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Hensel Phelps / Kiewit Joint Venture
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CMI - M.C. Dean - Brittingham & Associates

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SECTION 05090

WELDING, STRUCTURAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360	(2005) Specification for Structural Steel Buildings

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT RP SNT-TC-1A	(2001) Recommended Practice

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A3.0	(2001) Standard Welding Terms and Definitions Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting and Thermal Spraying
AWS D1.1/D1.1M	(2006; Errata 2006) Structural Welding Code - Steel
AWS D1.3	(1998) Structural Welding Code - Sheet Steel
AWS Z49.1	(2005) Safety in Welding, Cutting and Allied Processes

ASTM INTERNATIONAL (ASTM)

ASTM E 165	(2002) Liquid Penetrant Examination
ASTM E 709	(2001) Magnetic Particle Examination

1.2 DEFINITIONS

Definitions of welding terms are in accordance with AWS A3.0. The following classifications Class 1 (highest class) to Class 3 (lowest class) indicate the project's class of weld joints.

1.2.1 Class 1 Weld Joints

This covers complete penetration weld joints only. These weld joints apply where failure would cause a loss of the system and/or be hazardous to

personnel. Class 1 weld joints are highly stressed (dynamic and cyclic loading) and characterized as a single point of failure with no redundancy for the redistribution of stress into another member.

1.2.2 Class 2 Weld Joints

This covers both complete and partial penetration groove weld joints and fillet weld joints. These weld joints apply where failure would reduce the overall efficiency of a system but loss of the system or a hazard to personnel would not be experienced.

1.2.3 Class 3 Weld Joints

This covers both complete and partial penetration groove weld joints and fillet weld joints. These weld joints apply where failure would not affect the efficiency of a system nor create a hazard to personnel. Class 3 weld joints are connections of secondary members not subject to dynamic action and/or low stressed miscellaneous applications.

1.3 GENERAL REQUIREMENTS

Conform the design of welded connections to AISC 360, unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Perform welding as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Do not commence welding until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and the submittals approved by the structural engineer. Perform all testing at or near the work site. Each Contractor performing welding shall maintain records of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Welding Procedure Qualifications; G
Welder, Welding Operator, and Tacker Qualification
Inspector Qualification
Previous Qualifications
Pre-qualified Procedures

Copies of the welding procedure specifications; the procedure qualification test records; and the welder, welding operator, or tacker qualification test records.

SD-06 Test Reports

Quality Control
Nondestructive Examination

A quality assurance plan and records of tests and inspections. Submit all records of nondestructive examination in accordance with paragraph "Acceptance Requirements".

SD-07 Certificates

Certified Welding Procedure Specifications (WPS)
Certified Brazing Procedure Specifications (BPS)
Certified Procedure Qualification Records (PQR)
Certified Welder Performance Qualifications (WPQ)
Certified Brazer Performance Qualifications (BPQ)

Certificates in accordance with paragraph "Other Applications".

1.5 WELDING PROCEDURE QUALIFICATIONS

Except for pre-qualified (per AWS D1.1/D1.1M) and previously qualified procedures, each Contractor performing welding shall record in detail and qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Conform qualification of welding procedures to AWS D1.1/D1.1M and to the specifications in this section. Submit for approval copies of the welding procedure specification and the results of the procedure qualification test for each type of welding which requires procedure qualification. Approval of any procedure, however, does not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the specified requirements. Submit this information on the forms in Appendix E of AWS D1.1/D1.1M. Individually identify and clearly reference on the detail drawings and erection drawings all welding procedure specifications, or suitably key them to the contract drawings. In case of conflict between this specification and AWS D1.1/D1.1M, this specification governs.

1.5.1 General Requirements

The organization performing this work must be certified in the following: American Institute of Steel Construction (AISC) Quality Certification Program Category Category II Complex Steel Building Structures.

a. For Structural Projects, provide documentation of the following:

1) Component Thickness 1/8 inch and greater: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.1/D1.1M.

2) Component Thickness Less than 1/8 inch: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.3.

1.5.2 Previous Qualifications

Welding procedures previously qualified by test may be accepted for this contract without re-qualification if the following conditions are met:

a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.

b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.5.3 Pre-qualified Procedures

Welding procedures which are considered pre-qualified as specified in AWS D1.1/D1.1M will be accepted without further qualification. The Contractor shall submit for approval a listing or an annotated drawing to indicate the joints not pre-qualified. Procedure qualification is mandatory for these joints.

