); any trees hoisted in this manner will be rejected.
4. Scarify root ball as needed and to cut any circular root systems. Properly cut off broken or frayed roots.
5. Center plants in pits or as directed by Architect.
6. Face plants with fullest growth facing forward or as directed by Architect.

7. Plant trees and shrubs to expose original container soil and set with root crown approx. 1 inch above finished grade. Backfilling will not be permitted around trunks.
8. All plants which settle deeper than their surrounding grade are to be carefully raised and replanted at correct elevation at no additional cost to Owner.
9. Set each plant plumb and hold rigidly in position until soil has been tamped firmly around rootball. All palm apical meristems shall be plumb. Fill pit with prepared soil, progressively settling soil by water jetting and flooding to remove air pockets and voids.
10. Water thoroughly immediately following planting. Backfill all voids which develop with additional prepared planting soil to bring to finish grade
11. Box container removal:
    a. Remove bottom of wood boxes before planting. If it is not possible to remove box bottom because of size, soil type or condition of rootball, remove every other bottom board, or other method approved by Architect.
    b. Remove sides of box without damage to root ball after positioning plant and partially backfilling.
12. Ball and burlap removal: Remove burlap away from the crown of the tree or palm. Cut away as much of burlap as possible without injury to root ball. Remove wire basket to 18 inches below finish grade

C. Backfill:
1. Planting pits shall be backfilled with amended soil mix. Water jet to remove all air pockets.
2. In a suitable area "central mix" all backfill soil to achieve a uniform blend with amendments. The intent is to achieve a consistent well blended soil in one location and not amend soil adjacent to each planting pit. Clean-up unused excavated soil and dispose of off-site. Protect mix from water until it has been placed around plants.

D. Fertilizer Tablets:
1. Apply in accord with manufacturer’s recommendations.
2. Initially set required number of tablets on the top of each root ball while plants are still in their containers to facilitate planting and verification by Architect.
3. Locate plant tablets 1/3 depth of root ball in accord with manufacturer's instructions.

E. Watering Basins:
1. Where no other temporary watering system is required, construct an earthen basin around each tree. Each basin shall be of a depth sufficient to hold at least 4 inches of water. Maintain water basins until removal is required for installation of shrubs or turf.
2. Monitor tree and shrub root balls for adequate moisture content. Deep water and/or flood water basins as needed to maintain proper soil moisture.

F. Tree Staking and Guying:

1. Staking and guying of all trees shall be completed immediately after planting. Provide new stakes and ties or guying cables and anchors as shown on Drawings.

2. Remove and dispose of all original nursery stakes and ties.

G. Pruning: shall be limited to the minimum amount necessary to remove injured branches and to shape tree for design intent as directed by Architect. This shall include, but not be limited to: lifting of branch structure, thinning of canopy, and elimination of cross branching. Pruning is not to be done in nursery prior to delivery. Pruning paint shall not be used.

H. Auger Holes: Provide 12-inch diameter augured drain holes at 15 feet o.c. in all planting areas and in each tree pit and as indicated on drawings. Triangular space auger holes in large areas. Backfill with amended planting soil. Required depth of drain holes is to be to free draining soil layer below planter or a maximum of 6 ft. below bottom of planting pit.

I. Root Control Barriers: Prior to backfilling, install root control barriers around rootballs as required for specified trees shown on drawings. Connect panels to form a continuous barrier around root ball. Install per manufacturer's directions.

J. Soil Preparation:

1. For sodded, sprigged, and ground cover areas (except slopes 2:1 or greater): After approximate finished grades have been established, uniformly apply required amendments and thoroughly cultivate by means of mechanical tilling into the top 6 inches of soil.

2. The following rates and quantities shall be used for basis of bid only. Specific recommendations will be made after rough grading operations are complete and soil samples have been tested. In the event conditions are substantially different than described, adjustment will be made by Change Order as agreed upon with the Architect.

   Application rates given are per 1000 sq. ft.:

   a. Organic amendment: 2 cu. yd. (Humus material).

   b. Fertilizers: Single superphosphate (0-20-0) 6 lb.

   c. Potassium sulfate (0-0-50): 4 lb.

   d. Ureaformaldehyde (38-0-0): 1/2 lb.

   e. Polyacrylamide (PAM): 12 lb.

      NOTE: If PAM is unavailable, increase organic amendment to 3 cu. yd. per 1000 sq. ft.

3. For soil preparation with PAM, broadcast the amendments and fertilizers as noted above. Apply PAM with a drop spreader. Use caution to avoid drift onto non-soil areas. PAM must be kept dry until it has been incorporated into the soil. Rototill amendments thoroughly into the soil 6 inches deep within 4 hours after application of PAM. Slightly dampened soils will need an immediate tillage after the PAM application. If the organic amendment is damp and is applied after the PAM, rake the PAM into the soil to the addition of the organic

amendment or allow the amendment to dry prior to application of PAM. Irrigate the soil to allow water to penetrate to a depth of 6 inches. The soil needs to be damp but not saturated. Allow the soil to dry or at least dry to the point where the stringiness has disappeared, then re-rototill the soil 6 inches deep.

K. Hydromulch/Hydrosprigging

1. Areas to be hydro-sprigged shall be brought to a smooth even surface according to civil grading plans. Maintain previously established grades and swales.
2. After ground surfaces have been raked smooth and on an even plane, in accordance to specifications and upon approval by Architect, proper soil moisture must be obtained then broadcast stolons/seed uniformly at rates listed on the Drawings.
3. Determine the proper fertilizer required, for both planting and on-going maintenance, for the plant materials. Determine the quality, analysis and ratio; method of application; and frequency of the fertilizer, to insure sufficient nutrients for the sustained growth of the plant material.
4. Broadcast grass sprigs uniformly over prepared surface at a rate of 10 cu. Ft./1000 sq. ft. and mechanically force sprigs into lightly moistened soil.
5. On the same day and immediately following sprigging operations, indicated field areas are to be capped with wood fiber using conventional "Hydromulch" equipment as manufactured by the Bowie Machine Works, or approved equal. 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 40 lb. per 1,000 sq. ft. (1700 lb. per acre) using water at the rate of 25 gallons per 1,000 sq. ft. (1,000 gallons per acre).
6. Hydromulching of turf areas shall consist of mixing the hydromulch slurry, pre-plant fertilizer product, and spraying the mixture over the newly installed grass sprigs and soil.

3.05 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring watering basins, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or list in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.06 CLEAN UP

A. Pick up all trash resulting from this work no less frequently than the last working day of each week or as directed by Architect. All trash shall be removed completely from site. After planting operations have been completed, remove trash, excess soil, empty plant containers and rubbish from property. Scars, ruts, and other marks in ground caused by this work shall be repaired and the site left neat and orderly throughout.

B. Leave site area broom-clean and wash down all paved areas within Contract area, leaving premises in a clean condition.

3.07 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of Landscape Installer. Maintain as required in 3.05 PLANT MAINTENANCE. Begin maintenance immediately after plants area installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: Six months from date of acceptance of planting completion.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of Landscape Installer. Maintain as required in 3.05 PLANT MAINTENANCE. Begin maintenance immediately after plants area installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: Six months from date of acceptance of planting completion.

3.08 FINAL ACCEPTANCE

A. Maintain all planted areas free of debris and insects. Mow, cultivate, weed and water all areas until final acceptance of work is made by Architect. All punch list items shall be completed and all irrigation to be operational prior to Architect's acceptance of project installation.

B. Prior to final approval of work:

1. Re-sod or replant areas where necessary to obtain full and even coverage.
2. Remove all debris resulting from work of this Section.
3. Regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.
4. Fill all depressions and eroded channels with sufficient soil mix to repair grade and ensure proper drainage. Compact lightly, and replant filled areas in accord with Drawing requirements.

C. Final acceptance of work and approval by Architect for Substantial Completion shall include, but may not be limited to:

1. Punch list items completed and approved by Architect.
2. Final grades approved in accord with Drawings and Specifications.

3. Site weed-free and in accord with approved weed control plan.
4. Trees, shrubs, groundcovers, and mulches are all installed in accord with Drawings and Specifications.
5. Landscape irrigation system complete and fully operational.

D. Architect will issue a Letter of Acceptance upon final completion and approval of all work.

END OF SECTION

SECTION 05500 – METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Metal fabrications include items made from iron and steel and aluminum plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere.

B. Extent of metal fabrications is indicated on drawings and schedules.

C. Types of work in this section include metal fabrications for:

1. Rough hardware.

2. Miscellaneous framing and supports.

D. Related Work Described Elsewhere:

1. Section 06100 – ROUGH CARPENTRY

1.02 QUALITY ASSURANCE

A. Shop Assembly: Preassemble 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.

1.03 SUBMITTALS

A. General: Submit under provisions of Section 01330 – SUBMITTAL PROCEDURES.

B. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products.

C. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.

D. Where materials or fabrications are indicated to comply with certain requirements for design loadings include structural computations, material properties and other information needed for structural analysis.

E. Samples: Submit 2 sets of representative samples of railing materials and finished products as may be requested by Architect.

~~1.04 WARRANTY~~

~~A. Manufacturer's Warranty (Aluminum Decorative Screens): Submit written warranty (2 copies) before Substantial Completion signed by screen manufacturer/fabricator agreeing to repair or replace defective materials or components that fail in materials or workmanship during the warranty period.~~

1. ~~The warranty shall include extrusions, decorative cut screen plate, trim, fasteners and all other accessories.~~
2. ~~This warranty shall cover all on-site labor to repair or replace all defective parts for the entire warranty period.~~
3. ~~Warranty Period: 10 years after the Substantial Completion date.~~

~~B. Finish Paint Warranty (Aluminum Decorative Screens): Provide paint manufacturer's warranty for coating system under Hawaiian weather conditions, provide following as a guide for expected warranty:~~

1. ~~TGIC polyester paint finish shall be free from material defects and shall be warranted for 5 years from the date of Substantial Completion.~~
2. ~~Warranty shall cover paint finish system against peeling, chipping, cracking or color change in excess of 5 NBS units when tested according to ASTM D 2244 during the term of this warranty.~~
3. ~~In the event that the above paint system fails under normal wind and weathering conditions within the warranty period, the manufacturer/supplier shall replace or repair as necessary any panels whose factory color finish that fails.~~

PART 2 - PRODUCTS

2.01 MATERIALS

A. Asbestos Prohibition: No asbestos containing materials or equipment shall be used in this section. The Contractor shall ensure that all materials and equipment incorporated in the project are asbestos-free.

B. Ferrous Metals:

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
2. Structural Steel Plates, Channels, Angles and Bars: ASTM A 36/A 36M.
3. Welding Rods and Bare Electrodes: Select according to AWS specification for the metal alloy to be welded.

C. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

1. Aluminum Plate: ASTM B 209, Alloy5052-H32.
2. Extruded Bars and Shapes: ASTM B 221, Alloy 6063-T5/T52

D. Fasteners:

1. Any fasteners in wet or exposed areas of the wall shall be series 300, non-magnetic stainless steel. All other fasteners shall be hot-dipped galvanized unless otherwise noted.

a. Use types, gages, and lengths to suit unit installation conditions.

b. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

2. Exposed Fasteners: Where indicated or required provide flat-head fasteners with exposed heads finished to match exposed aluminum components.

a. Provide fasteners with tamper-resistant heads.

3. Screws: ANSI B18.2.1, ANSI B18.6.2, and ANSI B18.6.3.

4. Plain Washers: Round, carbon steel, ANSI B18.22.1, except where specified of stainless steel.

5. Threaded Concrete and Masonry Anchors:

a. Material and Finish: Bi-Metal, 300 Series Stainless Steel head and shank fused to harden steel tapping threads and point with corrosion resistant coating with not less than 800 hours of salt-spray resistance according to ASTM B 117.

b. Basis of Design: Elco Industries, Inc.; Aggre-Gator; Hex Washer Head with Silver Stalgard finish.

c. Not Acceptable: Self-drilling fasteners, screw in plugs, and powder actuated fasteners are not permitted in concrete

6. Toggle Bolts: ANSI B18.2.1 as required.

7. Lock Washers: Helical spring type carbon steel, ANSI B18.21.1.

8. Self-drilling fasteners shall be Drill-Flex as manufactured by DeWalt. or Kwik-Flex as manufactured by Hilti, Inc. No substitutions accepted. Self-drilling fasteners used in wet areas shall include Dewalt Stal-Guard SUB finish or Hilti's Kwik-Cote finish respectively.

9. Self-piercing fasteners shall be TruGrip Metal-to-Wood fasteners as manufactured by ITW Buildex. or approved equal. Self-piercing fasteners used in wet areas shall include ITW Buildex's Climseal finish.

E. Miscellaneous Steel Backing Plates: Provide adequate steel backing plates as required by architectural and mechanical drawings for the attachment of items such as fixtures, toilets, sinks, railings, equipment, and other items. Securely fasten all plates in precise position to supporting members.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187

2.02 FABRICATION, GENERAL

A. Workmanship: Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.

B. Fabricate metal fabrications to design, dimensions and details shown. Provide members in sizes and profiles indicated, with supporting members and brackets

of size and spacing shown, but not less than required to comply with requirements indicated for structural performance and delegated structural analysis

C. 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 indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Welded Connections: Use welding method which is appropriate for metal and finish indicated and that develops strength required to comply with structural performance criteria. Finish exposed welds and surfaces complying with NOMMA Joint Finishes; “Finish #1 – No Evidence of Welded Joint”. Weld all around at connections, including at fittings. Perform welded connections prior to finishing.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.

F. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

G. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

H. Galvanizing: Provide a zinc coating for those items shown or specified to be galvanized, as follows:

1. ASTM A 153 for galvanizing iron and steel hardware.

2. ASTM A 123 for galvanizing rolled, pressed an forged steel shapes, plates, bars and strip 1/8-inch thick and heavier, and for assembled steel products.

3. Coating thickness shall be not less than G90 designation.

I. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

J. Surface Preparation: Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 'Commercial Blast Cleaning".

2. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning".

2.03 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting metal fabrications.

B. Fabricate items of sizes, shapes and dimensions required. Furnish steel washers.

2.04 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework reinforcement, and other members as required to complete work.

B. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes, plates, and steel bars, for supports, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

C. Galvanize all miscellaneous frames and supports.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine the areas and conditions under which metal fabrications will be installed and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected and approved by the Architect.

B. 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.

C. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.02 INSTALLATION , GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, and other connectors as required.

B. All welding shall be done by skilled mechanics qualified or licensed in accordance with local building regulations and shall conform to the recommended practices of the American Welding Society. All welds or damage to structural steel coating must be prepared and touched up with zinc-rich primer as described herein.

C. Use welding method which is appropriate for metal and finish indicated and that develops strength required to comply with structural performance criteria. Finish exposed welds and surfaces complying with NOMMA Joint Finishes; “Finish #1 – No Evidence of Welded Joint”. Weld all around at connections, including at fittings.

D. Do not weld or abrade surfaces of components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting

E. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete masonry or similar construction.

F. Fit exposed connections accurately together to form tight hairline joints.

G. Align screen units so that variations from level for horizontal members, parallel for aligned members shall not exceed 1/8-inch in 12-feet.

H. Repair finishes damaged by cutting, welding, soldering, and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations and refinish entire unit, or provide new units

I. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.03 CONNECTIONS

A. Nonwelded Connections: Use manufacturer's standard mechanical joints for permanently connecting components. Use wood blocks and padding to prevent damage to screen and awning members and fittings. Seal recessed holes of exposed locking screws using plastic filler cement colored to match finish of the screen and awning.

B. Welded Connections: Use welding method which is appropriate for metal and finish indicated and that develops strength required to comply with structural performance criteria. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces complying with NOMMA Joint Finishes; “Finish #1 – No Evidence of Welded Joint”. Weld all around at connections, including at fittings. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

3.04 ADJUST AND CLEAN

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, 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.

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

END OF SECTION

DIVISION 08- DOORS AND WINDOWS

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Standard steel frame products and doors assemblies including glazing, glazing stops and louvers as indicated and scheduled on drawings.

2. Behavioral Health steel frame products and assemblies including glazing and glazing stops as indicated and scheduled on the Drawings.

B. Related Work Described Elsewhere:

1. Finish hardware is specified in Section 08710 - FINISH HARDWARE.

2. Paint Finish is specified in Section 09900 – PAINTING.

1.02 DEFINITIONS

A. Behavioral Health Assemblies: Steel frame assemblies located in areas that are accessible to the patients.

1.03 REFERENCES

A. American National Standards Institute (ANSI)

1. ANSI/NFPA 80, Standard for Fire Doors and Other Opening Protectives.

2. ANSI/UL 10C, Standard for Positive Pressure Fire Tests of Door Assemblies.

B. American Society of Testing and Materials (ASTM)

1. ASTM A 653, Specification for Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A 1008, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability. Solution Hardened and Bake Hardenable.

3. ASTM A 1011, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra-High Strength.

C. Hollow Metal Manufacturer’s Association (HMMA)

1. HMMA 805, Recommended Selection and Usage Guide for Hollow Metal Doors and Frames.

2. HMMA 810, Hollow Metal Doors

3. HMMA 820, Hollow Metal Frames

D. Steel Door Institute (SDI)

1. ANSI/SDI A250.8, Specifications for Standard Steel Doors and Frames
2. ANSI/SDI A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
3. ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames.
4. SDI 117, Manufacturing Tolerances for Standard Steel Doors and Frames.

1.04 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 100 “Recommended Specifications for Standard Steel Doors and Frames”, Hollow Metal Manufacturer’s Association, HMMA and as herein specified.

B. Manufacturer’s Qualifications: Provide evidence of having personnel and plant equipment capable of fabricating hollow metal door and frame assemblies of the type specified herein.

C. Fire-Rated Assemblies: Where fire-rated assemblies are indicated or required, provide fire-rated door assemblies that comply with NFPA 80 “Standard for Fire Doors and Fire Windows”, and have been tested, listed, and labeled in accordance with UL 10C ‘Positive Pressure Fire Tests of Door Assemblies” and NFPA 252 “Fire Tests of Door Assemblies” by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

D. Fire door assemblies in exit enclosures and exit passageways must have a maximum transmitted temperature end point of not more than 250°F (121°C) above ambient at the end of 30 minutes of the standard fire test exposure.

E. Hardware Mounting Heights: The Contractor shall be responsible to coordinate all mounting heights of various finish hardware with all project requirements.

1.05 SUBMITTALS

A. Submit under the provisions of Section 01330 – SUBMITTAL PROCEDURES.

B. Manufacturer’s Data: Submit manufacturer’s technical product data substantiating that products comply with requirements.

C. Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections, gauges, and finishes. Show anchorage and accessory items.

D. Manufacturer’s recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

E. Manufacturer’s Qualifications.

F. Schedule: Provide a schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

G. Label Construction Certification: For assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for that each frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

H. Contractor responsible for coordination and installation of products covered under this Section shall:

1. Verify and submit to the manufacturer's the actual opening sizes and site conditions by field measurements before fabrication. Coordinate field measurements with fabrication and construction schedules to avoid delays.

2. Verify that substrate conditions, whether existing or installed under other Sections, are as detailed in the Architect's drawings and are acceptable for product installation in accordance with the manufacturer's instructions.

I. Reflect measurements and conditions determined under Section 1.04.G in submittal documents and manufacture product accordingly.

J. Do not proceed with fabrication without receipt of approved submittal drawings and approved hardware schedules.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage. Strap knock-down frames in bundles. Provide temporary steel spreaders securely fastened to the bottom of each welded frame.

B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover in a dry, secure place. Place units on minimum 4-inch high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chambers.

1.07 COORDINATION

A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.

B. Coordinate work with frame opening construction, door and hardware installation.

C. Sequence installation to accommodate required door hardware.

D. Hardware Mounting Heights: The Contractor shall be responsible to coordinate all mounting heights of various finish hardware with all project requirements.