1.5.4 Retests

If welding procedure fails to meet the requirements of AWS D1.1/D1.1M, the procedure specification must be revised and re-qualified, or at the Contractor's option, welding procedure may be retested in accordance with AWS D1.1/D1.1M. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, must be submitted with the welding procedure.

1.6 WELDER, WELDING OPERATOR, AND TACKER QUALIFICATION

Each welder, welding operator, and tacker assigned to work on this contract must be qualified in accordance with the applicable requirements of AWS D1.1/D1.1M and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used.

1.6.1 Previous Personnel Qualifications

At the discretion of the structural engineer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without re-qualification if all the following conditions are met:

a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.

b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.

c. The previously qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.

d. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

1.6.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, submit the names of the welders, welding operators, and tackers to be employed, and certification that each individual is qualified as specified. The certification must state the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. Keep the certification current, on file, and furnish 3 copies.

1.6.3 Renewal of Qualification

Re-qualification of a welder or welding operator is required under any of the following conditions:

a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.

b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.

c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Submit as evidence of conformance all records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified.

d. A tacker who passes the qualification test is considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker is required to pass the prescribed tack welding test.

1.7 INSPECTOR QUALIFICATION

Inspector qualifications must be in accordance with AWS D1.1/D1.1M. Qualify all nondestructive testing personnel in accordance with the requirements of ASNT RP SNT-TC-1A for Levels I or II in the applicable nondestructive testing method. The inspector may be supported by assistant welding inspectors who are not qualified to ASNT RP SNT-TC-1A, and assistant inspectors may perform specific inspection functions under the supervision of the qualified inspector.

1.8 SYMBOLS

Symbols must be in accordance with AWS A2.4, unless otherwise indicated.

1.9 SAFETY

Safe weldiing practices and safety precautions during welding must conform to AWS Z49.1.

PART 2 PRODUCTS

2.1 WELDING EQUIPMENT AND MATERIALS

All welding equipment, electrodes, welding wire, and fluxes must be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures. All welding equipment and materials shall comply with the applicable requirements of AWS D1.1/D1.1M.

PART 3 EXECUTION

3.1 WELDING OPERATIONS

3.1.1 Requirements

Conform workmanship and techniques for welded construction to the requirements of AWS D1.1/D1.1M and AISC 360. When AWS D1.1/D1.1M and the AISC 360 specification conflict, the requirements of AWS D1.1/D1.1M govern.

3.1.2 Identification

Identify all welds in one of the following ways:

a. Submit written records to indicate the location of welds made by each welder, welding operator, or tacker.

b. Identify all work performed by each welder, welding operator, or tacker with an assigned number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. Place the identification mark for seam welds adjacent to the weld at 3 foot intervals. Identification with die stamps or electric etchers is not allowed.

3.2 QUALITY CONTROL

Perform testing using an approved inspection or testing laboratory or technical consultant; or if approved, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. Perform visual and radiographic, ultrasonic, magnetic particle, and dye penetrant inspections to determine conformance with paragraph STANDARDS OF ACCEPTANCE. Conform procedures and techniques for inspection with applicable requirements of AWS D1.1/D1.1M, ASTM E 165, ASTM E 709, except that in radiographic inspection only film types designated as "fine grain," or "extra fine," are acceptable.

3.3 STANDARDS OF ACCEPTANCE

Conform dimensional tolerances for welded construction, details of welds, and quality of welds with the applicable requirements of AWS D1.1/D1.1M and the contract drawings. Perform nondestructive testing by visual inspection and radiographic, ultrasonic, magnetic particle, or dye penetrant methods. The minimum extent of nondestructive testing must be random 20 percent of welds or joints, or as indicated on the drawings.

3.3.1 Nondestructive Examination

The welding is subject to inspection and tests in the mill, shop, and field. Inspection and tests in the mill or shop do not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

3.3.2 Destructive Tests

Make all repairs when metallographic specimens are removed from any part of a structure. Employ only qualified welders or welding operators, and use the proper joints and welding procedures, including peening or heat treatment if required, to develop the full strength of the members and joints cut and to relieve residual stress.

3.4 GOVERNMENT INSPECTION AND TESTING

In addition to the inspection and tests performed by the Contractor for quality control, the Government may perform inspection and testing for acceptance to the extent determined by the Contracting Officer. The costs of such inspection and testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the Government if the welds are satisfactory. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph STANDARDS OF ACCEPTANCE.

3.5 CORRECTIONS AND REPAIRS

If inspection or testing indicates defects in the weld joints, repair defective welds using a qualified welder or welding operator as applicable. Conduct corrections in accordance with the requirements of AWS D1.1/D1.1M and the specifications. Repair all defects in accordance with the approved procedures. Repair defects discovered between passes before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, blend the affected area into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before re-welding, examine the area by suitable methods to ensure that the defect has been eliminated. Repaired welds shall meet the inspection requirements for the original welds. Any indication of a defect is regarded as a defect, unless re-evaluation by nondestructive methods or by surface conditioning shows that no unacceptable defect is present.

-- End of Section --

SECTION 05091

ULTRASONIC INSPECTION OF WELDMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ASNT Q&A Bk C	(1994) Question and Answer Book C: Ultrasonic Testing Method; (Supplement to Recommended Practice SNT-TC-1A)
ASNT RP SNT-TC-1A	(2001) Recommended Practice

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2006) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM E 165	(2002) Liquid Penetrant Examination
ASTM E 709	(2001) Magnetic Particle Examination

1.2 DEFINITIONS

1.2.1 A Scan

Method of data presentation on a cathode ray tube using rectangular coordinates in which a horizontal base line indicates elapsed time when reading from left to right. A vertical deflection in the base line indicates reflect signal amplitude.

1.2.2 Acoustically Similar Material

Material the same as that to be inspected; or another material proven to have acoustical velocity within plus or minus 3 percent and an attenuation within plus or minus 0.25 dB/inch of the inspected material for the inspection frequency and wave mode, using the same mode as that to be used for inspection.

1.2.3 Amplitude

When referring to an indication in A scan presentation, amplitude is the vertical height of the indication measured from peak-to-peak for radio frequency indications and trace-to-peak for video indications.

1.2.4 Attenuation

Dissipation or loss of energy as ultrasonic vibrations travel through the

material. Attenuation is caused almost entirely by scattering of the ultrasonic vibrations generated by the search unit.

1.2.5 Attenuation-Correction Controls

Circuitry to provide a continuous increase in amplification with respect to time. This circuitry compensates for the reduction in sensitivity with depth as a result of sound beam divergence and its attenuation in material.

1.2.6 Back Reflection or End Reflection

Reflection from the opposite side, end, or boundary of the material into which the ultrasonic energy was introduced.

1.2.7 Calibrated Gain Control (Attenuator)

Circuitry with which gain can be reduced finite amounts by switching electrical signal attenuation into the circuit.

1.2.8 Calibration

Process of comparing an instrument or device with a standard to determine accuracy or produce a scale.

1.2.9 Cathode Ray Tube (CRT)

An electron tube in which a controlled beam of electrons from the cathode is used to produce an image on a fluorescent screen at the end of the tube.

1.2.10 Couplant

Any material, usually a liquid or semiliquid, used between the search unit and the inspection surface to exclude air and to convey the ultrasonic vibrations between the search unit and the material being inspected.

1.2.11 Damping Control

Control that varies the duration of transducer ringing.

1.2.12 Decibel (dB)

Units for the logarithmic expression of the ratio of power levels. Power levels can be functions of voltage, current, or impedance, for example. Decibel units having no values of their own are only significant when a reference is stated, as 10 dB above one reference level or 6 dB below another reference level.

1.2.13 Delay Control

Means of delaying the pattern obtained on the CRT.

1.2.14 Discontinuity

Anything within a material that will cause a detectable interruption in an ultrasonic beam.

1.2.15 Distance-Amplitude Correction Curve

Curve showing the relationship between signal amplitude and equal-sized

reflecting surfaces at various distances from the transducer. Reference standards are used to obtain such curves.

1.2.16 Dynamic Range

Ratio of maximum to minimum size of reflective areas that can be adequately distinguished on the CRT at a constant gain setting.

1.2.17 Effective Depth of Penetration

Maximum depth at which the sensitivity is satisfactory for the quality of test desired.

1.2.18 Examination

Within the context of this specification, examination is equivalent to the word "inspection."

1.2.19 Gain Control

Circuitry designed into the ultrasonic system to vary reflection amplitude. This control is usually calibrated in decibels. It is also called the sensitivity control.

1.2.20 Gross

Background displacement of the trace on the CRT from the established baseline due to the gain setting, the characteristics of the test equipment, or the material under examination.