E. Verify field dimensions for factory assembled frames prior to fabrication.

1.08 WARRANTY

A. Provide manufacturer's standard written warranty in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty Period: One (1) year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheets: Zinc coated commercial quality carbon steel, Type B; suitable for exposed applications, complying with ASTM A 1008. Protective zinc coating to comply with ASTM A 653 coating designation G90 at all doors and frames.

B. Supports and Anchors: Fabricate of not less than 18-gauge galvanized sheet steel.

C. Frame Anchors:

1. 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.
2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
3. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
4. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
5. Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    a. Compression Type: Not less than two anchors for each jamb.
    b. Stud Wall Type: Provide three anchors per jamb up to 60-inches in height and four anchors for jambs 60 to 90 inches in height.
    c. Masonry Type: Provide two anchors per jamb up to 60-inches in height and three anchors for jambs 60 to 90 inches in height.
6. Floor Anchors: Angle clip type:
    a. 16 gauge minimum.
        1) Same gauge as door frames for floor anchors used in Behavioral Health assemblies.
    b. To receive 2 fasteners per anchor.
    c. Welded to the bottom of each jamb.

1) Weld floor anchors inside the jamb with at least 4 weld spots per anchor for floor anchors used in Behavioral Health assemblies.

D. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize, complying with ASTM A 153/A 153M "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware", Class C or D as applicable.

E. Factory Applied Primer Paint: Rust-inhibitive enamel paint, either air-drying or baking, suitable as a base for specified finish paints conforming to ANSI A250.10 "Test 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. Standard Steel Door and Frame Manufacturers: Subject to compliance with requirements of this section, provide products from one of the following:

1. Amweld Building Products, Inc.
2. Ceco Door, Assa Abloy
3. Curries Co.
4. Steelcraft
5. Or approved equal.

2.03 FABRICATION, GENERAL

A. Fabricate doors and frames to meet the quality standards and fabrications methods established by the Steel Door Institute (SDI) and the Hollow Metal Manufacturer's Associations (HMMA) and in accordance with the Contract Documents and approved submittal drawings.

B. Fabricate steel doors and frame units to be rigid, neat in appearance and free from defects, warp or buckle.

C. Fabricate frames, concealed stiffeners, reinforcement, edge channels, and moldings from galvanized cold-rolled steel.

D. Fabricate all doors and frames from galvanized sheet steel.

E. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

G. Finish Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI/SDI A250.6 series specifications for frame preparation for hardware.

1. Reinforce standard 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. Standard Doors and Frames

1) Mortised Hinges: 0.093-inch.

2) Surface Closers: 0.067-inch.

b. Behavioral Health Assemblies

1) Hinges: 0.167-inch

2) Closers: 0.167-inch

3) Lock Front: 0,093-inch

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 for Standard Steel Doors and Frames” and the 2010 ADA Standards for Accessible Design Section 404.2.7.

H. Factory Painting:

1. Clean, phosphatize, and prime paint exposed surfaces of steel doors 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 factory coat of prime paint to an even consistency to provide a uniformly finished surface ready to receive paint finish specified in Section 09900 – PAINTING.

2.04 STANDARD STEEL DOORS

A. Flush Steel Doors:

1. Provide doors complying with the requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:

a. Interior Doors: Level 2 (18 gauge); Physical Performance Level B (Heavy Duty), Model 1 (Full Flush)

b. Exterior Doors: Level 3 (16 gauge) and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

2. Construction, General:

a. Doors shall be of the types and sizes shown on approved shop drawings.

b. Door face sheets shall be joined at their vertical edges with no visible seems on their faces. Minimum door thickness shall be 1-3/4-inches.

c. Face sheets shall be stiffened by continuous vertical formed steel sections which, upon assembly span the full thickness of the interior space between the door faces. These stiffeners shall be not less than 22 gage, spaced so that the vertical interior webs shall be no more than 6” apart and securely fastened to both face sheets by spot welds

spaced at a maximum of 5” o.c. vertically. Spaces between stiffeners shall be filled with fiberglass or mineral rockwool batt-type material.

d. Door faces shall be joined together at their vertical edges by a continuous weld extending the full height of the door. All such welds to be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.

e. Top and bottom edges of all doors shall be closed with continuous steel channels not less than 16 gage, spot welded to both faces.

f. Edge profiles shall be provided on both vertical edges of doors as follows:

1) Single-acting swing doors - beveled 1/8-inch in 2-inches.

3. Finish: As specified herein.

B. Door Accessories:

1. Door Vision Lite Frames (where scheduled): Steel sheet matching door face material; minimum 0.032-inch base-metal thickness

a. Profile: Flush type, with beveled stops.

b. Corner Construction: Mitered and welded.

c. Fasteners: Countersunk.

d. Fixed-Stop Location: Secure (key) side of door.

e. Fire-Rated Doors: Comply with requirements in NFPA 80.

f. Glass:

1) Non-rated Doors: 1/4” fully tempered clear glass complying with the requirement of Section 08800 – GLAZING.

2) Fire-Rated Doors (20-Minute):

a) Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials. FireLite Plus; TGP, Nippon Electric Glass Co.

b) Fire Rating: 20 minutes

c) Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent.

d) Labeling: Permanently label each piece of fire-rated glass with the appropriate marking.

2. Door Louvers (where scheduled): SDI 111C; steel sheet matching door face material unless otherwise noted

a. Fire-Rated Automatic Louvers: Constructed with movable blades closed by actuating fusible link; listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.

b. Storm-Rated Louver: Stationary louvers constructed with 0.063-inch-thick extruded aluminum storm resistant blades, finished to match door. Provide isolation material to prevent galvanic corrosion due to dissimilar metals.

2.05 STANDARD STEEL FRAMES

A. Provide metal frames for doors of type and style as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gauge cold-rolled furniture steel.

1. Fabricate frames with mitered corners in the following type construction:

a. Exterior Door Frames: Full Welded construction.

b. Interior Door Frames: Knock-down (mechanical interlock joint) construction with hairline seam.

2. Form all frames of hot dip galvanized steel.

3. Frames shall comply with ANSI A250.4 “Performance Test Procedures for Steel Door Frames and Frame Anchors”, Level A, one million cycle swing test performance for a 4070-door frame.

4. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

5. Transom Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

B. Door Silencers: Except on weather-stripped 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.

E. Finish: As specified herein.

2.06 FRAMES IN BEHAVIORAL HEALTH ASSEMBLIES

A. Provide metal frames for doors borrowed lites, transoms and windows of type and style as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 14 gauge (0.067-inch) galvanized steel.

1. Fabricate frames with mitered corners in the following type construction:

a. Interior Borrowed Lite, Transom and Window Frames: Full Welded construction.

B. Fabricate frames such that all finished work is neat in appearance, square, and free of defects, warps and buckles. Form pressed steel members such that they are straight and of uniform profile throughout their lengths.

C. Fabricate jamb, header and sill profiles in accordance with the frame schedule and as shown on the approved submittal drawings.

D. Fabricate corner joints such that all of their contact edges are closed tight with faces mitered and stops either butted or mitered. Continuous weld faces and soffits and finish the faces smooth. The use of gussets or splice plates as a substitute for welding is not acceptable.

E. Continuously weld all other face joints and finish them smooth.

F. Provide continuous perimeter sealant using security sealant specified in Section 07925 – SECURITY SEALANTS at patient side to create flush, ligature-resistant condition.

G. Minimum height of stops in door openings are required to be 0.625 in. Height of stops on security glazing openings are required to be as shown on approved submittal drawings.

H. Fabricate frames for multiple openings using mullion members which, after fabrication, are closed shapes conforming to profiles shown on approved submittal drawings, and that have no visible seams or joints. Continuous weld and finish smooth all joints between faces of abutted. Weld all joints between stops of abutted members along the soffit such they are left neat and uniform in appearance.

I. Floor Anchors

1. Where applicable, provide floor anchors with two (2) holes for fasteners and fasten them inside jambs with at least four (4) spot welds per anchor.

2. Where so scheduled, install adjustable floor anchors, that provide not less than 2 -inches height adjustment, and fasten them in place with at least four (4) spot welds per anchor.

3. Fabricate floor anchors of the same material thickness as frame.

J. Jamb Anchors

1. Provide the number of anchors on each jamb as follows:

   a. Borrowed light and Window frames: 2 anchors plus 1 for each 18-inches or fraction thereof over 36-inches, spaced at 18-inches maximum between anchors.

2. Door frames: 2 anchors plus 1 for each 18-inches or fraction thereof over 54-inches, spaced at 18-inches maximum between anchors.

K. Glazing Stops:

1. Where security glazing is scheduled or specified, provide pressed steel angle removable glazing stops of not less than 0.123-inch material thickness. Fabricate angle stops such that they are mitered or butted and tight fitting at the corner joints; and are secured in place using 1/4 – 20 or 1/4 – 28 button head tamper resistant, corrosion-resistant machine screws spaced not less than 2-inch from the ends and 9-inches o.c.

   a. Where applicable don’t locate removable stops on the patient side.

2. Stops in borrowed lite, transom and window frames shall have a height to provide 1-inch security glazing engagement. Stops shall be sized and located to accept 1/2-inch-thick glazing.

L. Glazing: 1/2-inch-thick polycarbonate glazing with UV and abrasions resistant coating.

1. Acceptable Manufacturer's:

a. AZ Polymers, LLC; AZCARB AR 15 Polycarbonate Glazing

b. Plaskolite, LLC; Tuffak 15 Polycarbonate Glazing

c. Polyvantis, LLC, SL4855 Polycarbonate Glazing.

2. Provide setting blocks and continuous glazing tape per glazing manufacturer's recommendations.

2.07 FIRE-RATED ASSEMBLIES

A. Assemblies shall bear the listing identification label of the Underwriters Laboratories, Inc. (UL), Factory Mutual Engineering Corp. (FM), Warnock Hersey International (WHI), or a nationally recognized testing laboratory qualified to perform tests of fire assemblies in accordance with ANSI/UL 10C and NFPA 252 and having a listing for the tested assemblies. 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 frame manufacturer. Labels shall not be painted.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION, DOORS

A. General: Install steel doors and frames 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 A250.4 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 and masonry 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. Install fire-rated frames in accordance with NFPA 80.

4. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

5. Glazing: Comply with installation requirements in Section 08800 - GLAZING and with hollow metal door and frame manufacturer's written instructions

C. Door Installation: Fit hollow-metal accurately in frames, with clearances specified in ANSI/SDI 100.

1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.04 TOLERANCES

A. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus, or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus, or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

3. Twist: Plus, or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

4. Plumbness: Plus, or minus 1/16 inch, measured at jambs at floor.

3.05 ADJUST AND CLEAN

A. Factory Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of factory coating and apply touch-up of matching air-drying coating.

B. Final Adjustments: Check and readjust operating finish hardware items, leaving steel frames undamaged and in complete and proper operating conditions.

END OF SECTION

SECTION 09652 – RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Sheet Vinyl Flooring
2. Transition Strips

B. Related Sections include the following:

1. Section 09651 – RESILIENT TILE FLOORING for resilient base.

1.02 SUBMITTALS

A. Product Data: Submit manufacturers data, installation instructions, and maintenance manuals for resilient flooring

B. Samples for Verification: Physical samples of each different color and pattern of flooring system specified, showing the full range of variations expected in these characteristics.

C. Heat-Welded Seam Samples: For each flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

D. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer: Provide flooring by a firm with a minimum of 10 years experience in the production of resilient flooring of the type equivalent to that specified.

B. Installer Qualifications: Engage an experienced installer with a minimum of 5 years experience to perform work of this Section who has specialized in installing resilient flooring products similar to those required for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

D. Slip Resistance: Flooring products shall have a Dynamic Coefficient of Friction (DCOF) AcuTest value shall not be less than 0.42 in accordance to ANSI A 137.1.

E. Fire-Test-Response Characteristics: Provide products with the following fire-test response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 55 and 85 deg F.

C. Store the indoor resilient surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to Project.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.05 PROJECT CONDITIONS

A. Maintain a temperature of 70 deg F plus or minus 5 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post-installation period, maintain a temperature of not less than 55 deg F or more than 85 deg F.

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install flooring and accessories after other finishing operations, including painting, have been completed.

E. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.06 WARRANTY

A. Special Limited Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace flooring that fails within specified warranty period.

1. Material warranty must be direct from the product manufacturer.

2. Failures include, but are not limited to, the following:

a. Material manufacturing defects.

b. Surface wear and deterioration to the point of wear-through.

c. Failure due to substrate moisture exposure not exceeding the manufacturer’s required value for relative humidity when tested according to ASTM F2170 or for moisture vapor emission rate when tested according to ASTM F1869.

3. Warranty Period: Fifteen (15) years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

A. Sheet Vinyl Flooring (**RF-02** & **RF-03**)

1. Sheet Vinyl: ASTM F1303, Type 1, Grade 1, Class B backed heterogeneous sheet vinyl flooring with UV cured factory finish.
    a. Wear-Layer Thickness: 0.020-inch
    b. Overall Thickness: 0.080-inch
2. Seaming Method: Heat Welded.
3. Adhesive Method:
    a. Full-spread adhesive to completely adhere flooring to substrate.
4. Roll Size:
    a. Roll Width: 12-feet.
5. Color and Pattern: As schedule.
6. Performance Criteria:
    a. Static Load Limit/ Maximum Static Load:
        i. ASTM F 970: Passes, ≤0.005-inch
        ii. Modified ASTM F 970 for maximum static load, 2000 psi
    b. Residual Indentation: ASTM F1914; Passes ≤0.012-inch

B. Accessories Integral Flash Cove Base:

1. Reducers: Butt-to transition, polyvinyl chloride (PVC), high quality additives, and colorants, ASTM E 648 Class 1.

2.02 INSTALLATION MATERIALS

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

B. Adhesives: Flooring manufacturer's trowel on solvent-free, two part epoxy adhesive recommended by manufacturer to install heterogenous vinyl backed resilient products and substrate conditions indicated.

1. Adhesive shall be solvent free with zero VOC content, low odor , no ammonia and non-flammable in wet state.
2. Slab Moisture Design Tolerance:
    a. Maximum relative humidity of 85 percent when tested according to ASTM F 2170.
    b. Maximum moisture vapor emission rate of 5 pounds of water per 1000 sq. ft. in 24 hours when tested according to ASTM F1869.

C. Heat Welding Bead: Solid-strand product of floor covering manufacturer. Color to match flooring.

D. Vapor Retarder (Where Required): Two-part, fluid- applied, epoxy based membrane compatible with flooring adhesive. For field applications that are inside the weatherproofing system, vapor retarder products shall have the a VOC content of not more than 100 g/L.

1. Slab-Cote Extreme Moisture Vapor Barrier Coating as manufactured by Bostik, Inc.
2. Drytek Moisture Vapor Barrier as manufactured by Laticrete.
3. Vapor Seal – HM as manufactured by Dependable Floor Products.
4. Or approved equal.

E. Integral Flash Cove Base Accessories:

1. Top Edge Cap Trim: Fabricated to act as edge cap for resilient sheet flooring. Round Cap No. 040, Mercer or pre-approved equal.
   a. Top Shape: Curved.
   b. Colors: Ash 603.
2. Cove Fillet Support Strip: Curved cove providing transition from floor to wall. Cove Stick No. 725 Merstick, Mercer or pre-approved equal.
   a. Curve Radius: 1- inch.

F. Transition Strips: Rubber transition strip; Johnsonite Slim Line Transition, Model # SLT-38-B

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where installation of vinyl products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may act as a bond breaker. Substrate surface shall be smooth and flat to within 1/8 inch per 10 feet.
2. Slab shall be tested for moisture vapor emissions in accordance with ASTM F 1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride or relative humidity in accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes based of the flooring and adhesive manufacturer’s recommendations or requirements.
   a. ASTM F 1869 Testing: One test shall be conducted for every 1000 square feet of flooring and the results not to exceed the value required by the floor or adhesive manufacturer per 100 square feet per 24 hours whichever is more stringent.

b. ASTM F 2170 Testing: Preform three (3) tests for the first 1000 square feet and at least one additional test for each additional 1000 square feet of flooring and the results shall not to exceed the value required by the floor or adhesive manufacturer whichever is more stringent.

3. Perform alkalinity and adhesion tests recommended in writing by manufacturer.

4. Subfloor finishes comply with requirements specified in Section 03300 - CAST-IN-PLACE CONCRETE for slabs receiving resilient flooring.

5. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Apply the specified vapor retarder or approved equal in strict accordance to the manufacturer’s written instructions.

C. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates. Substrate tolerance: level to within 1/8" in 10' at all locations.

D. Remove coatings, including curing compounds, and other substances that act as bond breakers and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

E. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

3.03 FLOOR INSTALLATION, GENERAL

A. General: Comply with tile manufacturer's written installation instructions.

B. Scribe, cut, and fit floor covering to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

C. Extend floor covering into toe spaces, door reveals, closets, and similar openings.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

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

F. Flooring to be adhered to the concrete slab in all locations eliminating the possibility of waves or wrinkles forming caused by the floor shifting, moving or by rolling loads displacing it

3.04 SHEET VINYL INSTALLATION

A. Unroll sheet vinyl floor coverings and allow them to stabilize before cutting and fitting. Lay out sheet vinyl flooring maintaining uniformity of floor covering direction. Minimize the number of seams keeping seams a minimum 6-inches away from parallel joints in the floor covering. Match edges of flooring for color shading at seams. Avoid cross seams.

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

C. Integral-Flash-Cove Base: Cove floor coverings 4 inches up vertical surfaces. Support floor coverings at horizontal and vertical junction by cove strip. Butt at top against cap strip.

3.05 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.

1. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
2. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish the Substantial Completion date in each area of Project. Clean products according to manufacturer's written recommendations.

END OF SECTION

SECTION 10240 – SOUND BARRIER WALL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

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

B. Related Sections include the following:

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

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

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

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

1.03 SUBMITTALS

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

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

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

C. Welding certificates.

D. Qualification Data: For Installer and fabricator.

E. Samples:

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

F. Coordinated Calculation Submittal:

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

1.04 QUALITY ASSURANCE

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

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

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

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

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

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

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

1.06 DELEGATED DESIGN REQUIREMENTS

A. Delegated Engineering Requirements:

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

1.07 PERFORMANCE REQUIREMENTS

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

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

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

C. Acoustic Performance:

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

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

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

PART 2 - PRODUCTS

2.01 MANUFACTURER

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

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

2.02 MATERIALS

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

B. Channels, Angles: ASTM A 36.

C. Plate and Bar: ASTM A 36.

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

E. Welding Electrodes: Comply with AWS requirements.

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

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

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

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

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

1. Nuts: ASTM A563 heavy-hex carbon steel

2. Plate Washers: ASTM A36 carbon steel.

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

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

2.03 FABRICATION

A. Structural Steel:

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

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

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

C. Gates

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

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

2.04 GALVANIZING

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

2.05 FINISHES, GENERAL

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

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

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

PART 3 - EXECUTION

3.01 EXAMINATION

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

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

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

D. Beginning installation means acceptance of conditions.

3.02 PREPARATION

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

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

3.03 INSTALLATION, GENERAL

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

3.04 INSTALLATION, STRUCTURAL SUPPORTS

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

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

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

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

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

3.05 INSTALLATION, BARRIER PANELS

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

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

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

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

3.06 ADJUSTING AND CLEANING

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

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

END OF SECTION

SECTION 12494 – ROLLER SHADES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes manually operated **and motorized** roller shades with single roller.

B. Related Sections include the following:

1. Section 06100 – ROUGH CARPENTRY
2. Section 08520 – GLAZED ALUMINUM SYSTEMS
3. Section 09250 – GYPSUM BOARD ASSEMBLIES
4. **Section 16500 - LIGHTING**

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

1. Motorized Shade Operators: Include operating instructions.

2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.

1. Motorized Shade Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.

2. Wiring Diagrams: Power, system, and control wiring.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members and attachment to building structure.
2. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
3. Shade mounting assembly and attachment.
4. Size and location of access to shade operator, motor, and adjustable components.

D. Samples for Verification:

1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
2. For the following products:
   a. Shade Material: Not less than 3 inches square, with specified treatments applied. Mark face of material.

E. Product Certificates: For each type of roller shade, signed by product manufacturer.

F. Qualification Data: For Installer.

G. Product Test Reports: For each type of roller shade.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of roller shade.

I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:

1. Methods for maintaining roller shades and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.
4. **Motorized shade operator.**

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be approved by manufacturer and shall have 5 years minimum experience of successful installations of specified products in projects of similar size and scope

B. Source Limitations: ***Obtain roller shades system through one source from a single manufacturer with a minimum of ten years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.***

C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

D. Product Standard: Provide roller shades complying with WCMA A 100.1.

E. Coordination:

1. Power wiring (line voltage), to be provided by roller shade installer/dealer, per requirements provided by manufacturer. Coordinate following with roller shade installer/dealer.

2. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.

3. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation and location of installation using same designations indicated on Drawings.

B. Store materials in a dry, secure place. Protect from weather, surface contaminants, corrosion, construction traffic and all other potential damage.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.06 EXTRA MATERIALS

A. The manufacturer shall make available to the Owner a method of ordering new equipment for replacement or parts to be used as spares.

B. The manufacturer shall make available new or remanufactured parts for a minimum period of ten years from the date of Substantial Completion.

1.07 WARRANTY

A. Roller Shade Hardware Warranty: Manufacturer’s standard non-depreciation, transferrable warranty for interior shading.

1. Shade Hardware: 10-years unless otherwise indicated

2. Shadecloth: Manufacturer’s standard 25-year warranty.

3. Roller Shade Motors: Manufacturer's standard non-depreciating 10-year warranty.

4. Roller Shade Installation: One-year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ROLLER SHADES

A. Basis-of-Design Product: Subject to compliance with requirements, provide

1. Manual Single Roll Shade System: Mecho/5 by MechoShade Systems, Inc; Wide Bracket with fascia.

2. Motorized Single Roll Shade System: Electroshade by MechoShade Systems Inc; Wide Bracket with fascia

B. Sheer Shade (**WT-1**): EcoVeil1750

1. Fabric Width: 126-inches.
2. Fabric Thickness: 0.0358-inches
3. Type and Color: 100% Thermoplastic Olefin shade cloth. Color as scheduled.
4. Material Properties:
   a. Openness Factor – 1%,
5. Bottom Hem: Straight
6. Anti-Microbial Characteristics: Shade cloth shall conform to requirements for 'No Growth' in accordance with ASTM G 21 results for fungi, using fungus samples ATCC 9642, 9644, and 9645.

C. Rollers: Extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with double-sided adhesive strip for attaching shade material. Provide a minimum one turn of fabric on roller before the working section of fabric starts.

D. Direction of Roll: Regular from back of roller.

E. Mounting Brackets: Single mounting brackets; galvanized or zinc-plated steel

F. Removable Bottom Flap: Extruded aluminum 0.063-inch thick; long edges rolled; continuous panel concealing bottom of shade roller, brackets, and operating hardware and operators; length as indicated on Drawings; removable design for access.

G. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide exposed-to-view, external type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.

H. Mounting: Single mount as indicated on the Drawings, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

I. Shade Operation: Manual as scheduled on the Drawings:

1. Manual Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
    a. Bead Chains: Stainless steel.
        1) Loop Length: Full length of roller shade.
        2) Limit Stops: Provide upper and lower ball stops.

2. Motorized operator as schedule on the Drawings

a. Motorized Operator: See Article 2.03 of this Section.

2.02 ROLLER SHADE FABRICATION

A. Product Description: Single roller shade consisting of a one roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.

B. Concealed Components: Non-corrodible or corrosion-resistant-coated materials.

1. Lifting Mechanism: With permanently lubricated moving parts.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting roller, and operating hardware and for hardware position and shade mounting method indicated.

E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

G. Colors of Metal and Plastic Components Exposed to View: [As selected by Architect from manufacturer's full range, unless otherwise indicated.

2.03 MOTORIZED ROLLER SHADE OPERATORS

A. General: Provide factory-assembled motorized shade operation systems designed for lifting shades of type, size, weight, construction, use, and operation frequency indicated. Provide operation systems of size and capacity with features, characteristics, and accessories suitable for Project conditions and recommended by shade manufacturer, complete

with electric motors and factory-prewired motor controls, power disconnect switches, enclosures protecting controls and all operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

B. Comply with NFPA 70.

C. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

D. Low-Voltage Motors: MechoShade Systems LLC; WhisperShade lQ2-DC System. Tubular, asynchronous, integral DC motor. 24 VDC; temperature Class B, thermally protected, totally enclosed, maintenance-free. Powered by low voltage power supply and connected into the Networked Digital Lighting Control System specified in Section 16500 – LIGHTING.

1. Audible Noise: 38 dBA measured 3-feet from motor unit, depending on motor torque.

2. Nominal Speed: 10 to 28 RPM. Configurable. Speed managed such that it does not vary due to load/lift capacity.

3. Low voltage power supply for powering external accessories connected to either the dry contact or network port.

4. Network Functions:

a. Integrate with third-party lighting control systems as specified Section 16500 - LIGHTING.

5. Controls:

a. Wired Wall Switch:

1) Single Zone Intelligent Wall Switch: Push-Button for control of one motorized shade or one zone.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

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

3.02 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Replace shades exceeding specified tolerances at no extra cost to Owner.

C. Connections: Connect motorized operators to building electrical system and audiovisual system.

3.03 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.04 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

Provide plumbing fixtures and trim as scheduled.

1.02 SUBMITTALS

A. Submit in accordance with Section 01330 - SUBMITTAL PROCEDURES

B. Manufacturer's Data: Submit manufacturer's technical data for all materials.

C. Operation and Maintenance Data: Submit operation and maintenance data including maintenance schedules, spare parts requirements, and procedures.

D. LEED Submittals: Submit LEED submittal requirements according to Section 01352 - LEED REQUIREMENTS.

1.03 QUALITY ASSURANCE

A. Single Source: Provide similar plumbing fixtures and trim from a single manufacturer.

B. All work shall conform to the current edition of the Uniform Plumbing Code.

1.04 RELATED WORK

A. Section 01352 - LEED REQUIREMENTS.

B. Section 15400 – PLUMBING.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acceptable Manufactures:

1. Fixtures: Kohler, American Standard, Eljer, Acorn or approved equal.
2. Faucets: Kohler, American Standard, Eljer, Moen, Sloan, Chicago, or approved equal.
3. Water Closet Seats: Kohler, American Standard, Olsonite, Beneke, or approved equal.
4. Electric Water Coolers, Drinking Fountains, and Bottle Fillers: Haws, Halsey Taylor, Elkay, Acorn, or approved equal.

B. Where applicable, refer to the Index Creations cross reference "Blue Books". Fixtures, fittings, equipment or appliances listed as similar in the "Blue Books" shall be acceptable under this paragraph. Prequalification is not required.

C. All fixtures shall include accessories to comply with the energy conservation and water conservation requirements of the Building Code and Plumbing Code of the County.

D. All fixtures designated "Accessible" shall conform to the accessible requirements of the Building Code of the County, and Americans with Disabilities Act Accessibility Guidelines (ADAAG). Sections **[**602 for Drinking Fountain and Water Coolers**] [**604 for Water Closets,**] [**605 for Urinals,**] [**606 for Lavatories,**] [**607 for Bathtubs,**] [**608 for Showers,**] [**606 for Sinks,**] [**309 for Controls and Operating Mechanisms**].**

E. Faucet hole covers shall be provided for extra faucet holes. Faucet hole covers shall be polished stainless steel.

F. All plumbing fixtures shall include stops, P-traps, trap arms and escutcheons of the following type unless otherwise specified.

1. Stops shall be chrome plated brass with compression fittings, chrome plated copper tubing risers and chrome plated brass escutcheons.

2. P-traps and Trap Arm shall be 17 gauge chrome plated brass with slip joint. Slip joints which are not accessible, such as tub waste fittings, shall be soldered.

G. Electronic sensor operated valves, or faucets shall be 120 volts UL Listed, or 24 olts UL Listed with transformer supplied with the valve, or faucet. Wiring up to and including a junction box in the plumbing wall space shall be provided and installed under DIVISION 16 of these specifications. All wiring from junction box provided in the plumbing wall space to valves and sensor shall be provided and installed under this section of the specifications in accordance with applicable sections of DIVISION 16 - ELECTRICAL. All wiring including 24 volt wiring shall be placed in conduit. Solenoid and compression valves, strainers, control modules and transformers shall be installed in a recessed stainless steel wall box.

2.02 FIXTURE SCHEDULE

The following general description is given for quality only. Substitutes are acceptable if approved in writing by the Architect.

A. WATER CLOSET Commercial Type (WC-4): Shall be floor mounted floor outlet, 1.28 gallons per flush maximum, flush valve, siphon jet, elongated bowl, vitreous china with mounting bolts, washers, china bolt caps, and 1-1/2 inches top spud.

American Standard 2234.001 "Madera FloWise 15” Height" (1.28 gpf)

Seat: White solid plastic commercial weight elongated open front seat with self-sustaining check hinges: American Standard #5901.100 Heavy duty open front less cover or approved equal.

Flush valve assembly shall be chrome-plated brass diaphragm type with vacuum breaker, one inch angle control screwdriver stop with bumper, wall and spud escutcheons.

B. WATER CLOSET Ligature Resistant Type (WC-2): Shall be on-floor, wall outlet,

1.28 gallons per flush maximum, flush valve, blowout jet, ligature resistant elongated bowl, 304 Stainless steel and polished to a satin finish, rear mount, concealed flush valve style with 1-1/2" NPT connection.

Acorn LR2140-W-2-RM "Secur-Care – Ligature Resistant" (1.28 gpf)

Flush Valve Options:

1. -FVH Flush Valve, Hydraulic (N/A for Top Supply)

Toilet Options

1. -CO1: Cleanout with O-Ring to No-Hub 2-3/7" x 4"

Product Options

1. -EGE: Enviro-Glaze Color Specify EG10
2. -SW: Wall Sleeve

Carriers shall be cast iron providing positive support for wall hung fixture with vertical adjustment to suit mounting height, adjustable extension nipple, chrome plated fixture cap nuts and washers, and pipe fitting either vertical or horizontal to suit piping arrangement. Separate face plate, rod support feet, carrier anchor foot, and carrier assembly shall be provided when necessary to position carrier immediately behind chase wall. Carrier manufacturers shall be Josam, Smith, Wade, Zurn, or approved equal.

C. WATER CLOSET ACCESSIBLE Commercial Type (WC-3): Shall be floor mounted, floor outlet, 1.28 gallons per flush maximum flush valve, blowout jet, elongated bowl, vitreous china with mounting bolts, washers, china bolt caps, 1-1/2 inches top spud and minimum 2-1/8 inches waste trapway. Maximum height of fixture rim shall be 16.5 inches from finished floor.

American Standard 3043.001 "Madera FloWise 16-1/2" Height" (1.28 gpf)

Flush valve assembly shall be chrome plated brass diaphragm type, with vacuum breaker, one inch angle control screwdriver stop with bumper, wall and spud escutcheons. Valves shall be as manufactured by Sloan, Delany, or Zurn. Flush valve actuator shall be located on the wide side of the water closet stall.

ADA (ADAAG SECTION 309 AND 604) Compliant Handle:

Sloan "Regal" 111-1.28

Delany "Flushboy" F402-1.28-G

Zurn "Aquaflush" Z6000-HET-YO (1.28 gpf)

D. WATER CLOSET ACCESSIBLE Ligature Resistant Type (WC-1): Shall be on-floor, wall outlet, 1.28 gallons per flush maximum flush valve, siphon jet, elongated bowl, 304 Stainless steel and polished to a satin finish, rear mount, concealed flush valve style with 1-1/2" NPT connection. Maximum height of fixture rim shall be 18 inches from finished floor.

Acorn LR2140-W-2-RM "Secur-Care – Ligature Resistant LR2140" (1.28 gpf)

Flush Valve Options:

1. -FVH Flush Valve, Hydraulic (N/A for Top Supply)

Toilet Options

1. -CO1: Cleanout with O-Ring to No-Hub 2-3/7” x 4”

Product Options

1. -EGE: Enviro-Glaze Color Specify EG10
2. -SW: Wall Sleeve

E. LAVATORY - WALL HUNG Commercial Type (LAV-3, LAV-4): American Standard 0955001EC "Murro” or approved equal, 22 inches x 21 inches vitreous china wall hung lavatory, 4 inch faucet hole centers, rear overflow, recessed self-draining deck, for concealed arm or wall support.

1. Faucet: Chicago Faucets 3502-E2805ABCP chrome-plated metering faucet with non-aerating spray, vandal-proof. Provide 0.5 gpm flow control device. Connect cold water to both faucet inlet connections if there is no hot water provided.
2. Drain: American Standard 2411.015 or Kohler K-7129-A, 1-1/4 inches chrome-plated brass tailpiece with integral grid (perforated) drain.
3. Shutoff Valve: Brass Craft KTSCR19XC or approved equal 1/2 inch angle 1/4-turn ball supply with loose key stop.
4. Piping: ProFlo PFPTB103 or approved equal, 1-1/4 inches x 1-1/2 inches chrome-plated 17-gauge tubular P-trap and ProFlo PFE11 escutcheon (wall flange).

Notes:

a. See Architectural drawings for lavatory mounting heights. Mounting height for accessible lavatories shall be in accordance with the accessible clearance requirements of the City and County of Honolulu Building Code and ADAAG Section 606. Fixture substitutions shall show that they meet the accessible clearance requirements of the Building Code and ADAAG Section 606.

b. Drain piping and water piping insulation shall be molded closed cell vinyl with anti-microbial additive. Installation shall be in compliance with the Americans with Disabilities Act (ADAAG Section 606). Insulation shall be self extinguishing and as manufactured by Truebro, McGuire Products, Brocar Products or approved equal.

F. LAVATORY - WALL HUNG Ligature Resistant Type (LAV-1, LAV-2): Whitehall WH3740BAR "Ligature Resistant ADA Compliant Bariatric Stainless Steel Basin Powder Coated White”, 22 inches x 20 inches 304 stainless steel wall hung lavatory, 4 inch faucet hole centers, rear overflow, basin, countertop, backsplash, and side splash. Conceal P-trap, trap cover to be constructed of 18 gage, type 304 stainless steel and powder coated white. Fixture is rated at 1,000 lbs when used with an appropriate system.

1. Faucet: Whitehall WH3375-SO “Ligature Resistant Sensor Activated Faucet” chrome-plated electronic faucet with non-aerating spray, vandal-proof. Provide 0.5 gpm flow control device, multi-stream laminar spray nozzle, 9VDC sensor and faucet connections. Faucet valve shall be sensor activated and include Auto-Purge feature. Connect cold water to both faucet inlet connections if there is no hot water provided.

2. Drain: American Standard 2411.015 or Kohler K-7129-A, 1-1/4 inches chrome-plated brass tailpiece with integral grid (perforated) drain.

3. Shutoff Valve: Brass Craft KTSCR19XC or approved equal 1/2 inch angle 1/4-turn ball supply with loose key stop.

4. Piping: ProFlo PFPTB103 or approved equal, 1-1/4 inches x 1-1/2 inches chrome-plated 17-gauge tubular P-trap and ProFlo PFE11 escutcheon (wall flange).

Notes:

a. See Architectural drawings for lavatory mounting heights. Mounting height for accessible lavatories shall be in accordance with the accessible clearance requirements of the City and County of Honolulu Building Code and ADAAG Section 606. Fixture substitutions shall show that they meet the accessible clearance requirements of the Building Code and ADAAG Section 606.

b. Drain piping and water piping insulation shall be molded closed cell vinyl with anti-microbial additive. Installation shall be in compliance with the Americans with Disabilities Act (ADAAG Section 606). Insulation shall be self extinguishing and as manufactured by Truebro, McGuire Products, Brocar Products or approved equal.

G. CORNER FLOOR SERVICE SINK (MS): Kohler K-6710 "Whitby" or approved equal. 28 inches x 28 inches acid-resisting enameled cast iron service sink complete with drain strainer and K-8940 removable vinyl coated wire rim guard.

Kohler K-838T60-4A “Triton Bowe” or approved equal mixing faucet with 2.2 gpm faucet flow restrictor, pail hook, vacuum breaker, hose thread spout, and loose key stops. Include rubber hose and wall hook. Connect cold water to both faucet connections if there is no hot water provided.

H. WASH MACHINE SUPPLY FITTING: Symmons W-400 “Laundry-Mate” Water Control Valve for automatic washing machine with square head cock shut off on risers.

I. WASHER BOX: Symmons LM600 "Laundry-Mate" box with 3/4 inch hose outlets, 2 inch drain and 1/2 inch angle screwdriver stops with escutcheon.

J. LABORATORY SINK (SK-1 and SK-2):

(SK-1): Elkay ELUH2816PD “Lustertone Classic Stainless Steel 30-1/2” x 18-1/2” x 7-1/2” Single Bowl Undermount Sink with Perfect Drain”

(SK-2): Elkay ELUHAD281655PD “Lustertone Classic Stainless Steel 30-1/2” x 18-1/2” x 5-3/8” Single Bowl Undermount ADA Sink w/Perfect Drain”

1. Faucet shall be Chicago Faucet model 434-ABCP, for hot and cold water, single lever, pulldown side spray, chrome plated. Integral, tubular brass spout. Dual-pattern 1.5 GPM outlet. 1/2" NPSM supply inlets for 3/8” or 1/2" flexible riser.

2. Plumber shall provide and install faucet, tailpiece, p-trap, trap arm, chrome plated brass 1/2 inch 1/4-turn ball supply stops, escutcheons, and accessories necessary to complete final connection.

K. LAUNDRY SINK – Ligature Resistant Type (SK-3):

(SK-3) Elkay ELUHAD141455PD "Lusterstone Classic Stainless Steel 16-1/2" x 16-1/2" x 5-3/8" Single Bowl Undermount ADA Sink w/Perfect Drain"

1. **Faucet: Whitehall WH3375-SO "Ligature Resistant Sensor Activated Faucet" chrome-plated electronic faucet with non-aerating spray, vandal-proof. Provide 0.5 gpm flow control device, multi-stream laminar spray nozzle, 9VDC sensor and faucet connections. Faucet valve shall be sensor activated and include Auto-Purge feature. Connect cold water to both faucet inlet connections if there is no hot water provided.**
2. **Drain: Elkay LKPD1 "Perfect Drain Fitting Type 304 Stainless Steel Body and Strainer".**
3. **Shutoff Valve: Brass Craft KTSCR19XC or approved equal 1/2 inch angle 1/4-turn ball supply with loose key stop.**
4. **Piping: ProFlo PFPTB103 or approved equal, 1-1/4 inches x 1-1/2 inches chrome-plated 17-gauge tubular P-trap and ProFlo PFE11 escutcheon (wall flange).**

Notes:

b. See Architectural drawings for lavatory mounting heights. Mounting height for accessible lavatories shall be in accordance with the accessible clearance requirements of the City and County of Honolulu Building Code and ADAAG Section 606. Fixture substitutions shall show that they meet the accessible clearance requirements of the Building Code and ADAAG Section 606.

b. Drain piping and water piping insulation shall be molded closed cell vinyl with anti-microbial additive. Installation shall be in compliance with the Americans with Disabilities Act (ADAAG Section 606). Insulation shall be self extinguishing and as manufactured by Truebro, McGuire Products, Brocar Products or approved equal.

L. SHOWER ACCESSIBLE Commercial Type (SH-2):

1. Chicago Faucets SH-TP2-11-013 shower valve shall be chrome-plated brass single handle pressure balanced mixing valve with temperature limit stops, screwdriver check stops, 1/2 inch inlets and outs, wall elbow with in-line vacuum breaker shower head with ball joint, 2.5 gpm flow restrictor, mounting plate and bolts to suit installation.
2. Shower drain shall be same as specified floor drain commercial type.