1.2.21 Hertz

One complete set of recurrent values of a periodic quantity comprises a cycle. In other words, any one set of periodic variations starting at one condition and returning once to the same condition is a cycle.

1.2.22 Immersion Techniques

Test methods in which the part to be tested and the search units are immersed in water or other suitable liquid couplant. A mechanical device is used to firmly hold and direct the wave angle of the search unit. The search unit does not contact the item being inspected.

1.2.23 Indication

Visual presentation on the cathode ray screen resulting from a sound beam reflection from a boundary surface or discontinuity.

1.2.24 Initial Pulse Indication

Usually called the "initial pulse". A signal on the CRT screen marking the instant at which a voltage impulse is applied to the transmitting crystal. Its rising edge is frequently invisible due to the time lag in the probe shoe and the consequent necessity to ensure coincidence between the time base zero and the instant at which the transmitter pulse actually enters the material under test.

1.2.25 Linearity

Property of an instrument revealed by a linear change in reflected signal or displacement. The vertical linearity is determined by plotting the change in ratios of signal amplitude from two adjacent reflections from an area of known size. The horizontal linearity is determined by plotting the distance the signal is displaced along the sweep against the change in material thickness or by noting the spacing of multiple back reflections.

1.2.26 Longitudinal or Compressional Waves

Simple compression-rare-fraction waves in which particle motion within a material is linear and in the direction of wave propagation. Also called straight beams, or compressional or normal waves.

1.2.27 Longitudinal Wave Inspection

Ultrasonic technique, normally using straight beam methods, in which longitudinal waves are the dominant form.

1.2.28 Mid-Screen Reflection

Reflection whose amplitude is equal to one-half the useable screen height on the CRT.

1.2.29 Megahertz (MHz)

One million hertz per second frequency.

1.2.30 NDT Level I

An NDT Level I individual should be qualified to properly perform specific calibrations, specific NDT, and specific evaluations for acceptance or rejection determinations according to written instructions, and to record results.

1.2.31 NDT Level II

An NDT Level II individual should be qualified to set up and calibrate equipment and to interpret and evaluate results with respect to applicable codes, standards, and specifications.

1.2.32 NDT Level III

An NDT Level III individual should be capable of establishing techniques and procedures; interpreting codes, standards, specifications, and procedures; and designating the particular NDT methods, techniques, and procedures to be used.

1.2.33 Node

Distance a shear wave travels in a straight line from the inspection surface before being reflected by the opposite surface.

1.2.34 Pulse Repetition Rate

Number of spaced pulses of sound per second sent into the material being inspected.

1.2.35 Range Control

Means of expanding the pattern obtained on the CRT so that any portion of the total distance being tested can be presented.

1.2.36 Reference Reflector

Standard reflector 0.06 inch diameter reference hole in the IIW reference block. Other approved blocks may have a different diameter reflector.

1.2.37 Reflector

Boundary, consisting of an opposite side, crack, or separation, or a distinct change in material such as slag or porosity that reflects the ultrasonic energy the same as a mirror reflects light.

1.2.38 Refracted Waves

Waves that have undergone change of velocity and direction by passing from one material to another material with different acoustical properties. Refraction will occur wherever the angle of the incident wave to the interface is other than perpendicular.

1.2.39 Rejectable Discontinuity (Defect)

Reflector large enough to produce a signal (decibel rating) that exceeds the reject/repair line.

1.2.40 Resolution

Ability to clearly distinguish signals obtained from two reflective surfaces with a minimum separation distance. Near-surface resolution is the ability to clearly distinguish a signal from a reflector at a minimum distance under the contact or near surface without interference from the initial pulse signal. Far-surface resolution is the ability to clearly distinguish signals from reflectors displaced at minimum distances from the far or back surface when the sound beam is normal to that back surface.

1.2.41 Ringing

Excitation in a transducer due to the application of a short pulse of high voltage.

1.2.42 Scanning

Procedure of moving the search unit or units along a test surface to obtain complete inspection of the entire volume of a material being inspected. Preliminary scanning refers to a somewhat common practice of rapidly traversing a weld ultrasonically with a higher instrument gain or sensitivity level than will be used for the evaluation. It gives the operator an estimate of the welding quality and also makes all defects more prominent and less likely to be missed.