M. SHOWER ACCESSIBLE Ligature Resistant Type (SH-1):

1. Whitehall WH538-FH-CSH-SRCH shower heads are chrome-plated brass with 14 gage type 304 stainless steel white mounting flange powder coated and provides a vandal and ligature resistant shower head with a conical shape. Temperature and pressure mixing valve automatically mixes hot and cold water, 1/2 inch inlets and outs, spray pattern is non-adjustable multi-stream style and provides 1.5 gpm flow rate.

2. Shower drain shall be same as specified floor drain ligature resistant type.

N. BOTTLE FILLER (LIGATURE RESISTANT): Acorn Whitehall Model WHBF3 or approved equal. Semi-Recessed Pushbutton operated Ligature Resistant Cup Filler. Unit also has a strong, Ligature Resistant, and Vandal-Resistant design for years of trouble-free service. When installed properly the Cup Filler complies with ADA forward and side reach requirements. Cup Filler is fabricated of type 304 stainless steel and provided with EG10 White powder coating. Unit is certified to ANSI A117.1, Public Law 111-380 (NO-LEAD), CHSC 116875 and NSF/ANSI 61, Section 9. Optional WF3000 PFAS Certification for Lead, Bacteria, Chlorine, Microplastics, and NSF/ANSI for Cyst and total PFAS reduction.

O. ICE MAKER: Scotsman HID207AX-1 “Meridian Air-cooled Ice and Water Dispenser Nugget-Style Countertop with Touchfree Infrared 196 Lb/Day ENERGY STAR” with UV-LED Sanitation, 115V/60HZ/1PH, and 1/2” water inlet connection.

P. HOSE BIBB (INTERIOR): Chicago No. 952 chrome plated sill faucet with integral vacuum breaker, 3/4 inch hose thread outlet, lock shield cap, No. 293-6 loose key tee handle and 1/2 inch female inlet. Chicago No. 1771 built-in chrome plated straightway loose key shutoff valve with 1/2 inch female inlet and outlet and wall flange.

Q. HOSE BIBB (EXTERIOR): Chicago No. 998 rough chrome plated exterior sill faucet with integral vacuum breaker, 3/4 inch hose thread outlet, No. 293-6 removable tee handle, lock shield cap, 3/4 inch female inlet, McDonald 9802W or Lunkenheimer 454 3/4 inch bronze square head service cock.

R. FLOOR DRAIN Commercial Type (FD-2): Smith 2010-A (Round Top) or approved equal. Cast iron body and flashing collar with nickel bronze adjustable heel proof and vandal proof grate. When indicated on drawing, floor drain body shall be provided with a trap primer connection. Size of strainer shall be 6 inches, 8 inches, and 10 inches diameter for drain outlet sizes 2 inches, 3 inches, and 4 inches respectively. Outlet size shall be as indicated on drawings.

S. FLOOR DRAIN Ligature Resistant Type (FD-1): Smith 2005-A (Round Top) or approved equal. Cast iron body and flashing collar with nickel bronze adjustable heel proof and vandal proof grate. When indicated on drawing, floor drain body shall be provided with a trap primer connection. L Speedi-Set Service Weight. Size of strainer shall be 6 inches, 8 inches, and 10 inches diameter for drain outlet sizes 2 inches, 3 inches, and 4 inches respectively. Outlet size shall be as indicated on drawings.

T. FUNNEL FLOOR DRAIN (FFD): Same as floor drain specified above with 4 inches diameter bronze funnel, Smith 3580-PB, Josam F4 Wade EF-4, Zurn ZB-328 or approved equal. When indicated on drawing, floor drain body shall be provided with a trap primer connection. Strainer and funnel shall be bronze finish.

U. AREA DRAIN - SECURED YARD (AD): Smith 1610T or approved equal. Cast iron body, ADA Flat Strainer, bronze clamp ring, shallow sump with flashing flange. Provide vandal proof screws. Outlet size shall be as indicated on drawings.

V. TRAP SEAL PRIMER VALVE: Precision Plumbing Products Trap Primer, MIFAB M-500-NPB, or approved equal. Pressure drop activated type, corrosion resistant brass material, with no springs or diaphragms, integral vacuum breaker

and backflow preventer, distribution unit and UPC approval.

W. THERMOSTATIC MIXING VALVE: Valve shall be thermostatic type, pressure-balanced or combination thermostatic and pressure-balanced. Thermostatic mixing valve shall be sized according to the flow capacity required from the valve. The body shall be of heavy cast bronze, and interior parts shall be brass, bronze, corrosion-resisting steel or copper. The valve shall be equipped with necessary stops, check valves, and unions on the inlets and shall be lead-free compliant. Permissible tempered water temperature variation above and below setpoint shall be per ASSE 1017 requirements.

X. ELECTRONIC LAVATORY FAUCET RECESSED VALVE BOX: MIFAB or approved equal. Box shall be 16 gauge satin coat steel box with stainless steel type 304 door and frame. Box shall be waterproof with continuously welded joints. Door shall be provided with a continuous hinge and key operated cylinder lock. Box size shall be indicated on drawings.

PART 3 - EXECUTION

3.01 FIXTURE INSTALLATION

A. Set all plumbing fixtures in an approved workmanlike manner. Point up edges against wall with approved sealant.

B. Flanges at wall penetrations shall be flush against wall and shall not spin when rotated by hand.

C. Adjust equipment and plumbing fixtures and trim to operate properly and clean all fixtures just prior to final inspection.

D. Rough outlets for all fixtures shall be set exactly to the measurements furnished by the manufacturer; fixtures in batteries with their rough outlets set in a straight line at equal spacing.

E. Verify fixture rough-in height and location with architectural drawings.

F. Each fixture shall be installed at the exact height and location shown on architectural drawings, or as directed.

G. Fixture supplies, trap and trap arm shall be set square with wall, in line with fixture outlets without any offsets, angles, or bends.

H. Each fixture shall be set level and in continuous contact with floor or wall; fixture in batteries shall be set on one line, at equal spacing.

I. Joints between fixtures and walls or floor shall be adequately sealed, forming a smooth, even watertight joint. China caps shall be securely sealed into place over floor flange bolts, entirely covering washer and bolt hole.

J. Wall Supports: Proper provisions for supporting all wall hung plumbing fixtures are totally within the scope of this section of the specifications. All metal supports shall receive one coat of red lead and oiled before erection.

K. Chrome plated brass wall escutcheons shall be provided for all piping. Exposed piping shall be chrome plated. Pipe within cabinets shall be considered exposed and shall therefore be chrome plated.

3.02 TESTING AND ADJUSTING

A. All work completely installed and tested as required by this section and the applicable plumbing ordinances, and proven leak tight before inspection is required. Providing of all required equipment and labor to make the test and repeating of the tests to the satisfaction of those making the inspection is within the scope of this section of the specifications.

B. Procedure:

1. Plumbing Fixtures: Filled with water and checked for leaks and/or retarded flow.

2. All Valves: Adjusted and balanced to provide for the proper operation of the various fixtures. After disinfecting, strainer and aerator screens shall be removed, cleaned and reinstalled.

3.03 SPARE-PARTS DATA

After approval of materials and equipment and 2 months prior to the date of beneficial occupancy, the Contractor shall furnish a complete list of parts and supplies, with current source of supply.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15500 - FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

As specified in Section 00700 - GENERAL CONDITIONS OF THE CONTRACT.

1.02 MECHANICAL GENERAL PROVISIONS

As specified in Section 15011 - GENERAL MECHANICAL PROVISIONS shall apply to work specified in this Section.

1.03 DESCRIPTION OF WORK

A. Provide a complete wet pipe automatic fire sprinkler system for the entire building, as required by code and authority having jurisdiction. The sprinkler system layout as shown on drawings is intended only to describe the general scope of work required and is not to be construed as being a complete workable design in accordance with the Building and Fire Codes of the County of Kauai, and all the applicable NFPA Codes and Regulations. Final design and providing of the Sprinkler System meeting all applicable codes and regulations shall be the sole responsibility of the Contractor. The electrical work to be included under this section is limited to labor and materials required for providing a complete working local supervisory system, include the circuitry between panels, alarms, detectors, etc.

Design and provide each system giving full consideration to blind spaces, piping, electrical equipment, ductwork, and other construction and equipment in accordance to detailed drawings to be submitted for review. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air devices. Center sprinkler heads with respect to ceiling grids, unless otherwise indicated.

B. The work includes the designing and providing of approved Clean Agent, FK-5-1-12 extinguishing system for protection of the Security/Electronics 74 and Data Room 8. The design, equipment, materials, installation and workmanship shall be in strict accordance with the required and advisory provisions of NFPA 2001, except as modified herein. Each system shall include all materials, accessories and equipment inside and outside the building necessary to provide each system complete and ready for use. Design and install each system to give full consideration to built-in spaces, piping, electrical equipment, ductwork and all other construction and equipment and to be free from operating and maintenance difficulties, all in accordance with detailed drawings to be submitted to the Officer-in-Charge for approval. Devices and equipment for fire protection service shall be of a make and type listed by the Underwriter's Laboratories, Inc., or approved by the Factory Mutual System. In the publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the

word "shall" had been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" shall be interpreted to mean the State Designated Representative.

C~~B~~. Fire extinguisher cabinets.

D~~C~~. Related Sections:

1. Section 01330 - SUBMITTALS.
2. Section 01352 - LEED REQUIREMENTS.
3. Section 15011 - GENERAL MECHANICAL PROVISIONS: As specified in Section 15011 - GENERAL MECHANICAL PROVISIONS shall apply to work specified in this Section.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 - SUBMITTALS and Section 15011 - GENERAL MECHANICAL PROVISIONS.

B. Product Data.

C. Layout shop drawings.

D. Design Calculations.

1. Hydraulic calculations.

2. Clean Agent, FK-5-1-12 discharge calculations.

3. Battery Capacity calculations.

E. Shop and Permit Drawings: Submit a layout of the proposed system shop **drawings**.

F. LEED Submittals: Submit LEED submittal requirements according to Section 01352 - LEED REQUIREMENTS, paragraph 1.05, Item F., LEED Documentation Submittals:

1. Credit EQ 4.1 - Low-Emitting Materials for Adhesives and Sealants: Using the "ENVIRONMENTAL MATERIALS REPORTING FORM" appended to the end of Section 01352 - LEED REQUIREMENTS, for all adhesives and sealants installed in the building interior (defined as inside the weatherproofing system and applied on-site) submit manufacturer information along with cut sheets, MSDS, and/or letters from product manufacturers indicating the product meets testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.05 RELATED WORK SPECIFIED IN OTHER SECTION

A. Smoke detectors to be connected to fire alarm system by electrical.

B. All electric power wiring and conduit for flow switch and other equipment required under this section shall be provided under the Electrical Work.

1.06 REFERENCE SPECIFICATION

Latest edition of the Building and Fire Codes of the County of Kauai shall be followed. Where these specifications vary from said standards, the more rigid requirements shall apply.

1.07 STANDARDS

Comply with the local ordinances; requirements of Local Authority, Standards of the National Fire Protection Association regulations of the County of Kauai Building and Fire Departments, and all other applicable regulatory bodies.

1.08 SUBSTITUTIONS

Substitutions shall be in accordance with DIVISION 1- GENERAL REQUIREMENTS.

1.09 COORDINATION

Coordinate with the various trades. Where items must fit spaces previously constructed, verify measurements at the site. Coordinate with other work to ensure that all required inserts, sleeves, and attachments are properly set and that adequate provision is made for installing this work.

1.10 PERMITS AND INSPECTIONS

Obtain and pay for permits, arrange for periodic inspection by local authorities and deliver certificates of final inspection and compliance to the Architect.

1.11 DRAWINGS

A. Contract Drawings: Follow architectural plans of Building and diagrammatic fire protection layouts wherever practicable. Locations are approximate, and before installing, study adjacent architectural details and make installation in an appropriate manner.

B. Shop and Permit Drawings: Submit a layout of the proposed system shop drawings in compliance with the Section "Special Provision", and copies of brochures or catalogs cuts of fixtures and equipment including detailed construction drawings, for approval by the agency having jurisdiction, and by the Architect. Drawings shall be stamped by the contractor's licensed mechanical engineer registered in the State of Hawaii. Show all fire protection work, indicating where piping is exposed or concealed and location of all valves and equipment. No work shall be commenced until these locations are approved by the Architect. Shop drawings shall be submitted in accordance with Section 15011 - GENERAL MECHANICAL PROVISIONS.

C. Material and Equipment: Material or equipment brochures for the following items shall be submitted in accordance with Section 15011 - GENERAL MECHANICAL PROVISIONS.

Fire Extinguishing Cabinets	Fire Department Connection
FK-5-1-12 Fire Extinguishing System	Hangers and Supports

Piping and Fittings	Seismic Restraints
Sprinklers Heads	~~Seismic Restraints~~
Valves and Accessories	

D. As-built drawings shall be provided in accordance with Section 15011 - GENERAL MECHANICAL PROVISIONS.

1.12 GUARANTEE

Guarantee all work for a period of one (1) year from date of final acceptance and in accordance with Section 15011 - GENERAL MECHANICAL PROVISIONS.

1.13 DESIGN

A. Design automatic wet pipe fire extinguishing sprinkler systems in accordance with the required and advisory provisions of Building and Fire Codes of the County of Kauai, by hydraulic calculations for uniform distribution of water over the design area. Each system shall include materials, accessories, and equipment inside and outside the building to provide each system complete and ready for use. Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Devices and equipment shall be for fire use in wet pipe sprinkler systems. Design systems for earthquake protection.

B. Heads in relation to the ceiling and the spacing of sprinkler heads shall not exceed that permitted by the Building and Fire Codes of the County of Kauai. Uniformly space sprinklers on the branch piping. Unless otherwise indicated on drawings, heads shall be located in the center of ceiling panels.

C. Pipe sizing shall limit water velocities to 20 feet per second maximum.

D. Submit electronic copy and at least 1 hardcopy set of hydraulic calculations to the Architect for review and approval. Use pressure information indicated on the drawings; hydraulic calculations shall add 10 percent, but not less than 5 psi safety factor to the calculated required water pressure at the required flow. If computer calculations are used, submittal shall include legend of all abbreviations and step-by-step detailed explanation of printouts. Incomplete submittal will be returned without review.

E. Submit electronic copy and at least 1 hardcopy set of complete shop drawings stamped by the contractor's licensed mechanical engineer to the Architect for review and approval.

F. Obtain fire and building department permit for construction. Provide amount of shop drawings and calculations sets as required by the Building Department.

G. Design and installation of Clean Agent, FK-5-1-12 fire extinguishing systems shall conform to NFPA 70, NFPA 72, NFPA 75, and NFPA 2001 to the requirements as hereinafter specified.

H. Annotate clean agent, FK-5-1-12 system piping layout with reference points

for design. In field wiring diagrams, show locations of devices and points of the system. Prepare working drawings on sheets not smaller than the contract drawings, in accordance with the requirements for "Plans" as specified in NFPA 2001. Include data essential to the proper installation of each system.

I. Submit clean agent, FK-5-1-12 discharge calculations verifying total storage requirements, flooding concentrations, discharge times, flow through the piping network, pipe sizes, and nozzle orifice sizes, in accordance with the manufacturer's listed design manual and NFPA 2001. Submit substantiating battery capacity calculations showing capacity, supervisory and alarm power requirements. The calculations must be shown on the shop drawings

J. The system shall totally flood the protected area providing a volumetric concentration of Clean Agent, FK-5-1-12 of not less than 4.5 percent nor more than 10 percent at 70 degrees F

K. The Clean Agent, FK-5-1-12 concentration shall be based upon shutting down the heating, ventilation and air conditioning (HVAC) systems at the time of agent discharge. The required Clean Agent, FK-5-1-12 concentration shall be maintained in the protected area for a minimum of ten minutes

L. The maximum Clean Agent, FK-5-1-12 liquid discharge time shall be 10 seconds.

M. Each system shall be provided with its own connected reserve supply of Clean Agent, FK-5-1-12. Each reserve supply shall contain an amount of Clean Agent, FK-5-1-12 equal to the primary supply of the system to which it is connected.

N. Upon completion, and before final acceptance of the work, submit a complete set of as-built (record) working drawings, including complete as-built circuit diagrams, of each Clean Agent, FK-5-1-12 system for record purposes. The as-built working drawings shall be not smaller than the contract drawings and shall be reproducible drawings on vellum with title block similar to full size contract drawings. The as-built working drawings shall be furnished in addition to the record drawings required by Section 01300 SUBMITTALS.

1.14 WORKMANSHIP

All materials and equipment shall be installed in accordance with the Building and Fire Codes of the County of Kauai to conform with the contract documents. The system shall be installed by an experienced firm regularly engaged in the design and installation of fire-protection sprinkler systems in accordance with the Building and Fire Codes of the County of Kauai. The Architect may reject any proposed installer who cannot show evidence of such qualifications. Architect's approval will not relieve the Contractor from his responsibilities to perform all work in accordance with specifications to contract terms.

1.15 INSTRUCTIONS TO OWNER

The Contractor shall provide the Owner with the necessary (as required by the Building and Fire Codes of the County of Kauai) information concerning the care,

operation and maintenance of the system.

1.16 CONFORMANCE TO AGENCY REQUIREMENTS

Where materials or equipment are specified to be approved by the Underwriters' Laboratories, Inc., the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. The label of or listing in the Underwriters' Laboratories, Inc., Building Materials List, or the Electrical Appliance and Utilization Equipment List will be acceptable as sufficient evidence that items conform to Underwriters' Laboratories, Inc., requirements.

1.17 NAMEPLATES

Each major component of equipment shall be engraved with the manufacturer's name, address, and catalog number and electrical data on a metal plate mechanically attached to the item of equipment.

1.18 VERIFICATION OF DIMENSIONS

The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, to verify all dimensions in the field, and to advise the Architect of any discrepancy before performing any work. Fabrication of piping shall be in accordance with field measurements.

1.19 DELIVERY AND STORAGE

All equipment and materials shall be delivered and stored in a manner to preclude any damage from the weather, humidity, temperature variations, dirt and dust, or other contaminants. Additionally, all piping shall be capped or plugged until installed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All valves, fittings, and alarm devices shall be UL listed and FM approved for use in wet pipe sprinkler systems.

2.02 MANUFACTURER

A. UL listed Sprinkler and Alarm equipment shall be products of Central, Reliable, Viking, Automatic Sprinkler Corp., Tyco or approved equal.

B. Clean Agent Fire Suppression System and Alarm Equipment shall be products of Kidde Fire Systems, Fike Corporation, or approved equal manufacturer.

2.03 SPRINKLER HEADS

A. UL and Factory Mutual Laboratory approved automatic closed pendent or upright

type, ordinary degree temperature ratings (165 degrees F). All fire sprinkler heads shall be chrome plated, 1/2-inch orifice, and 1/2-inch NPT unless otherwise noted on drawings. For areas that require ligature resistant devices, as indicated on drawings, fire sprinkler heads shall be institutional type. See drawings for special requirements.

B. Cover plates for concealed pendent sprinkler heads shall be color coordinated to match surroundings. Coordinate colors with the Architect prior to ordering.

C. Sprinklers in light hazard and ordinary hazard occupancies shall be of the quick response type.

D. Water shields shall be provided as needed.

E. All surface type escutcheons shall be not more than 5/8 inch deep. Recessed type escutcheons shall be supplied by the same manufacturer as the sprinkler head. Escutcheons shall be chrome plated steel.

F. Furnish extra sprinklers, sprinkler stoppers and wrenches as required by the Building and Fire Codes of the County of Kauai. Provide where directed an approved metal cabinet with hinged door, lock and 2 keys, for storing extra sprinklers, sprinkler stoppers and wrenches.

2.04 FIRE SPRINKLER PIPE AND FITTINGS

A. Aboveground: NFPA 13, except as modified herein. Piping shall be black steel, Schedule 40. (Light wall steel pipe and copper tubing are not allowed). Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are connected shall be threaded. Other pipe fittings shall be welded, or threaded. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. When space is available, rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 1.5 inches and larger. Mechanical couplings manufacturer shall supply fittings and rubber gaskets. Sprinkler pipe and fittings shall be metal. Piping and fittings shall be shipped pre-coated with end caps from the factory. Rusted items delivered and installed at the job site will be rejected.