1.2.43 Search Unit

Device containing a piezoelectric material used for introducing vibrations into a material to be inspected or for receiving the vibrations reflected from the material. The active element of the search unit is defined as the effective transmitting area. Search units are also called transducers or

probes. They may be single or dual and contain one or two piezoelectric elements, respectively, for transmission and reception. The single search unit is sometimes enclosed in a transducer wheel or search unit wheel. The search unit may be manually handled and placed in direct contact with the material to be inspected or may be held in a fixture for immersion techniques.

1.2.44 Sensitivity

Measure of the ultrasonic equipment's ability to detect discontinuities. Quantitatively, it is the level of amplification of the receiver circuit in the ultrasonic instrument necessary to produce the required indication on the scope from the reference hole in the reference block. Also see "Standard Reference Level."

1.2.45 Shear Waves

Waves in which the particles within the material vibrate perpendicularly to the direction in which the wave travels or propagates. Also called transverse waves.

1.2.46 Shear Wave Inspection

Inspection technique using shear waves in a material. The search unit is placed at an angle to the contact surface of the material so the resultant refracted sound is a shear wave at an angle to the normal.

1.2.47 Standard Reference Level

Mid-screen height reflection when beaming at the 0.06 inch hole in the primary reference block or the reference hole in the secondary standard.

1.2.48 Surface Waves

Waves that propagate along the surface of the material and penetrate it to only about 1/2-wavelength. Also known as Rayleigh waves.

1.2.49 Test Frequency

Operating frequency in hertz per second of the search unit during period of activation. Frequency is usually expressed in megacycles per second or megahertz. The latter term has been adopted for international use and is preferred.

1.2.50 Video Form

Type of signal presentation on a CRT in which only the upper half of the signal appears.

1.3 GENERAL REQUIREMENTS

The procedures, methods, standards, and description of equipment specified herein shall be used for inspection of weldments. Ultrasonic inspections shall be made to detect the following defects:

a. Cracks or crack-like faults.

b. Root defects, including lack of penetration and fusion.

c. Lack of fusion between passes on the sidewall.

d. Porosity or inclusions and excessive undercutting.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Ultrasonic Inspection

Procedures and Methods. The pulse echo contact method with an A scan presentation shall be used for the ultrasonic inspection of welded joints, except that immersion techniques may be used for some applications when approved by the Contracting Officer. The Contractor shall provide a standard reference block and working standards as described in paragraph REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION. The procedures to be used for personnel and equipment qualification, equipment calibration, and inspection, shall be submitted to the Contracting Officer at least 30 days prior to their intended use. Approval by the Government will in no way affect the obligation of the Contractor to employ qualified personnel, equipment, and procedures, and to perform the inspection as specified. The procedure description shall include the following:

a. Couplant.

b. Search unit characteristics including angle, size, shape, nominal frequency, type designation.

c. Method and type of wave.

d. Equipment and accessories including manufacturer, model number, date of manufacture, last date of calibration, and the manufacturer's electrical, physical, and performance specifications.

e. Decibel (dB) compensation system for distance-amplitude correction.

Reports containing the following information:

a. Identification and Location of Inspected Item: Name and place of the inspected item, the person performing the inspection, and the date of inspection.

b. Detail of Inspections: Details of methods, types of waves used, search units, frequencies, inspection equipment identification, and calibration data with enough information to permit duplication of the inspection at a later date.

c. Response in Calibration: The response from the DSC or SC block used in calibration and for acceptance/rejection in terms of the response from the 0.06 inch reference hole in the standard IIW

block (primary standard).

d. Identification of Unacceptable Areas: Locations, dimensions, types, and area of unacceptable defects and discontinuities giving reflections over 50 percent of the reject/repair line. These may be noted on a sketch or marked-up drawing.

e. Record of Repair Areas: A record of repaired areas shall be furnished as well as test results for the repaired areas.

1.5 WAVE TYPES

The types of waves and the conditions under which they shall be used are specified below:

1.5.1 Shear Waves

Unless conditions prohibit, shear waves shall be used. A longitudinal wave procedure may be used instead, if approved by the Contracting Officer. Refracted waves between 40 degrees and 70 degrees shall be used except where different angles are indicated in approved procedures, such as for materials less than 1/2 inch thick, for materials with sound velocities greater than in steel, when the weldments are not readily accessible, or when existing backing rings or backing strips are not removed. For inspection of weldments containing backing rings or backing strips, the instrument shall be adjusted and the refracted angles shall be selected in a way to separate the weldment and the backing ring reflections. The search unit angle and the resulting shear wave angle in the material to be inspected shall be established by the Contractor for each application and this information shall be included in the procedure submitted for approval.