B. Underground: Provide outside-coated, cement mortar-lined, ductile-iron pipe and fittings conforming to NFPA 24 for piping under the building and less than 5 feet outside of the building walls. Anchor the joints in accordance with NFPA 24; provide concrete thrust block at the elbow where the pipe turns up toward the floor, and restrain the pipe riser with steel rods from the elbow to the flange above the floor. Minimum depth of cover shall be 3 feet.

2.05 WATER - FLOW ALARM

Provide water-flow alarm valve complete with electric alarm switch, alarm retarding device; local, water motor alarm gong weather-proof type; valves, pressure gages, fittings; install complete as per manufacturer's printed installation direction.

2.06 SUPPORT

A. Support sprinkler system piping from building structure by means of hangers,

inserts and other supports, as per requirements in the Building and Fire Codes of the County of Kauai and as indicated on drawings.

B. Provide all necessary supplemental structural steel for proper support or attachment of hangers. Steel shall be hot dipped galvanized.

C. All ferrous items including but not limited to hangers, fasteners rods and accessories shall be galvanized.

2.07 PIPE SLEEVES, ESCUTCHEONS

Furnish and set cast iron (below grade) or Schedule 40 steel pipe sleeves to accommodate pipes passing through foundations, walls, floors, partitions; provide escutcheons at exposed finished surfaces pierced by pipes. Extend sleeves above finished floor and pack space between pipe and sleeve as recommended by the Building and Fire Codes of the County of Kauai.

2.08 SPRINKLER WATER FLOW SWITCH

Vane-type water flow detector or pressure switch shall be installed as indicated on the drawings. The detector shall have a minimum of 2 contacts. The detector shall incorporate a retard element to prevent false signals and be installed in accordance with the manufacturer's recommendations. Local electric audible alarm activated by the detector circuit shall also be provided by Sprinkler Contractor.

2.09 GAUGES

Shall be 3-1/2 inches dial type.

2.10 VALVES

Flanged gate valves shall be O.S. & Y. type, iron body, brass trim, 175 pounds working pressure. Flanged check valves shall be iron body, brass seat and discs, clearway swinging type, with drip connections, 175 pounds working pressure. Valves used in conjunction with valve supervisory devices shall have items notched or otherwise modified to suit the supervisory device.

When indicated on drawings valves located in pit shall be equipped with an indicator post with valve position locking device. UL listed butterfly valves may be used in lieu of gate valve with the Architect's approval.

2.11 FIRE DEPARTMENT CONNECTION

Potter Roemer Co., No. 5715 free standing cast bronze body, Underwriters Labeled 2 way inlet connections with 4 inches N.P.T. outlet, 2, 2-1/2 inch satin chrome finish inlet snoots with National Standard Hose Thread, clapper type independent check valves with ground seats, satin chrome finish bronze snoots plugs with chain and with satin chrome finish coat bronze nameplate lettered as indicated on drawings; and Potter Roemer Co., 5970 Series Identification Plate that describe the name of the building(s) it serves. Complete installation shall include check valve and other accessories as required by the Building and Fire Codes of the County of Kauai.

2.12 ALARM CHECK VALVE ASSEMBLY

The riser or risers shall be installed where shown on plans. The alarm shall consist of a variable pressure alarm check valve, and water motor gong. Contractor shall also completely install a flow switch; wiring by Electrical Contractor.

2.13 CONTROL PANEL

A. Provide a releasing panel that is able to be networked with the building security system. Provide complete electrical supervision of all circuits. Install modular type panel in a flush or surface mounted steel cabinet with hinged door and cylinder lock. Switches and other controls shall not be accessible without the use of a key. The control panel shall be a neat, compact, factory-wired assembly containing all parts and equipment required to provide specified operating and supervisory functions of the system. Panel cabinet shall be finished on the inside and outside with factory-applied enamel finish. Provide prominent rigid plastic or metal identification plates for all lamps and switches. A single open or ground fault condition in any detection or actuation circuit shall not result in any loss of system function, but shall cause the actuation of system trouble signals. A ground fault condition or single break in any other circuit shall result in the activation of the system trouble signals. Supervision of wiring external to the control panel for mechanical equipment shutdown is not required, provided a break in such wiring will cause the associated mechanical equipment to shut down. Loss of AC power, a break in the standby battery power circuits, or abnormally low battery voltage shall also result in the operation of the system trouble signals. The abnormal position of any system switch in the control panel shall also result in the operation of the system trouble signals. Trouble signals shall operate continuously until the system has been restored to normal at the control panel. Panel shall be provided with the following switches:

1. Trouble silencing switch which transfers trouble signals to an indicating lamp. Upon correction of the trouble condition, audible signals will again sound until the switch is returned to its normal position, or the trouble circuit shall be automatically restored to normal upon correction of the trouble condition.

2. Evacuation alarm silence switch which when activated will silence all alarm devices and cause operation of system trouble signals.

B. System control panel shall be UL Fire Prot Dir listed or FM APP GUIDE approved for extinguishing system control (releasing device service).

2.14 SECONDARY POWER SUPPLY

A. Supply shall include nickel cadmium, lead calcium or sealed lead acid batteries and charger. Dry cell batteries are not allowed. House batteries in a well constructed steel cabinet with cylinder lock.

B. Storage Batteries: Provide batteries of adequate ampere-hour rating to operate the system under supervisory conditions for 60 hours at the end of which time batteries shall be capable of operating the entire system in a full

alarm condition for not less than 30 minutes. Provide calculations substantiating the battery capacity. Provide reliable separation between cells to prevent contract between terminals of adjacent cells and between battery terminals and other metal parts.

C. Battery Charger: Provide completely automatic high/low charging rate type charger capable of recovery of the batteries from full discharge to full charge in 48 hours or less. Provide an ammeter for recording rate of charge and a volunteer to indicate the state of battery charge. Provide a red pilot light to indicate when batteries are manually placed on a high rate of charge as part of the unit assembly if high-rate switch is provided.

2.15 MANUAL ACTUATION STATIONS

A. Provide actuation stations for systems at the exits from the protected areas. Operation of a manual station shall cause the control panel to go into full alarm condition and discharge Clean Agent, FK-5-1-12 into the protected area following the adjustable time delay. Stations shall be of a type not subject to operation by jarring or vibration. Stations shall have a dual action release configuration to prevent accidental system discharge. Break-glass-front stations are not permitted. Station color shall be yellow or orange. Warning signs shall be placed at each station indicating that operation of the station will cause immediate Clean Agent, FK-5-1-12 discharge. Where building fire alarm pull stations are also mounted at the exits from the protected areas, they shall be separated from Clean Agent, FK-5-1-12 actuation stations by at least 3 feet horizontally, labels shall be provided to clearly distinguish building fire alarm stations from Clean Agent, FK-5-1-12 stations and stations shall be of different colors.

2.16 SMOKE DETECTORS

A. Designed for detection or abnormal smoke densities by the photoelectric principle. Necessary control and/or power modules required for operation of the device shall be integral with the main control panel. Detectors shall be compatible with main control panel provided and shall suitable for use in a supervised circuit. Malfunction of the electrical circuitry to the detector shall result in the operation of the system trouble alarm. Each detector shall contain a visible indicator lamp that shall show when the unit is activated. Each detector shall be the plug-in type in which the detector base contains screw terminals for making all wiring connections. Remote indicator lamp shall be provided for each detector that is located above suspended ceilings, beneath raised floors or otherwise concealed from view.

B. Photoelectric Detectors: Operate on a multiple cell concept using a light-emitting diode (LED) light source. Failure of the LED shall not cause an alarm condition but shall operate the detector trouble indicating lamp.

C. Detector Spacing and Location: In accordance with the requirements of NFPA 72, the manufacturer's recommendations and the requirements started herein. Spacing and location of detectors shall take into account the airflow into the room and supply diffusers. Detectors shall not be placed closer than 900 millimeters from any discharge grille. Spacing of

detectors on room ceilings shall not exceed 41.80 square meters per detector. Spacing of detectors under raised floors shall not exceed 23.25 square meters per detector. Detectors installed beneath raised floor framing, with the detector facing downward. Where the space under the raised floor is less than 305 millimeters in height, detectors shall be mounted with their bases either horizontal or vertical, with the detection chambers mounted in the upper half of the underfloor space. Under no circumstances shall detectors be mounted facing upward.

2.17 ABORT SWITCH

A. Provide one switch where shown. Activation of switch shall delay only equipment shutdown and agent discharge. Switch shall be guarded, spring-loaded type which operates only when pressure is manually applied to the switch. Upon release of manual pressure, switch shall de-activate allowing delayed functions to resume. After start of agent discharge, switch shall have no effect. Activation of switch during normal (non-alarm) conditions shall cause activation of system trouble signals.

2.18 ALARM SIGNALING DEVICES

A. Audible Alarms: Alarm Horns - Recessed, vibrating type suitable for use in an electrically supervised circuit and shall have a sound output rating of at least 90 decibels at 3 meters.

B. Visual Alarm: Surface mounted lamp assembly suitable for use in an electrically supervised circuit. Lamp shall be the flashing stroboscopic type and powered from the control panel alarm circuit. Lamps shall provide a minimum of 100 candela. Flash rate shall be between 60 and 120 flashes per minute. Lamps shall be protected by a thermo-plastic lens, red for pre-discharge alarms and blue for discharge alarms. All visual alarms shall be synchronized.

2.19 MAIN ANNUNCIATOR

A. Annunciator shall be integral with the main control panel. Provide separate alarm and trouble lamps for each zone alarm initiating circuit located on the exterior of the cabinet door or visible through the cabinet door. Supervision will not be required provided a fault in the annunciator circuits results only in loss of annunciation and will not affect the normal functional operation of the remainder of the system. Each lamp shall provide specific identification of the area by means of a permanent label. In no case shall zone identification consist of the words "Zone 1," "Zone 2," etc., but shall consist of the description of the area.

2.20 AUTOMATIC FIRE DAMPERS

A. Provide automatic control of fire dampers in air conditioning supply duct work as specified in Section 23 00 00 AIR CONDITIONING AND VENTILATION. Activation of fire dampers shall occur upon activation of Clean Agent, FK-5-1-12 discharge.

2.21 ELECTRICAL WORK

A. Electrical work is specified in SECTION 16010 - ELECTRICAL WORK.

B. Wiring: Control and fire suppression wiring, including connections to fire alarm systems, shall be provided under this section and shall conform to NFPA 70. Wiring for 120 volt circuits shall be No. 12 AWG minimum. Wiring for low voltage DC circuits shall be No. 14 AWG minimum. All wiring shall be color coded. Use rigid metal conduit or intermediate metal conduit, except electrical metallic tubing may be used in dry locations not enclosed in concrete and where not subject to mechanical damage.

C. Operating Power: Power shall be 120 volts AC service, transformed through a two winding isolation type transformer and rectified to 24 volts DC for operation of all signal initiating, signal sounding, and trouble signal. Provide secondary DC power supply for operation of system in the event of failure from emergency to normal power shall be fully automatic and shall not cause transmission of a false alarm. Obtain AC operating power to control panel and battery charger as indicated on the drawings. The power supply shall be equipped with a locking mechanism and marked in red with the words "FK-5-1-12 System Circuit Control".

D. Conductor Identification: All circuit conductors shall be identified within each enclosure where a tap, splice or termination is made. Conductor identification shall be by plastic coated self-sticking printed markers or by heat-shrink type sleeves. Attach the markers in a manner that will not permit accidental detachment. Properly identify control circuit terminations.

2.**22**~~13~~ FIRE EXTINGUISHER CABINETS

A. Fire Extinguisher Cabinet: Potter Roemer, Croker, J.L., or approved equal, unit consisting of 20-gauge aluminum box with anodized aluminum door, style "E" break glass (25 square inch), decal Figure No. 1970, cylinder lock. Finish shall be baked enamel inside, rust resistant prime coat outside except for aluminum door and trim. 10 lb. dry chemical fire extinguisher, UL rating of 4A:80B:C. See architectural drawings for mounting heights.

		Overall	Recess
F.E.C.-R	Fully Recessed 1704-E	13 inches x 28 inches x 6 inches	10 inches x 25 inches x 5.5 inches
F.E.C.-SR	Semi Recessed 1724-E	13 inches x 28 inches x 6 inches	10 inches x 25 inches x 4 inches

2.23 CLEAN AGENT FIRE EXTINGUISHERS

A. Fire Extinguisher Cabinet shall be as specified in the preceding paragraph. Fire extinguisher shall be 10 lb. Clean agent, UL rating of 2A and shall be placed in fire extinguisher cabinets, or surface mounted.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Do not scale the plans. Check all measurements at the building and adjust the work to fit the space allotted. Close cooperation between all trades will be required. Any work done without regard for the work of other trades shall be moved if necessary, at the option of the Architect, without extra charge, to permit the proper installation of other work.

B. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, or other substances can enter the pipe or fittings.

C. The responsibility for the care and protection of the equipment and work rests with the Contractor until it has been tested and accepted.

D. Work shall not proceed before obtaining a building permit, and approved shop drawing and approved equipment submittals.

3.02 CUTTING AND PATCHING

A. Place sleeves for piping penetrating through poured concrete or masonry construction prior to pouring of concrete or construction of masonry.

B. Do not cut any openings in any structural member until location is approved by the Architect.

C. Cutting holes in hardened concrete is not permitted except by special permission of the Architect, which will be an individual basis and require the use of small hand tools, diamond drills, or other controlled means at the Architect's discretion.

D. Cutting of reinforcing bars is not permitted. Splay bars to clear or move holes as required.

E. If necessary to cut holes in slabs or concrete walls, first prelocate holes to clear beams, joists, columns, etc. Cut hole neat and clean using diamond core drill or small chipping gun. Leave all reinforcing bar intact; enlarge holes if necessary.

F. If necessary to cut holes in masonry walls, carefully remove a minimum amount of masonry.

G. Install sheet metal or black iron pipe sleeves through holes cut in slabs, concrete walls or masonry walls. In concrete slab walls, install sleeves to clear reinforcing bars and tightly pack concrete around sleeve for full thickness of walls. In masonry walls, rest or re-grout all loose masonry units; pack cement grout tight and solid around sleeves for full thickness of wall.

3.03 FITTINGS

Fittings for above ground piping shall be of a type specifically approved for use in sprinkler systems. Bushings shall be used only where standard fittings of the required size are not available. The use of bushings is further restricted to requirements of the Building and Fire Codes of the County of Kauai.

3.04 REDUCERS

Reductions in pipe sizes shall be made with one-piece reducing fittings.

Bushings will not be acceptable, except when standard fittings of the proper size are not available. Where used, face bushings shall be installed with the outer face flush with the face of the fitting opening being reduced. Bushings shall not be used in elbow fittings in more than one outlet of a tee, in more than 2 outlets of a cross, or where reduction in size is less than 1/2 inch.

3.05 PIPE SUPPORTS AND HANGERS

A. The recommended methods and requirements for supporting or hanging pipe as set forth in the Building and Fire Codes of the County of Kauai shall be mandatory.

B. Install hangers and supports for all pipe work to provide for expansion and contraction, prevent vibration and maintain required grading by proper adjustment.

C. Refer to structural drawings for type of construction from which piping and/or equipment is to be suspended. Drilling of pre-stressed concrete is not permitted without written approval from the Structural Engineer.

D. Drilled in Threaded Inserts: Where supports in beams and joists are required after concrete has been poured, Phillips "Redhead" Drilled-In Threaded Inserts shall be provided, installed in accordance with the manufacturer's recommendations and U.L. listed for seismic applications. Locations shall be approved by the Structural Engineer.

3.06 EARTHQUAKE (SEISMIC) PROTECTION

Install sprinkler systems with seismic protection to prevent pipe breakage during an earthquake. Provide flexible couplings, swing joints, sway bracings and adequate clearances in accordance with NFPA 13. Provide seismic protection in accordance with IBC 2018, Chapter 9 and Section 1613 - Kauai.

3.07 PIPE SLEEVES

Pipes passing through concrete or masonry walls or concrete floors shall be provided with pipe sleeves fitted into place at the time of construction. All rectangular and square openings shall be as detailed. Each sleeve shall extend through its respective wall or floor, and be cut flush with each surface. Unless otherwise indicated, sleeves shall be of such size as to provide a minimum of 1/4-inch all-round clearance between the pipe and sleeve. Sleeves in bearing walls, waterproofing membrane floors, and wet areas shall be steel pipe or cast iron pipe. Sleeves in non-bearing walls, floors, or ceilings may be steel pipe, cast iron pipe, or galvanized sheet metal with lock-type longitudinal seam.

3.08 BRACING AND CLAMPING

The connection between the underground piping and the base of the riser shall be anchored by means of tie rods and pipe clamps. Bends, plugs, and tees shall be braced or clamped in accordance with the requirements of NFPA 24.

3.09 THRUST BLOCKS

Adequate concrete reaction thrust blocks conforming to NFPA 24 shall be installed at underground pipe fittings.

3.10 TESTS

A. Subject Sprinkler System to tests required by and in presence of representatives of agencies having jurisdiction. Notify the Fire Protection Engineer a minimum of 5 working days in advance of flushing and testing. Conduct, duration, other details of tests not covered by agencies' requirements shall be in accordance with the Building and Fire Codes of the County of Kauai. Provide instruments, equipment; pay expenses incurred in making tests; obtain approvals, and certificates. Where evidence of stoppage appears in piping or equipment, disconnect, clean, repair, reconnect obstructed parts; also bear cost of cutting and patching adjoining work necessitated by such cleaning and repairing. Provide material and test certificate for underground and aboveground piping per NFPA 13 with the necessary information. Aboveground and belowground piping shall be hydrostatically tested at 200 psi for 2 hours without any pressure loss.

Note: The Fire Protection Engineer must witness tests and sign certificate.

3.11 SPECIAL CONDITIONS

A. Conformance with provision of the IBC 2018, Chapter 9 and Section 1621 - Kauai (as amended and adopted) are hereby made a part of this section of the specifications.

B. Fire Sprinkler Heads shall be located in the center of ceiling panels. When centering sprinkler heads in the ceiling panel require additional sprinkler heads, additional sprinkler heads shall be added.

C. Brace excessively long sprigs and drops at individual sprinkler heads. In general, sprigs and drops shall not exceed 20 inches without additional bracing.

3.12 WATER SUPPLY CONNECTION

Connect sprinkler system to new main water service pipe outside of building with detector check meter. Before connecting, flush water service through unrestricted opening at least 4 inches diameter. Refer to civil drawing for detector check meter location.

3.13 DRAIN AND TEST CONNECTIONS

Install horizontal piping graded to low points and in manner to make it possible to test and empty entire system; provide valves and piping of sizes and in locations in accordance with the requirements of the Building and Fire Codes of the County of Kauai. Drain valve and discharge fittings shall be visible; use sight-

drain fittings if necessary. Provide flushing connections at end of cross mains, consisting of capped nipple same diameter as pipe but not larger than 2 inches.

3.14 VALVE SEALS, TAGS, CHARTS

A. Seals: Provide approved seal for each manually operated shut-off valve required to be sealed in open position.

B. Signs: Provide identification signs of standard design, fasten securely at designated locations as per the Building and Fire Codes of the County of Kauai.

C. Tags: Provide brass tags 1-1/2 inches diameter; stamp with designator numbers, secure with 12-gauge copper wire to spindle of all control valves.

D. Charts: Provide 2 copies of approved sprinkler system diagram and valve chart, giving designating number, function, location of each valve; mount in painted, glazed frames, and hang where directed.

3.15 TESTING AND FLUSHING

Testing and flushing shall be done in accordance with the Building and Fire Codes of the County of Kauai.

3.16 DISINFECTION

Disinfect the new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C601. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million. Exercise caution when mixing chlorine disinfection solutions. Flushing of chlorinated water shall be done in accordance with NFPA 25 - INSPECTION, TESTING AND MAINTENANCE OF SPRINKLER SYSTEMS. The Contractor shall be responsible for the proper disposal of chlorinated water to safeguard public health and environment in accordance with the applicable Department of Health requirements.

3.17 FIELD PAINTING

A. Clean, pre-treat, prime, and paint all new fire sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat of oil base primer applied to a minimum dry film thickness of 1.0 mil.

B. Clean, pretreat, prime, and finish paint new Clean Agent, FK-5-1-12 fire extinguishing systems, including piping, conduit, hangers and miscellaneous metalwork. Apply coatings only to clean, dry, surfaces using clean brushes. Clean surfaces to remove all dust, dirt, rust and loose mill scale. Immediately after cleaning, the metal surfaces shall receive one coat of primer conforming to FS TT-P-645 applied to a minimum dry film thickness of one mil. Exercise due care to avoid the painting of operating devices. Materials which are used to protect devices, while painting is in

process, shall be removed upon the completion of painting. Remove all devices which are painted and provide new clean devices of the proper type in lieu thereof.

C~~B~~. Clean, pre-treat, prime and paint (as described above) existing fire sprinkler system, where indicated on drawing.

D~~C~~. Finish painting shall consist of 2 coats - material and dry film thickness as specified in Section 09900 - PAINTING.

3.18 FIELD TESTING

A. Preliminary Tests: Perform tests in the presence of the Fire Protection Engineer to determine conformance with the specified requirements. Each piping system shall be pneumatically tested at 150 psig and shall show no leakage or reduction in gage pressure after 30 minutes. The contractor shall conduct complete preliminary tests, which shall encompass all aspects of system operation. Individually test all detectors, manual actuation stations, alarms, control panels, and all other components and accessories to demonstrate proper functioning.

B. Final Acceptance Tests: The Fire Protection Engineer, Special Inspector, State, Construction Manager and Commissioning Authority will witness formal tests and approve all systems before they are accepted. The system shall be considered ready for such testing only after all necessary preliminary tests have been made and all deficiencies found have been corrected to the satisfaction of the Fire Protection Engineer and written certification to this effect is received by the State. The Fire Protection Specialist shall conduct the Final Acceptance Test and shall provide a complete demonstration of the operation of the system. This shall include automatic and manual operation of the systems and the room integrity test. In addition, the Fire Protection Specialist shall have available copies of as-built drawings and certificates of tests previously conducted. The installation shall not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received.

C. System Function Tests Without Clean Agent, FK-5-1-12 Discharge: The entire detection/alarm/actuation system shall be operated. As a minimum, operation and supervision of the following functions and devices shall be demonstrated.

1. **All operational and supervisory functions of the control and annunciator panels, including the cross-zoning, pre-discharge alarm, discharge alarm, post-discharge alarm and time delay features.**
2. **Each manual actuation station and associated circuit.**
3. **All pre-discharge and post-discharge alarms and associated circuits.**
4. **All actuator circuits and discharge heads (without Clean Agent, FK-5-1-12 discharge).**
5. **Air handling, Fan coil, and computer equipment shutdown.**
6. **Automatic fire dampers.**

7. **Activation of the building fire evacuation alarm system.**
8. **Activation of the Base fire alarm system (receipt of fire alarm at alarm office).**
9. **All of the above tests shall be repeated with the system on battery power only.**

3.**19**~~18~~ STANDARDIZED PIPE IDENTIFICATION SYSTEM

A. Use an arrow marker with each pipe content marker, the arrow shall always point away from the pipe marker and in the direction of the flow.

B. If flow can be in both directions, use a double headed arrow marker.

C. Apply pipe marker and arrow marker at every point of pipe entry or exit where line goes through wall.

D. Apply pipe marker and arrow marker on each riser and "T" joint.

E. Apply pipe marker and arrow marker every 20 feet on long continuous lines.

F. Apply markers on the 2 lower quarters of the pipe and where view is unobstructed.

G. Arrow markers shall be 4 inches long minimum and pipe content marker lettering sizes shall be 1-1/2 inches minimum in height.

END OF SECTION

SECTION 16810 – AUDIO VIDEO SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes Audio-Video Systems.

B. The term “provide” used throughout this specification and drawings means “furnish, install, test, and certify”.

C. Within two weeks after award of contract, the AV Contractor shall arrange a “CA kickoff” meeting and/or conference call with the General Contractor, Construction Manager, Architect, Consultant, and Owner (when applicable) to discuss general project expectations.

D. Coordinate project schedule, installation schedule, phasing and any other requirements deemed necessary with Construction Manager and all necessary trades to ensure successful completion of work.

E. Phasing, temporary distribution/equipment, cutover and implementation where applicable, shall be coordinated with the Construction Manager.

F. Extent of Audio-Video Systems infrastructure work is indicated by Division 16 “Electrical” sections, drawings and schedules and is hereby defined to include, but not by way of limitation, the provisions of:

1. Raceway systems including but not limited to conduits, cable trays, sleeves, surface raceways, pull-boxes, junction boxes, back-boxes, etc.

2. Power distribution within equipment racks including programable power sequencing of AC circuits.

3. All AV system related infrastructure shall be provided as part of the Base Building Project including but not limited to raceway, cable, cable terminals, and AV equipment rack room fit-out where applicable.

G. Extent of Audio Video Systems Infrastructure as indicated by Division 16 “Communications” and those associated specification sections that address Ethernet and IT requirements shall include but not be limited to:

1. Patch cords, jumper cables, and cross-connect cables to interconnect wiring terminals as well as electronic equipment.

2. Network connectivity: a channel is defined as the connection from one active device to another, including any patch cords and equipment cords and shall not exceed 100 meters total length.

3. Testing of all category type cable infrastructure and grounding systems as noted by specification, drawings, and applicable industry standards.

H. General requirements also include but are not limited to:

1. Grounding and bonding of all metallic hardware components back to the nearest grounding bus including, but not limited to equipment racks, cabinets, cable trays, ladder rack, metallic cable sheaths, wall mounted wiring terminals, conduits, sleeves, metallic ductwork, and frames.

2. All physical cable management hardware including, but not limited to: “J-hooks” in accessible ceiling areas where conduit has not been provided for, “D-rings” on backboards, vertical and horizontal managers on racks and cabinets, vertical and horizontal ladder-type or wire basket cable tray within AV head-end equipment rooms.

3. The use of Velcro type cable ties are required; the use of plastic zip ties shall not be permitted. No exceptions.

4. Fire stopping as required. Contractor shall provide fire stopping for all low-voltage openings (including empty low voltage raceway) once cable installation is complete. Confirm specific fire stopping scope requirements with Construction Manager.

5. Seismic bracing of all equipment racks, ladder-type or wire basket cable trays, ceiling recessed equipment such as loudspeakers, plenum boxes et cetera as required by code and by local governing jurisdiction.

6. Preparation and submission of product data, shop drawings, testing reports, as-built drawings, and cabling documentation as required in this specification.

7. Construction and Installation warranties.

8. Manufacturer components, channel and solutions warranties.

9. Installation and testing of all system and components shall be documented.

10. Onsite administrative and user training.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 16 Electrical Sections pertaining to basic materials and installation methods, raceways, boxes, supports, grounding and bonding, and wiring.

C. Division 16 Telecommunication Sections pertaining to structured UTP/STP cabling, fiber optic cabling, low voltage coaxial signal distribution and installation methods.

D. Section 16813 “Audio Video Control Systems”.

E. Section 16819 “Audio Video Systems Performance Verification”.

F. Audio-Video Systems (AV) Construction Drawings for equipment locations, system layouts, one-line diagrams, and details.

1.03 REFERENCES

A. Audiovisual and Integrated Experience Association (AVIXA):

1. ANSI / INFOCOMM 2M – Standard Guide for Audiovisual Design and Coordination Processes
2. ANSI / INFOCOMM 10 – Audiovisual Systems Performance Verification
3. ANSI / INFOCOMM A102.01 – Audio Coverage Uniformity in Listener Areas
4. AVIXA F502.01 – Rack Building for Audiovisual Systems
5. AVIXA F502.02 – Rack Design for Audiovisual Systems
6. INFOCOMM F501.01 – Cable Labeling for Audiovisual Systems

B. Building Industry Consulting Service International (BICSI):

1. ANSI / BICSI 001 – Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities
2. ANSI / BICSI N1 – Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure
3. ANSI / BICSI N3 – Planning and Installation Methods for the Bonding and Grounding of Telecommunication and ICT Systems and Infrastructure

C. Code of Federal Regulations (CFR):

1. 29 CFR 1910.268 – Occupation Safety and Health Standards (OSHA) – Telecommunications
2. 36 CFR 1191 – Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

D. Electronic Components Industry Association (ECIA):

1. ECIA EIA/ECA 310-E – Cabinets, Racks, Panels, and Associated Equipment

E. National Fire Protection Association (NFPA):

1. NFPA 70 – National Electrical Code
2. NFPA 72 – National Fire Alarm and Signaling Code
3. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems

F. Telecommunications Industry Association (TIA):

1. TIA-568.0 – Generic Telecommunications Cabling for Customer Premises

2. TIA-568.1 – Commercial Building Telecommunications Infrastructure Standard
3. TIA-568.2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standards
4. TIA-568.3 – Optical Fiber Cabling Components Standard
5. TIA-568.4 – Broadband Coaxial Cabling and Components Standard
6. TIA-569 – Telecommunications Pathways and Spaces
7. TIA-606 – Administration Standard for Telecommunications Infrastructure
8. TIA-607 – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
9. TIA-862 – Structured Cabling Infrastructure Standard for Intelligent Building Systems
10. TIA-1152 – Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

G. Underwriters Laboratories (UL):

1. UL 263 – Fire Tests of Building Construction and Materials
2. UL 1480 – Speakers for Fire Alarm and Signaling Systems, Including Accessories
3. UL 2043 – Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handing Spaces
4. UL 62368-1 – Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements

1.04 DEFINITIONS

A. The term “Owner” shall refer to the facility’s owner or primary operator.

B. The term “Architect” shall refer to the Architect of Record (AOR).

C. The terms “Consultant”, “Designer of Record”, and “DOR” shall refer to CENSEO AV+Acoustics LLC, being responsible for the design and specification of the audio-video systems.

D. The terms “AV Contractor”, “AVC”, and “Contractor” shall refer to the Audio-Video Systems Contractor who has been awarded the contract for this scope and who has responsibility for the performance of the work specified in this specification.

E. The term “EC” shall refer to the electrical contractor.

F. The term “GC” shall refer to the general contractor.

G. The term “SCC” shall refer to the structured cabling contractor.

H. The terms “not in contract” and “NIC” shall refer to work or equipment that is not in the contract covered in this specification.

I. The terms “owner furnished equipment” and “OFE” shall refer to equipment which shall be furnished by the Owner or user to the Contractor. The Contractor shall be responsible for installing the equipment at the project site in good functional order as detailed herein. Where the equipment is existing or is used, the AV Contractor shall verify the operation and functionality of these devices prior to installation. Any deficiencies shall be brought to the Owner and Consultant’s attention immediately via written documentation.

~~J. The term “owner-furnished, contractor-installed” and “OFCI”…shall refer to xxx~~

~~K. The term “owner-furnished, owner-installed” and “OFOI” shall refer to xxx~~

~~L. The term “turn-key” shall refer to xxx~~

M. The term “procure” shall indicate the responsibility to acquire materials, equipment, or services needed to complete the project scope.

N. The term “furnish” shall indicate the responsibility to ship or deliver the item to the job site for receipt, staging and installation by others.

O. The term “install” or “installation” shall indicate the responsibility of receiving the item at the job site, providing adequate storage, unpacking or uncrating the item, physically securing the item or otherwise making ready the item for its intended use by following the instruction and approved methods of the manufacturer and those contained herein.

P. The term “provide” shall refer to the responsibility to both procure, furnish, install, test and certify equipment.

Q. The term “shall” is mandatory; the term “will” is informative; the term “should” is advisory.

1.05 SCOPE OF WORK

A. The completion of the work described within this specification section shall be the sole responsibility of one (1) firm, hereafter referred to as the AV Contractor or AVC. The AVC shall be responsible for providing all equipment, cabling, programming, testing, training and commissioning as described in this specification section.

B. The AV Contractor shall provide all equipment, cabling, programming and materials, whether specifically mentioned herein or not, to ensure a turn-key and fully operational system.

C. The specifications and drawings shall be read and used together. System features which are mentioned in the one are not necessarily shown in the other. In case of conflict between the drawings and specifications, request clarification via the pre-bid RFI proves. These pre-bid RFIs are due one (1) week before the bids are due. All pre-bid RFI responses shall be distributed to each Bidder.

1.06 System descriptions and functions

A. Lobby

1. A local digital signage display for wayfinding or announcements with a digital signage player mounted behind the display.

B. CR Observation, Day Room, and Large Therapy

1. A local display protected by an anti-ligature shroud. The display will have the ability to show digital signage, and wireless screen sharing.

2. Devices include a digital signage player, wireless presentation, and network equipment to send audio to ceiling PoE+ speakers. Devices must be mounted in the recessed display backbox.

3. Each display will be connected to two (2) ceiling recessed PoE+ speakers for improved audio quality.

4. Displays are controlled by a local passkey protected control panel to change display sources, volume, and power.

C. Visit/Tele

1. A local display protected by an anti-ligature shroud. The display will have the ability to show digital signage, wireless screen sharing and wireless conferencing.

2. Devices include a digital signage player, wireless presentation, and VTC equipment to. Devices must be mounted in the recessed display backbox.

3. Display will be connected to a VTC bar rigidly connected to the protective shroud.

4. Displays are controlled by a local passkey protected control panel to change display sources, volume, and power

D. Conference

1. The display will have the ability to show digital signage, wireless screen sharing, wireless conferencing, and local HDMI plate.

2. Devices include a digital signage player, wireless presentation, and VTC equipment to. Devices must be mounted in the recessed display backbox.

3. Display will be connected to a VTC bar rigidly connected to the protective shroud.

4. Displays are controlled by a local passkey protected control panel to change display sources, volume, and power

1.07 RELATED WORK BY OTHER TRADE CONTRACTORS

A. General Contractor: It is the responsibility of the GC to furnish and install all steel not shown on the Structural drawings but required for the Audio-Video equipment rigging and support. Additionally, the GC shall provide plywood backing to support video flat panel monitors, video walls, etc.

B. Electrical: It is the responsibility of the EC to furnish and install the work described in the Electrical documentation. All high-voltage work shall be done by the EC only.

1. It is anticipated that the AV equipment rack grounding bar shall be provided and installed by the EC / Tele-Data Contractors. See drawing detail sheets for additional information.

C. Tele-data: It is the responsibility of the Tele-Data / IT Contractor to furnish and install network data drops (including those designated as Dante signal types) and wireless LAN access point equipment that shall be utilized by the AV Systems and one-line diagrams. AVC shall closely coordinate their requirements with the Tele-Data Contractor.

1.08 MILESTONES

A. CA Kick-Off Meeting: Upon the contract award, and within twenty (20) working days, the AV Contractor shall initiate / set-up a meeting to discuss the project scope of the work, general project expectations and, but not limited to the following agenda items:

1. AV System Functionality
   a. Audio DSP programming, presets and operations
   b. Control system functionality / preliminary discussions

2. Shop Documentation and Submittal Schedule

3. Installation Schedule / Timetable
   a. Equipment delivery issues / lead times (if any)
   b. Substantial Completion
   c. Final Acceptance Testing

4. As-built Documentation

5. Owner Training

B. Electrical Infrastructure Site Survey: The AVC shall coordinate an electrical infrastructure & box site survey (box walk) with the GC & EC prior to the installation of drywall and ceiling and /or hard lid ceilings. AVC shall issue a report as to their findings to the OAC team so that identified issues can be resolved in a timely manner prior to the installation of the drywall or wall finishes.

1.09 BID SUBMITTALS

A. AV Contractor's Qualifications: Bidders shall submit a qualification package demonstrating compliance with all the requirements specified herein. Refer to 1.11 QUALITY ASSURANCE. At a minimum, the qualification package shall include the following:

1. A list of AV systems of comparable size and scope to that described herein, completed by the AV Contractor in that last five (5) years. Provide the project name, address, year of completion, and the name and telephone number of a person to contact who is a representative of the facility.

2. A personal resume of formal education, experience, and certifications of the identified team members. Including Project Manager, Project Engineer, and Software Programmer.

3. A description of the AV Installer's capabilities and facilities for rack assembly, shop fabrication software programming, repair, and servicing of AV systems.

4. A letter from the control system manufacturer(s) certifying that the AV Installer's software programmers have been factory trained and are qualified to provide the proposed installation.

5. All certifications and licenses shall be current must be held by the AVC for no less than one (1) year prior to this bid submittal

1.010 SUBMITTALS

A. Long Lead-Time Items: Prior to submittal of Shop Documentation, and within one (1) month of contract award, the AVC shall submit a list of anticipated long lead-time items (i.e., items with a lead time of 8 weeks or longer) for early approval. It is expected that all items listed in this submittal be furnished immediately upon approval.

B. Shop Documentation: The Shop Documentation submittal shall include the following items to be submitted simultaneously, no exceptions.

1. Bill of Materials: A complete list with quantities of equipment to be provided for the systems, including that required for items which are to be fabricated by the AV Contractor (i.e., a bill of materials). Products shall be listed in the same order as found herein. No exceptions.

2. Product Data: A complete set of manufacturer's equipment specifications with detailed technical information describing and illustrating all components and materials to be used in the installation of the AV systems. This would include those items listed by manufacturer and model number herein and any other components needed to provide complete functional systems.

3. Cabling Schedule: A complete materials list containing cable type, cable marker identifier, connector type, and origin and destination location for each cable.

4. Shop Drawings: The shop drawings shall be submitted after the award of contract and be of a scale suitable for use for fabrication. The AVC shall maintain on-site a hardcopy of their shop drawings detailing the latest as-built conditions. AV Contractor shall make the following shop drawings submittals:
   a. A one-line signal flow block diagram showing exactly the manner in which the AV Contractor proposes to install the system. Show all switches, modifications to equipment, relay and control circuits. Show all equipment/apparatus items which are required for realization of the functions described herein.
   b. Detail diagrams of items which are to be fabricated by the AV Contractor and/or which the AVC intends to fabricate or has fabricated, including, but not limited to, the custom panels

and receptacle plates. They shall show materials, finishes, panel/control markings, and complete dimensions when applicable.

c. Detailed diagrams showing equipment rack layouts.

d. Detailed diagrams showing loudspeaker mounting details with all hardware identified by manufacturer and model number.

~~e. A signal loss diagram for the coaxial distribution of video signals with calculations to verify that the signal strength at each endpoint is within industry specifications.~~

~~f. Any wireless microphone or monitor system shall indicate its proposed frequency band (such as G50 or J50A) on the one-line signal flow interconnect diagram.~~

C. Field Reports:

1. Electrical Infrastructure Site Survey required in Part 1 article “Milestones” of this Section.

2. System Start-Up Report specified in Part 3 article “Initial System Start-Up” of this Section.

D. Closeout Documents: Prior to Final Acceptance, AV Contractor shall submit the following:

1. System test reports, as specified in Part 3 of this Section. These documents are required twenty-one (21) calendar days before the anticipated final acceptance testing, else the appointment shall be rescheduled.

2. Updated control system and DSP source code and executable files, with all tunings and adjustments incorporated.

3. Updated frequency coordination, including specific “real world” frequency selection, showing no intermodulation distortion or channel conflicts.

4. Complete and accurate Final As-Built Drawings prior to final acceptance testing.

5. O & M manuals / documentation, programmable software files and executables as specified herein.

6. Written warranty, as specified herein, to take effect after the Consultant Final Acceptance Testing has occurred and any punch list-items have been completed.

1.011 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:

1. All electronic products shall be designed and marketed by the manufacturer for application in professional sound amplifying, reproduction and recording systems.

2. Obtain common materials and equipment through one source from a single manufacturer as much as practical.

B. Installer Qualifications:

1. Project Manager: At least one (1) person involved in the daily installation of these systems shall hold an AVIXA CTS-I certification.