1.5.2 Longitudinal Waves

When conditions prohibit the use of shear waves, longitudinal waves may be used. The procedure shall be specially developed to suit the application and shall have the prior approval of the Contracting Officer.

1.6 CHANGES IN PROCEDURE

Should application of an approved procedure not provide for good resolution or adequate ultrasonic penetration in the items to be inspected (see paragraph EQUIPMENT QUALIFICATION REQUIREMENTS), changes in procedure or equipment such as frequency, pulse repetition rate, angle of search unit, couplant, or oscilloscope shall be made by the Contractor. Adequacy of the new procedure shall be demonstrated to the Contracting Officer. The Government reserves the right to require a change in test equipment during these tests if any of the following test system characteristics fall below the levels listed in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS: sensitivity, amplitude and distance linearity, signal-to-noise ratio, entry and back surface resolution and penetration.

1.7 ULTRASONIC EQUIPMENT

The ultrasonic equipment shall conform to the requirements listed in AWS D1.1/D1.1M Section Inspection, subsection Ultrasonic Equipment, with the following exceptions:

a. The ultrasonic test instruments shall be able to generate, receive,

and to present pulses in the frequency range from 1 to 10 megahertz (MHz).

b. The horizontal linearity of the ultrasonic instrument shall be measured in accordance with paragraph EQUIPMENT QUALIFICATION REQUIREMENTS.

c. In addition to the resolution test specified in AWS D1.1/D1.1M, subsection Ultrasonic Equipment, both near- and far-surface resolution tests shall be conducted in accordance with the tests specified for these characteristics in the paragraph EQUIPMENT QUALIFICATION REQUIREMENTS.

1.8 PERSONNEL QUALIFICATION AND REQUIREMENTS

1.8.1 Personnel Qualification

The three levels of responsibility associated with ultrasonic inspection are defined in ASNT RP SNT-TC-1A. For qualification to perform ultrasonic inspection, personnel shall be certified under ASNT RP SNT-TC-1A and ASNT Q&A Bk C within a period of 1 year before the date of contract. Other qualification or certification may be accepted at the Contracting Officer's discretion. Personnel with only an operator or inspector trainee certification will not be considered qualified to pass judgement on the acceptability of inspected items, but may work under the direct supervision of a qualified ultrasonic inspector. Qualified ultrasonic inspectors shall be able to judge the acceptability of the item in accordance with paragraph ACCEPTANCE/REJECTION LIMITS.

1.8.2 Examinations

If the Contracting Officer doubts an individual's ability as an operator, inspector, or supervisor, the individual shall be recertified in accordance with ASNT RP SNT-TC-1A. At the option of the Government, the Contracting Officer may participate in administering the examination and in evaluating the results.

1.9 REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION

Reference standards shall be used to calibrate the inspection equipment, test its operating condition, and record the sensitivity or response of the equipment during the inspection in accordance with paragraph EQUIPMENT QUALIFICATION REQUIREMENTS. The standards shall comprise a standard reference block and reference specimens as noted below.

1.9.1 Standard Reference Block

The standard reference block or primary standard shall be provided by the Contractor and shall consist of the IIW block in AWS D1.1/D1.1M, Section Inspection, subsection Reference Standards. The standard reference block also shall be used in any reinspection on the same basis as the original inspection, even though the reinspection is to be performed by other ultrasonic instruments and accessories.

1.9.2 Working Standards

The Contractor may use other recognized working standards detailed with the IIW block in AWS D1.1/D1.1M such as the Sensitivity Calibration (SC) block. However, such blocks shall be referenced to the IIW block as noted in

paragraph SENSITIVITY CALIBRATION OF LONGITUDINAL AND ANGLE WAVE SYSTEMS. Details of their use shall be included in the procedure description submitted to the Contracting Officer. These blocks are the secondary standards. They shall be of acoustically similar material to the welds to be inspected. The secondary standards shall be suited for the applicable tests specified in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS and shall be used as follows, except where the IIW block is specifically required:

a. To assure adequate penetration of the base material.

b. To provide a secondary field standard.

c. To calibrate the equipment and establish the standard reference level.

1.9.3 Resolution Test Block

The Contractor shall furnish a resolution test block in accordance with the details shown in AWS D1.1/D1.1M Section Inspection, subsection Ultrasonic Equipment.