2. Project Engineer: A qualified staff engineer shall have five (5) years minimum experience and be certified as an AVIXA CTS-I. In place of a qualified staff engineer, the AV Contractor may retain a consulting engineer to direct the project. The staff or consulting engineer shall:
   a. Provide all technical liaison between the AV Contractor and the Construction Manager.
   b. Represent the AV Installer at meetings and conferences and be present at the job site for final inspection.
   c. Be responsible for the supervision of all technical and engineering work required to execute the contract and approve and sign the shop drawings.
   d. The staff engineer shall remain on the project (at a minimum) in a supervisory role until the completion of all AV-related work.

3. Software Programmer: A manufacturer-certified software programmer shall be required to author the control system programming component of this project.

4. The AVC's installation team members shall hold the following documentation of the following manufacturer certifications and training:
   a. Q-SYS Level 2
   b. Q-SYS Control & UCI Fundamentals through Advanced

C. Once site installation begins, written field updates, including photos, shall be required every two (2) weeks.

D. Final Acceptance: Final Acceptance will be contingent upon issuance by the AV Consultant of a letter of acceptance stating that the work has been completed and is in accordance with the contract documents. This is when the warranty period shall begin and not at "Substantial Completion".

1.012 DELIVERY, STORAGE, HANDLING

A. AV systems, infrastructure, raceways and equipment are sensitive to environmental conditions such as temperature, dirt, dust, and water. The AV contractor shall ensure the storage and installation of all AV Systems components are sequenced and scheduled accordingly to prevent any damage, loss of performance, and warranty void of such systems. All miss-installed components shall be replaced with new parts and re-installed at the AV Contractor's expense.

B. The AV Contractor shall ensure the storage and installation of all AV Systems components are sequenced and scheduled accordingly to prevent any damage, loss of performance, and warranty void of such systems.

C. All incorrectly installed components shall be replaced with new parts and re-installed at the AV Contractor's expense.

1.013 WARRANTY

A. Manufacturer Warranties:

B. Provide a written warranty, signed by the AV Contractor, due when the AVC issues the As-Built Documentation. The warranty period shall equal the requirements described the Division 00 sections.

C. Include the following provisions:

1. Warranty all equipment and the installation to be free of faulty workmanship.

2. Warranty all components, including solid state devices, to be free of defects.

3. Paint and exterior finishes, fuses and lamps are excluded from above warranty, except when damage or failure results from defective materials or workmanship covered by the warranty.

D. If, within the warranty period of the installation or within a longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents or provided by a manufacturer, any of the work or equipment is found to be defective or not in accordance with the Contract Documents, the AV Contractor shall correct it promptly including all parts and labor after receipt of notice from the Owner to do so unless the Owner has previously given the AV Contractor a written acceptance of such condition. This obligation shall survive termination of the contract. The Owner shall give such notice promptly after discovery of the condition. Such notice shall be provided by Owner representatives, to be identified, either verbally or in writing.

E. Nothing contained in the Contract Documents shall be construed to establish a shorter period of limitation with respect to any other obligation which the AV Contractor might have under the Contract Documents or any manufacturer's warranty. The establishment of the time period noted above, after the date of Final Acceptance or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents, relates only to the specific obligation of the Contractor to correct the work or equipment, and has no relationship to the time within which their obligation to comply with the Contract Documents may be sought to be enforces, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to their obligations other than specifically to correct the work or equipment.

F. The Owner reserves the right to expand or add to the system during the warranty period using firm(s) other than the AV Contractor for such expansion without affecting the Contractor's responsibilities, provided that the expansion is done by a firm which is an authorized dealer or agent for the equipment of system being expanded.

G. Structured Cable:

1. The manufacturer shall provide a warranty with a minimum term of twenty-five (25) years for structured cabling and all communications cable infrastructure components. This warranty shall cover all components including cables, jacks, patch panels, and wiring panels, etc. to maintain the specified performance, physical criteria, and applications assurance.

2. Any such components, link, or channel shall be replaced by the manufacturer at no cost to Owner during this period.

3. The Contractor and Manufacturer shall submit all information and documentation on Warranty

H. Service Warranty:

1. Replace defective materials and repair faulty workmanship within 72 hours of discovery at no cost to the Owner during the period of the Warranty.

2. If during the warranty period, system operation is not fully restored, or a working temporary solution is not deemed acceptable by the Owner, within four (4) business days, the Owner reserves the right to require the Contractor to provide on-site manufacturer's service technicians at no additional cost.

3. At no additional charge, provide maintenance service for a period of one (1) year after the AV Consultant's Final Acceptance of installation. This service shall consist of at least one (1) visit six (6) months and one (1) visit eleven (11) months after Final Acceptance for regular maintenance responsibilities, checking equipment and systems operations / functionality, and rigging safety. The AVC shall make all necessary adjustments in a timely manner.

4. If, during the warranty period, any component is out of service for more than four (4) days due to unavailability of parts or service, supply and install an identical new component. If an identical component is not available, temporarily substitute equivalent equipment, but only with the written approval of the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Unless otherwise indicated, equipment in this Section shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. All components used in the system shall be commercial designs that comply with the Specifications.

B. All materials, equipment and apparatuses shall be new and of the latest design or model offered for sale by the manufacturer.

C. Each major component of equipment shall identify the manufacturer's name, model and serial number. Items of the same classification shall be identical. This includes equipment, modules / cards, parts, and components.

D. Principal items of equipment and apparatuses are identified herein by part number and manufacturer. Alternate part numbers and manufacturers are identified in instances in which equivalence has been determined.

E. Acceptability for use in the systems shall be determined by the AV Systems Consultant. Such items shall be installed only after receipt of written approval. The Consultant retains the right to reject products which reflect, in the Consultant's opinion, sub-standard design practices, manufacturing procedures, support services, or warranty policies.

2.02 SUBSTITUTE EQUIPMENT

A. AV Contractors who wish to provide substitution options to the base bid may do so by providing a completely separate and discrete bid document in addition to the original bid documentation.

B. All substitution devices shall provide equal or better electronic or acoustical performance than the originally specified devices. This submittal would require a new EASE model for any proposed loudspeaker(s) to verify compliance with the Construction Documents where necessary.

C. The AV Consultant shall be the final judge regarding the validity of substitution bid data submitted. Acceptance of any / all substitutions shall be under the direction of the consultant only, who may or may not accept the substitution with or without explanations. The consultant approvals or rejections shall be noted as final. No exceptions.

2.03 MANUFACTURERS QUOTES

A. Though manufacturers may provide quotes for equipment intended for use in this scope of work, it is the responsibility of the AVC to verify the completeness of any such quotes / documentation as they are solely responsible for any discrepancies that arise during the shop drawing process and installation. No additional requests for payment after the bid award with regards to manufacturer quote discrepancies will be accepted.

2.04 DEVICE QUANTITIES

A. Every attempt has been made to provide an accurate and detailed equipment schedule. However, when a discrepancy is found, the quantities found on the one-lines shall take precedence over the equipment schedule specified herein. AVC shall issue a pre-bid RFI requesting clarification no later than five (5) working days prior to the bid due date. Responses shall be provided to all bidders prior to the bid due date.

2.05 EQUIPMENT SCHEDULE

A. Refer to Appendix A for the Audio-Video Systems equipment schedule.

2.06 EQUIPMENT PERFORMANCE SPECIFICATIONS

A. For all items which are identified by part number and manufacturer, performance specifications which are published in the most recent manufacturer's data sheets available at the time of bidding this contract shall be applicable to the present work as though fully written out herein.

B. For those items which are not identified by part number and manufacturer, the AV Contractor may select items which conform to the functional and/or technical specifications. For all such items, the AV Contractor shall submit for approval all technical data which is available from the supplier or manufacturer.

C. All terminated and bulk cable types shall be submitted in the shop documentation prior to purchase and installation.

2.07 CABLING, WIRING AND CONDUCTORS

A. General Notes:

1. Any specific cable AWG gauge detailed in the drawing package supersedes this document. These cable types are cited to illustrate the type and quality of cable required. Plenum cable must be utilized as required. Unless otherwise noted, cables from other reputable manufacturers will be considered acceptable only if data sheets are submitted and approved by the AV Consultant prior to installation. The AV Contractor must verify cable lengths and confirm the suitability of the cables listed above but may change based on field conditions. Where signal loss is beyond anticipated norms, the AVC shall coordinate with manufacturers and the AV Consultant to select a cable that will meet or exceed the requirements. No exceptions.

2. Cables running in plenum areas without conduit shall be plenum rated cable and match the specified cable below. It is the responsibility of the bidder to inspect the electrical drawings and verify in what spaces plenum cable shall be used. No claims for additional monies, based on the use of plenum cable, will be allowed.

3. All cables (except video and pulse cables which must be cut to an electrical length) shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior permission of the AV Consultant. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length based on the bend radius of the cable.

4. All cable that shall be used in outdoor applications shall be tactical / outdoor rated weather block cable and all connectors shall also be outdoor rated Neutrik “True Outdoor Protection” terminations where applicable.

5. All category cable channels, including patch cords, and patch bays must not exceed the 100-meter length. If it is determined in the field that a run will exceed this distance, immediately contact the AV Consultant for consultation and direction. No exceptions.

6. All USB-C cables must comply with the following:
   a. EMCA Certification for electromagnetic compatibility (EMC) and electromagnetic interference (EMI).
   b. Be rated as a Billboard Device to announce its capabilities to connected components.
   c. Be rated to USB 3.2 [Gen 1 (5 Gbps) or Gen 2 (10 Gbps)] as indicated.
   d. Be rated to support Power Delivery (PD) at the Profile/wattage level as required to fully power the connected device.

B. Approved Bulk Cabling

Approved Bulk Cabling for Audio-Video Systems					
Type / ID	Signal Type / Application	Cable Type	OSP / Plenum	Manuf.	Model
Analog Audio					
AA01	Mic / Line Audio (Mono Signal)	22 AWG STP	-	Belden	9451
			Plenum	Belden	9451P

			OSP	Belden	9451WB
RF Distribution					
RF01	50-Ohm Antenna (Low-Loss)	10 AWG Coax (RG-8 Type)	-	Belden	9913
			-	ECORE	EMR-400
			Plenum	Belden	89913
			OSP	Belden	9914
UTP					
U01	Control / Network Applications (Not audio or video streaming)		Plenum	Belden	2433
			OSP	Belden	OPS6AU
STP					
S01	4k / 8k HDBaseT Video Applications	4pr 23 AWG STP	-	Belden	2183R
			Plenum	Belden	2183P
			OSP	Belden	2141A
S02	Dante, AES67, NDI, and other audio or video over IP applications	4pr 23 AWG Cat6A STP	-	Belden	10GXS12
			Plenum	Belden	10GXS13
Control					
C01	IR & Serial Control (RS-232/-422)	4pr 22 AWG STP	Plenum	Belden	1502P
C02	Serial Control (RS-485) or DMX-512 (4-cond)	2pr 24 AWG STP	-	Belden	9842
			Plenum	Belden	82842
C03	Dry Contact & Signal Input / Output	1pr 22 AWG STP	-	Belden	8761
			Plenum	Belden	82761

C. Pre-Terminated Cables

Type / ID	Signal Type / Application	Cable Type	Manuf.	Series
	HDMI 2.1 8k60 4:4:4		Crestron	CBL-8K-HD
	Balanced XLR		Mogami	Gold Studio

2.08 FABRICATED MATERIALS

A. Designation / Engraving

1. All equipment controls, receptacles and all indicators shall have, unless otherwise noted, etched, permanently engraved, or silk-screened fully descriptive identification labels. The resolution of silk-screened labels shall not be less than 90,000 dots/sq. in.

2. The word “engraved” shall mean that the identification shall be engraved into the indicated panel, plate or control surface.

3. All engraving shall be with 5/32-inch high characters, unless otherwise noted, and shall be filled with engraver’s enamel of a contrasting color.

B. Receptacle Plates:

1. Receptacles shall be screwed, bolted or flush-riveted to the plate.

2. Plates shall be marked to indicate function and circuit of the receptacle, for example: MICROPHONE. Each receptacle shall have a discrete and unique identifier, for example: MIC 1, MIC 2, etc. All identifiers shown on the Contract drawings are for reference only.

3. All wall plates shall be powder coated rather than having an adonized finish.

4. Color and finish of blank panels and custom assembly panels shall match adjacent equipment panels to the extent possible. The finish of wall mounted receptacle panels shall be coordinated with the Architect.

C. Terminals and Terminations:

1. Microphone cables shall not be spliced or otherwise interrupted from termination to termination. All cables shall have visible adhesive identifying markers on each end.

2. Wiring in terminal cabinets shall be tied and clamped neatly to backboards or cable-forms.

3. Terminals shall, unless otherwise specified, be one of the following types:
   a. Wire-wrap type terminal block.
   b. Barrier strips with screw terminals.

4. Each terminal strip shall have a legibly marked identification strip.

D. Structural Assemblies:

1. Provide holes required for securing other components or assemblies to structural steel framing and for passage of other components through steel framing members as shown on final shop drawings. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.

2. In fabricating mounting brackets and other steel components requiring bends, the radii of the bends shall not be less than three times the thickness of the steel being bent.

3. All bolts and nuts used in the fabrication of mounting hardware shall be Grade 5 or better, i.e. rated five (5) times the anticipated load.

2.09 PAINTED ASSEMBLIES

A. Where the drawings or equipment list call for devices to be field-painted, the AV contractor shall be ultimately responsible for directing/supervising, and/or performing, any painting required. This responsibility shall not be delegated to a paint subcontractor without prior approval obtained through submission of a formal Request for Information (RFI) addressed to the attention of the AV consultant.

B. Loudspeakers and other acoustically transparent surfaces that are to be field-painted shall be painted with non-bridging paint. Product must be able to match any color of existing ceiling or desired look.

1. Basis Basis of Design product: ProCoat ProCoustic
   ProCoat Products, Inc.
   260 Centre Street, Suite D
   Holbrook, MA 02343
   P: (781) 767-2270
   F: (781) 767-2271
   E: info@procoat.com

C. Detach loudspeaker grilles, remove acoustically transparent backing foam (if present), and paint grilles separately. Do not paint grilles while still attached to the loudspeakers.

D. Paint loudspeaker cabinets only after performing the following:

1. Temporarily remove grilles (for painting separately per the requirement listed above); manufacturer logos; and any other detachable parts such as brackets, cable covers, etc.

2. Mask all non-paintable surfaces or sub-components such as acoustic transducers, port holes, and wiring terminal areas.

E. Non-acoustically transparent surfaces, such as back boxes, cover plates, and other devices, shall be hand-painted by the AVC, or under the direct supervision of the AVC, to ensure that access panels, covers, and trim pieces remain accessible after being painted. Grounding/bonding holes, embosses or lugs shall be masked to prevent being painted.

PART 3 - EXECUTION

3.01 INSTALLATION PRACTICES

A. The AV Contractor shall coordinate with EC on conduit/junction box locations for audio equipment and routing of audio, control, and power cables/conduits from terminals, poke-thru /floor and pull boxes, wall plates, and stub-ups to system equipment racks. This shall be done prior to the installation of wall or ceiling finishes.

B. Installation shall include the delivery, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, and all other work whether or not expressly required herein which is necessary to result in complete operational systems.

C. Contractor shall construct AV equipment racks and sub-assemblies, including all equipment to be installed therein off-site. All wiring work, labeling of wiring, cable dressing, hardware supports, and connection panels, cable wiring documentation, socket installation, ventilation and power supply regulation and filtering component installation shall be performed in AV Contractor's own premises.

D. The Contractor shall not deliver equipment in original packaging to the site for installation. All such equipment will be unpacked and checked thoroughly in AV Contractor's premises. Contractor shall test such equipment as it is received to ensure that it conforms to the manufacturer's specifications. On no account shall the Owner be liable for any delays of completion of the installed system due to defective equipment being received by Contractor.

E. Keep the job adequately staffed at all times. Designate a field supervisor to be present on the job site and in responsible charge during all phases of installation and check out. Maintain the same supervisor throughout the execution of the work unless circumstances beyond the control of the AV Contractor intervene. Install the system in cooperation with other trades in order to achieve coordinated progress and satisfactory final results. Watch for conflicts with work of other trades on the job. Execute without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or preserve symmetry and pleasing appearance.

F. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors. Any issue regarding a visual aesthetic shall be brought to the attention of the GC and Architect immediately so that all parties can coordinate and provide an adequate solution in a timely manner.

G. For the purposes of coordination with Architects specified furniture, the AV Contractor will ensure that such equipment or mounting hardware is compatible with and suitable for installation in that furniture. It shall be the AV Contractor's responsibility to ensure they coordinate with the furniture and / or millwork contractor and that parties shall exchange and follow their Shop Drawings to ensure that dimensions and structural supports are adequate for the AV equipment installation. It is the AV Contractor's responsibility that the request and delivery of such critical coordination information is satisfactorily executed and in as much as the Contractor has control over the delivery of such information, the AV Contractor shall deliver it as requested by the Architect.

H. The equipment specified herein must be capable of operation in environments of normal humidity, dust and temperature. AV Contractor should avoid installing equipment where extreme environmental conditions can occur and shall be responsible for protection of equipment and related wiring from such conditions.

I. The AV Contractor shall take precautions to prevent electromagnetic and electrostatic hum. Install the equipment to provide safe operation. Provide ventilation as required to maintain equipment within the manufacturer's specified temperature limits.

J. The AV Contractor shall do all cutting and patching necessary for proper installation of the system and shall repair any damage done by themselves or their workers. Any required penetration of slabs or CMU walls shall be made by a cutting method rather than by a concussive method.

K. All installation practices shall be in accordance with, but not limited to, the general design and construction requirements of the Architect, and these specifications and drawings.

Installation shall be performed in accordance with the applicable standards, requirements and recommendations of local authorities having jurisdiction (AHJ). Before commencing work, the Contractor shall familiarize all project team members with all of these requirements.

L. If, in the opinion of the AV Contractor, an installation practice is desired or required, which is contrary to these specifications or drawings, a written request for modification shall be made to the AV Consultant and / or Architect. Modifications shall not commence without written approval.

M. During the installation, and up to the date of issuance of the Final Acceptance Memorandum, the AV Contractor shall be under obligation to protect their finished and unfinished work against damage and loss. In the event of such damage or loss, they shall replace or repair such work at no cost to the Owner.

3.02 GENERAL INSTALLATION PROCEDURES

A. Locate all apparatuses requiring adjustments, cleaning or similar attention so that they will be accessible.

B. All boxes, equipment, wall plates, loudspeakers, antennas, and cabling shall be secured plumb and square.

C. All supporting structures and enclosures supplied by the AV Contractor, not having a standard factory paint finish, shall be painted. Paint specifications and color shall be supplied by the Architect.

D. Clearly, logically and permanently mark switches, connectors, jacks, relays, receptacles, cables and cable terminations.

E. Etch, engrave, silk screen or apply in a similar permanent manner all legends and markings on all custom panels and receptacle plates. Embossed tape, press type, etc., are not acceptable.

F. Provide all cables necessary for interconnection of permanently mounted equipment. Use terminations required to achieve full function of equipment as specified herein.

G. Exercise care in wiring, to avoid damage to the cables and to the equipment. Make all joints and connections with rosin-core solder or with mechanical connectors approved for Class I wiring. Execute all wiring in strict adherence to standard broadcast and BICSI procedures. AVC shall adhere to the cable manufacturers' recommended cable bend radius, no exceptions.

H. Run lines in separate metallic conduits for line level circuits (up to +30.0 dBm), loudspeaker circuits (above +30.0 dBm) and power circuits. Non-metallic or PVC conduits for AV system wiring are not acceptable. Confirm with EC that all metallic raceways have been properly bonded. Use only cables which are insulated from the conduit and from each other for the entire conduit length.

I. All shielded audio cable shall be bonded at both ends. Do not ground audio cable shields only at the source end. Preserve continuity of microphone shields at both connecting points. Connect all audio grounds in this system to a common point.

J. All equipment shall be firmly secured in place unless the equipment has been documented to be portable in nature, either within this Specification or as shown in the Construction Documents.