1.10 EQUIPMENT QUALIFICATION REQUIREMENTS

The ultrasonic instrument and accessories shall be evaluated on their arrival at the jobsite, immediately prior to the start of inspection. They shall be evaluated using the Contractor's furnished primary standard and shall meet or exceed the requirements listed in paragraphs below. Equipment that does not meet these requirements shall not be used in the inspection.

1.10.1 Requalifications

The equipment shall be requalified after normal use at intervals not to exceed 40 hours, except as noted. The equipment also shall be requalified immediately after maintenance or repair or when the Contracting Officer considers its operation questionable.

1.10.2 Longitudinal Wave System

1.10.2.1 Vertical Amplitude Linearity

Two adjacent reflections of different amplitudes obtained through the thickness of the primary or secondary standard shall vary in the same proportion as the amplitude of the first reflection is increased in discrete 2-dB increments between 20 percent and 80 percent to full screen height. For each gain setting, the amplitude of each reflection shall vary by the same factor, within plus or minus 5 percent. Requalification is required monthly or as otherwise stated.

1.10.2.2 Horizontal Linearity

The first three multiple reflections obtained through the thickness of the primary or secondary standard shall be equally spaced, within plus or minus 5 percent, when spread over 90 percent of the sweep length. Requalification is required monthly or as otherwise stated.

1.10.2.3 Near-Surface Resolution

Excessive ringing that appears on the CRT to the right of the sound entry

point shall not exceed a 1/2 inch equivalent distance in steel with the search unit placed on the 4 inch edge of the IIW (primary) block and positioned for maximum amplitude reflection from the 0.06 inch reference hole of the primary standard. The reference reflector shall be set to mid-screen and the gain shall be increased 20 dB. The reference hole located at least 1/2 inch from one edge of the AW DSC or SC secondary standard shall be used similarly. Acceptability will be on the same basis as in the primary standard.

1.10.2.4 Far-Surface Resolution

This property of the equipment shall be verified by the method detailed in AWS D1.1/D1.1M, Section Inspection, subsection Calibration of the Ultrasonic Unit with the IIW or Other Approved Calibration Blocks. In addition, the trailing edge of the third reflection shall return to the sweep line and be clearly discernible.

1.10.3 Angle Wave System

1.10.3.1 Vertical (Amplitude) Linearity

Two adjacent multiple reflections from the 0.06 inch reference hole in the primary standard shall vary in the same proportion as the amplitude of the first reflection in discrete 2-dB increments between 20 percent and 80 percent of full screen height. For each gain setting, the amplitude of each adjacent reflection shall vary within plus or minus 5 percent. For testing with the AWS SC or AWS DSC secondary standard, the same criteria shall apply. For the SC block, the transducer shall be placed on the longitudinal surface contiguous with the sound entry point lines, whereas the 4 inch longitudinal surface of the DSC block shall be used for the same purpose. Requalification is required monthly, or as otherwise stated.

1.10.3.2 Horizontal Linearity (Angle Wave}

The first three multiple echoes, obtained from the 0.06 inch reference hole of the primary standard or from the reference hole in a secondary standard with the transducer positioned at a minimum of 1 inch sound path distance, shall be equally spaced plus or minus 5 percent when spread over 90 percent of the sweep length. The gain shall be adjusted to give a mid-screen height first reflection. Requalification is required monthly or as otherwise stated.

1.10.3.3 Near-Surface Resolution (Angle Wave)

The search unit shall be positioned for maximum amplitude using the primary or secondary standard as in the horizontal linearity test. The gain shall be adjusted to give a mid-screen height first reflection and then shall be increased 20 dB. Excessive ringing that appears on the CRT to the right of the sound entry point shall not exceed 1/2 inch equivalent distance in steel.

1.10.3.4 Far-Surface Resolution (Angle Wave)

The equipment shall delineate the three resolution holes in the resolution block appropriate for the angle of the transducer to be used in the inspection.

1.10.3.5 Signal-to-Noise Ratio

With the search unit located as in the horizontal linearity test, the gain shall be set to obtain an 80 percent full screen height first reflection. The reference reflection-to-noise-amplitude ratio shall not be less than 10 to 1.