K. All fastenings and supports shall be adequate to support their loads with a safety factor of five (5) times the load weight or as required by ESTA , whichever is greater. Wind shear must be taken into account when installing all outdoor pole mounted devices.

L. All loudspeakers shall be installed according to the manufacturer's instructions. All loudspeakers shall be installed with a secondary seismic safety harness assembly in addition to the specified loudspeaker mount. No exceptions.

M. It is the responsibility of the AVC to test all loudspeakers and/or loudspeaker line arrays for sound pressure levels to verify that the full frequency spectrum coverage area is uniform throughout the listening area. AVC shall reposition and or adjust aiming angles as necessary until uniform full frequency coverage is reached per the specification. This work shall be done as part of this contract and no additional funds shall be provided to the AVC to accomplish this requirement. No exceptions.

3.03 COORDINATION

A. All work shall be reviewed and coordinated with the GC prior to commencing work.

B. The AV Contractor shall coordinate all AV equipment connections, panels and control locations with the Architect prior to installation.

C. Coordinate installation with Structural, Electrical, Mechanical, Plumbing, Fire Protection, and other trades to eliminate disruption and/or conflict with other systems.

D. Sequence installation of the AV Systems and infrastructure with other work to minimize possibility of damage and soiling during remainder of construction.

3.04 structural installation requirements

A. It is the GC's responsibility to provide structural support elements for the mounting of audio-video equipment. AVC shall closely coordinate with the GC regarding structural support required to safely install the AV equipment as needed.

B. Structural support elements are defined as those materials added to the structure for the reinforcement of general construction methods to meet a designed minimum load factor of five (5). These include but are not limited to:

1. Backing boards / plywood required for the support of audio-video equipment or cabling.

2. Strut supports hung from structural beams or concrete slab.

C. The AV Contractor shall provide all audio-video mounting and rigging equipment that fasten to the structural support elements.

D. All support elements and fastenings shall be able to support a minimum load factor of five (5) times the total assembled weight.

E. The AV Contractor shall be responsible for the complete and correct installation of all the audio-video equipment.

F. Hard Ceiling Lid Loudspeaker Locations: Hard lid ceiling loudspeaker locations requiring trim rings, rough-in brackets, and back boxes shall be installed during conduit installation where possible.

1. The Contractor shall install the trim rings, rough-in brackets, and back boxes for hard ceiling locations in a timely manner, not to conflict with scheduled work of other trades. In the event that this equipment is not installed in a timely manner, the Contractor shall be responsible for all retrofit work and materials to provide a fully functioning speaker assembly.

G. Trim and Escutcheon Components:

1. To ensure a proper finished appearance, the AV Contractor shall furnish and install trim / escutcheon components in all conditions where AV components pass through the finished walls, floors and ceilings. This would include but not be limited to video projector supports, video flat panel monitors, and control panels for supports which are not specifically supplied with integral flanges / trim components.

2. The visible component of any trim shall be as small as possible, preferably no wider than 1/2-inch. All trim components at the ceiling plane shall be finished to match the approved ACT ceiling grid system components. The AVC shall obtain a sample from the GC, including any custom color information, or standard color numbers. All trim components shall be submitted to the Architect for review and approval prior to fabrication.

3.05 BONDING

A. The Contractor shall be responsible for correcting any signal grounding problems within the AV System (excluding Division 26 grounds) including but not limited to electromagnetic / electrostatic hums, ground loops anomalies, and distortions.

B. A bonding buss bar shall be installed at each equipment rack location. The copper buss bar shall be sized to accommodate all connections plus future expansion.

C. In locations where multiple AV equipment racks exist, they shall be bonded to each other as well as bonded to the Secondary Bonding Bus Bar (SBB).

D. Ground all components according to the following methods:

1. Equipment having a power cord without a grounding conductor connected to chassis: Furnish and install 14 AWG grounding conductor from the component’s metallic chassis to grounding buss bar within rack.

2. Equipment having a power cord with a grounding conductor connected to chassis: Do not install an additional grounding conductor.

E. Shielded audio signal cables shall have the shields terminated at both ends. No exceptions.

F. All video and data shielded cables shall have the shielded conductors terminated on both ends.

3.06 PATCH PANEL ASSIGNMENTS

A. The Contractor shall provide patch panels that shall be the same category as the cable being passed through them and match the more stringent category rating if multiple cable types are terminated there. The AVC shall provide shielded terminations that also match the category of the most stringent cable type.

B. All patch panels shall be wired so that the signal “sources” (outputs from) appear on the upper row of a row pair; and all “loads” (inputs to) appear on the lower row of a row pair.

C. All audio and video patch panel designation strips shall utilize alphanumeric identifications and descriptive information. The jack position in each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the shop documentation functional block drawings, as well as on reproductions of these drawings, which shall be mounted in an appropriate location near the patch bays.

3.07 CABLE INSTALLATION

A. All cables for this project must conform to the latest version of NFPA 70 as well as local code requirements.

B. Where existing cabling is to be abandoned, it shall be completely removed as directed in the NFPA 70 / NFPA 72. No exceptions.

C. All cables, regardless of length, shall be marked with permanent wrap-around number letter cable markers at both ends. There shall be no unmarked cables at any place in the system. Wire labels done by hand in the field must be replaced with computer-generated labels for legibility. Marking codes used on cables shall match the codes / labels shown on the AVC shop drawings and on run sheets.

D. CAT6A / 4k cable runs shall not exceed the most current BICSI telecommunications cabling standards, i.e. 100 meters inclusive of all cross-connects and patches. When the distances are longer, the AVC must coordinate with the cable manufacturer to verify performance is still within the acceptable range of performance for this scope of work. No exceptions.

E. Internal and inter-rack cabling shall be neatly strapped, dressed, labeled, and adequately supported without pinching the cable bundle.

F. Use only Velcro-type cable straps to mount and bundle all cables. The use of plastic wire ties is prohibited. No exceptions.

G. Terminal blocks, boards, strips, or connectors shall be furnished for all cables that interface with racks, cabinets, consoles, or equipment modules. The use of “wire nuts” to terminate or connect cabling is strictly prohibited.

H. All cables and bundles shall be grouped according to the signals being carried. In order to reduce signal intermodulation distortion, separate groups shall be formed for the following cables:

1. Power loudspeaker cables
2. Low voltage system cables
3. Video cables / Category cables
4. Audio cables carrying signal levels less than -20.0 dBm
5. Audio cables carrying signal levels between -20.0 dBm and +20.0 dBm
6. Audio cables carrying signal levels greater than +20.0 dBm

I. All cables shall be continuous lengths without splices. All system wire, after being cut and stripped, shall have the wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. No bare wire terminations shall be allowed, unless specified on the drawings. No exceptions. Heat-shrink tubing shall be used to insulate the ground or drain wire.

J. All solder connections shall be made with rosin-core solder using temperature-controlled solder stations. No cold or cracked solder joints are acceptable. Any connections, which do not appear to be clean and shiny, or which show signs of cracking, shall be re-soldered by the AV Contractor before Final Acceptance testing of the system.

K. Mechanical connections using insulations, crimp-type connectors shall be bonded to the connector by soldering the wire to the metal part of the connector.

L. Connections made with screw actuated pressure type terminal strips shall be made by stripping approximately 1/4-inch of insulation from the stranded connector. The un-tinned wire shall be inserted into the terminal and tightened.

M. All wire bundles are to be neat and combed free of cable crossovers.

N. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer.

O. All wire markers / labels shall face a common direction.

P. All cables shall have proper connector housing.

Q. All cables located in the ceiling areas, excluding corridors, where conduit as not been provided for are to be J-hooked and kept separate from data cables with crossovers at ninety (90) degrees. Large conduit sleeves shall be required for all inaccessible ceiling areas or hard lid ceilings.

R. All cable passing through penetrations in fire rated walls must be fire blocked after cable installation by the AV Contractor.

3.08 FIELD QUALITY CONTROL

A. During the installation, the Contractor shall be expected to maintain a clean and safe working environment.

B. Upon completion of the work the Contractor shall remove all their waste material from the site and shall leave the relevant areas and equipment clean and in an operational state. The Contractor shall be responsible for repairing any damage caused to the premises by the AV Contractor's installation activities, at no cost to the Owner.

3.09 PROTECTION

A. Protect Work, stored products, and construction equipment from theft and vandalism.

B. Protect Owner's operations at site from theft, vandalism or damage from AV Contractor's work or employees.

C. Maintain security program throughout construction period, until Owner occupancy or Owner acceptance precludes the need for AV Contractor security.

3.010 INITIAL SYSTEM START-UP

A. Immediately after installing and energizing products and ensuring normal temperature/humidity operating conditions will be maintained, Contractor shall burn-in all mains-powered electronics for a period of not less than 48 hours continuously, to detect any possible “dead on arrival” (DOA) and/or early-life product manufacturing defects.

B. During the system burn-in period, Contractor shall monitor for any failures, degradation, or other anomalies.

C. Upon discovery of any product defects or failures, Contractor must immediately contact the manufacturer support team to begin expedited product replacement.

D. Upon completion of the system burn-in period, Contractor shall submit a written System Start-Up Report, listing which components were burned-in, the duration of burn-in, any abnormal occurrences, and steps taken (or being taken) to resolve any defects, degradation, or failures.

3.011 DEMONSTRATION AND FINAL ACCEPTANCE TESTING

A. General:

1. Final Acceptance Testing shall not be performed until the AV Contractor’s system checkout has been completed, documented, and results submitted to the AV Consultant for approval.

2. Upon approval of the AVC test reports by the AV Consultant, and at a time established by the Consultant, demonstrate the operation of each major component of the system and the completed installation. Typically ten (10) working days after the AVC test documentation / As-Built Drawings have been submitted for approval.

B. Site Testing: To be conducted in the presence of the Architect / Construction Manager / Owner (or representative) and the AV Consultant and shall consist of the following:

1. Final As-Built Drawings, run sheets, O & M Manuals, submitted test results, and other required documents, as detailed in the Construction Documents shall be on hand. One (1) complete set of these documents shall be delivered to the Owner at this time (one complete set shall have been delivered to the Architect prior to the scheduling of Final Acceptance Testing in PDF format).

2. A physical inventory will be taken of all equipment on site and will be compared to equipment lists in the contract documents.

3. The AVC shall demonstrate the operation of all system equipment installed.

4. Both subjective and objective tests shall be required by the AV Consultant to determine compliance with the specifications. The AVC shall be responsible for providing test equipment for this exercise. Therefore, be prepared to repeat and verify test results previously submitted to the AV Consultant. It is anticipated that final loudspeaker tuning / equalization adjustments shall be made at the direction of the AV Consultant.

C. After demonstration, assist as required in the following acceptance tests:

1. Listening tests: These tests may include speech intelligibility survey and subjective aural evaluations by observers at various positions under various operating conditions, using live speech and/or recorded music material.

2. Equipment tests: Any measurements of frequency response, distortion, noise or other characteristics and any operational tests deemed necessary may be performed on any item or group of items to determine conformity with these requirements.

D. Control System Operation: AVC shall coordinate with the Owner to review the operation of the AV system prior to and during installation. During the second training session, the Owner can request additional changes and updates to the GUI and system functionality if they so choose without additional cost to the project.

E. If the need for adjustment or modification becomes fully evident during demonstration and testing, continue working until the installation operates fully in accordance with the requirement of this specification.

F. In the event significant adjustments are required during the Final Acceptance Testing phase, or defective equipment must be repaired or replaces, tests may be suspended or continued at the option of the AV Consultant, Architect, and/or the Owner. The AVC can and shall be responsible for the AV Consultant’s expenses such as, but not limited to, lodging, travel, airfare, and the AV Consultant’s billable time.

3.012 DOCUMENTATION

A. Project Record: The AV Contractor shall supply one (1) clean full-size print of the system drawings which show all changes which were made during fabrication and installation to the Architect / Owner.

B. Maintenance Information:

1. The AV Contractor shall provide technical information for all electronic apparatuses, including but not limited to schematic diagrams and parts lists, manufacturer's installation instructions, operating instructions, and technical specifications.

2. The AV Contractor submittal shall include all shop drawings prepared and used by the AVC, as well as those which were not required to be submitted for approval. This shall include, but not be limited to, wiring diagrams, schedules for identification of building wiring and installation details useful to a maintenance technician.

C. Operation and Maintenance (O & M) Manuals: Provide one (1) hard copy of an instruction manual to the Owner containing the following:

1. Table of Contents

2. Bill of Materials

3. Instructions for operating the system in all modes of operation and for fulfilling all functional requirements.

4. List of settings and adjustments for semi-fixes controls.

5. Manufacturer's sheets of specifications, operating instructions, and service information arranged alphabetically by manufacturer and then by model number.

6. Detailed wiring diagrams and the simplified one-line diagram.

7. All system and device software files, executables, and GUIs.

D. Quick Reference Guides:

1. AVC to provide the Owner with two (2) laminated "Quick-Reference Guides" detailing the operation of each standalone AV system.

2. This shall include both touch-panel layouts and general system "how-to" quick-referenced.

3. This guide should be no longer than two (2) pages where both sides of a standard letter sized sheet are used.

3.013 TRAINING AND INSTRUCTION

A. A minimum of eight (8) hours of training shall be provided by the AV Contractor, at a time mutually agreed upon between the Owner and AV Contractor.

1. Four (4) hours prior to Final Acceptance Testing.

2. Four (4) hours one (1) month following the initial training. This will allow the Owner to acquaint themselves with the system so that they can provide follow up questions as to the systems operation.

B. During the training, the participants shall be given opportunities for “hands-on” experience with operating the controls. There shall be visual and audible demonstrations using the systems themselves as aids. Personnel for instruction and training for the AV systems shall be designated by the Owner.

C. In the event the AVC does not have qualified instructors on staff for projects with sophisticated or complex equipment, the Contractor will provide a manufacturer’s representative for such instruction at no additional cost to the Owner.

D. Training and instruction shall be provided in the presence of the AV Consultant. This condition may be waived at the discretion of the Consultant.

E. Training will be video recorded by the AVC on a DVD / Blu-ray disc or flash drive as designated by the Owner. AVC will supply the equipment necessary to record the training sessions. The AV Contractor shall provide two (2) electronic copies to the Owner and one (1) full-size set of documentation.

SEE APPENDIX ON FOLLOWING PAGES.

Room	Room Qty	Manufacturer	Model	Short Description
Conference	1	Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
Conference	1	BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
Conference	1	Chief	AS3LDP7	TEMPO FP WALL MOUNT SYSTEM, PDU BUNDLE
Conference	1	Extron Electronics	60-1271-13	DTP HDMI 4K 230 Rx HDMI Twisted Pair Receiver - 230 feet (70 m)
Conference	1	Extron Electronics	60-1421-13	DTP Transmitter for HDMI - Decorator-Style Wallplate, White - 230 feet (70 m)
Conference	1	Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
Conference	1	Extron Electronics	60-1604-01	Four Input 4K/60 HDMI Switcher
Conference	1	Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
Conference	1	LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
Conference	1	Logitech	960-001308	Rally Bar, Graphite, Video Bar, 4K, 15x zoom, PTZ, all-in-one design for sm/med rooms. Includes: Rally Bar w/stand, power supply, AC power cord, HDMI cable (2m/6.5ft), USB cable (2.2m/7/2ft), BT remote control, lens caps 2-yr limited warranty
Conference	1	Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
Consult	1	Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
Consult	1	BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
Consult	1	Chief	FPIWMS	TEMPO FP IN-WALL MOUNT SYSTEM
Consult	1	Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
Consult	1	Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
Consult	1	LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
Consult	1	Logitech	960-001308	Rally Bar, Graphite, Video Bar, 4K, 15x zoom, PTZ, all-in-one design for sm/med rooms. Includes: Rally Bar w/stand, power supply, AC power cord, HDMI cable (2m/6.5ft), USB cable (2.2m/7/2ft), BT remote control, lens caps 2-yr limited warranty
Consult	1	Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
Consult	1	Protective Enclosures Company	TVSPRO6570LT	The TV Shield PRO Lite 65-70" Indoor Wall Unit
Consult	1	The Display Shield	PROAL-65702	Anti-Ligature Slope Top
CR Observation	1	Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
CR Observation	1	BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
CR Observation	1	Chief	FPIWMS	TEMPO FP IN-WALL MOUNT SYSTEM
CR Observation	1	Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
CR Observation	1	Extron Electronics	60-2040-01	1G HDMI Compact Encoder
CR Observation	1	Extron Electronics	60-2056-23	One Powered NF 4C LP and One Passive NF 4C S LP
CR Observation	1	Extron Electronics	60-1603-01	Two Input 4K/60 HDMI Switcher
CR Observation	1	Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
CR Observation	1	LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
CR Observation	1	Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
CR Observation	1	Protective Enclosures Company	TVSPRO6570LT	The TV Shield PRO Lite 65-70" Indoor Wall Unit
CR Observation	1	The Display Shield	PROAL-65702	Anti-Ligature Slope Top
Day Room	1	Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
Day Room	1	BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options

Day Room	1 Chief	FPIWMS	TEMPO FP IN-WALL MOUNT SYSTEM
Day Room	1 Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
Day Room	1 Extron Electronics	60-2040-01	1G HDMI Compact Encoder
Day Room	1 Extron Electronics	60-2056-23	One Powered NF 4C LP and One Passive NF 4C S LP
Day Room	1 Extron Electronics	60-1603-01	Two Input 4K/60 HDMI Switcher
Day Room	1 Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
Day Room	1 LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
Day Room	1 Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
Day Room	1 Protective Enclosures Company	TVSPRO6570LT	The TV Shield PRO Lite 65-70" Indoor Wall Unit
Day Room	1 The Display Shield	PROAL-65702	Anti-Ligature Slope Top
Large Therapy/Craft	1 Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
Large Therapy/Craft	1 BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
Large Therapy/Craft	1 Chief	FPIWMS	TEMPO FP IN-WALL MOUNT SYSTEM
Large Therapy/Craft	1 Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
Large Therapy/Craft	1 Extron Electronics	60-2040-01	1G HDMI Compact Encoder
Large Therapy/Craft	1 Extron Electronics	60-2056-23	One Powered NF 4C LP and One Passive NF 4C S LP
Large Therapy/Craft	1 Extron Electronics	60-1603-01	Two Input 4K/60 HDMI Switcher
Large Therapy/Craft	1 Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
Large Therapy/Craft	1 LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
Large Therapy/Craft	1 Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
Large Therapy/Craft	1 Protective Enclosures Company	TVSPRO6570LT	The TV Shield PRO Lite 65-70" Indoor Wall Unit
Large Therapy/Craft	1 The Display Shield	PROAL-65702	Anti-Ligature Slope Top
Lobby	1 BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
Lobby	1 Chief	LTA1U	Tilt Wall Mount, Large
Lobby	1 LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
Visit/Tele	1 Barco	R9861613USB2	CX-30 ClickShare Conference Set TAA Compliant Gen 2
Visit/Tele	1 BrightSign	LS425	BrightSignOS enabled media player. Single Full HD video decode. USB-C, Analog/SPDIF Audio output. microSD storage options
Visit/Tele	1 Chief	FPIWMS	TEMPO FP IN-WALL MOUNT SYSTEM
Visit/Tele	1 Extron Electronics	60-1911-01	IPCP Pro xi Control Processor
Visit/Tele	1 Extron Electronics	60-1667-03	3.5” Portrait Wall Mount TouchLink Pro Touchpanel - White
Visit/Tele	1 LG Electronics	65UR340C9UD	HDMI(3), RS-232C(1), USB(1), RF in(1), audio out(1), RJ45In, NO EXT. SPK OUT
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Visit/Tele	1 Netgear	NET-GS305EPP-100NAS	NETGEAR 5-Port Gigabit Ethernet High-Power PoE+ Smart Managed Pl
Visit/Tele	1 Protective Enclosures Company	TVSPRO6570LT	The TV Shield PRO Lite 65-70" Indoor Wall Unit
Visit/Tele	1 The Display Shield	PROAL-65702	Anti-Ligature Slope Top