1.10.3.6 Exit Point

The search unit shall be placed on the graduated scale on the 12 inch edge of the primary standard and the ultrasound shall be beamed toward the curved edge of the block. The gain shall be set for a mid-screen first reflection. The search unit shall be moved back and forth until the first reflection is maximized. The index line on the side of the search unit shall be within 1/16 inch of the mid-point of the graduated scale in either direction. Requalification is required after 40 hours or as otherwise stated.

1.10.3.7 Transducer Angle

The established exit point of the probe shall be set over the applicable angle index line scribed on the 8 inch or 12 inch edge, as appropriate, of the primary standard. The gain shall be set to obtain a mid-screen first reflection from the 50 mm plexiglass-lined hole for search units up to 70 percent with the search unit placed on the 8 inch edge. Search units of large angles that have been approved specifically by the Contracting Officer shall be tested from the 12 inch edge using the 0.06 inch reference hole. The search unit shall be moved back and forth to maximize the first reflection. When the material to be inspected is not acoustically similar to the primary standard, the inspection angle shall be within plus or minus 2 degrees of the angle specified in the approved procedure. Requalification is required after 40 hours or as otherwise stated.

1.11 SENSITIVITY CALIBRATION OF LONGITUDINAL AND ANGLE WAVE SYSTEMS

Sensitivity calibration shall be done immediately after a change of operators and at least every 30 minutes thereafter as testing proceeds. Recalibration will be required after any power interruption, including a change of source, when the equipment is suspected of being in error, or after relocation of the jobsite. The 30-minute and relocation calibrations may coincide. The instrument shall be allowed to warm up before calibration is attempted. The instrument range and delay controls shall be adjusted to display signals from the reference hole in the primary (IIW block) or secondary standard (DSC or SC block or both) on the viewing screen for the range of distances to be inspected.

1.11.1 Calibration Procedure

The test instrument shall be calibrated as described below.

1.11.1.1 Longitudinal Wave

In calibrating with the primary standard, the transducer shall be positioned on the 4 inch edge for maximum reflection from the 0.06 inch reference hole. The gain shall be adjusted so that the first reflection is at 50 percent full scale. The top of that indication shall be marked on the CRT with a wax pencil or by other means. This establishes the standard reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair line. If a

secondary standard is to be used in the inspection, the reject/repair line shall be established similarly. For the DSC block, the transducer shall be positioned on the 4 inch long surface and with the SC degrees sound entry point lines. Adjustment for loss of signal due to distance shall be compensated for as noted above.

1.11.1.2 Angle Wave

In calibrating with either the primary or secondary standard, the transducer shall be positioned on the same surfaces as in the case of the longitudinal wave system but over the sound entry point lines appropriate for the angle of the transducer to be used in the inspection. The gain shall be adjusted to give a first reflection that is 50 percent of full-scale response. The top of that indication shall be marked with a wax pencil or by other means. This establishes the standard reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair line. Loss of signal shall be compensated as noted.

1.11.2 Calibration of the Secondary Standards

After adjusting the first reflection from the reference hole in the secondary standard to 50 percent full-scale response for a sheer or longitudinal wave inspection, a maximized reflection from the 0.06 inch reference hole in the primary standard shall be obtained without changing the gain setting. The gain setting shall be readjusted to obtain a 50 percent full-scale reflection and the readjusted setting shall be recorded as required by paragraph SUBMITTALS, SD-03, to provide a basis for recalibration when the secondary standard is unavailable.

1.11.3 Equipment With a Calibrated Gain Control (Attenuator)

When a calibrated gain control attenuator is used, the transducer shall be positioned for a maximum reflection from the reference hole in the secondary standard representing approximately 1/2 the longest inspection distance. This reflection shall be adjusted to mid-scale by varying the gain control accordingly. The difference in decibels between this amplitude and the signal obtained from the first, second, and longest distance reflection obtainable on the secondary standard shall be measured. The differences shall be recorded and plotted on a curve to determine the necessary correction to the amplitude at the various inspection distances. A level of 80 percent of the primary level obtained from the corrected signal heights, is equivalent to the reject/repair line.

1.11.4 Equipment With Electronic Distance Compensation Circuitry

If the difference in amplitude between the first reflection and the reflection obtained from the maximum inspection distance is 1 dB or less, the instrument may be used as is. If not, the procedure used for equipment with a calibrated decibel control shall be used to determine the necessary correction to the reflections obtained at the various inspection distances. This characteristic of the equipment shall be re-examined on a monthly basis or as otherwise stated in paragraph EQUIPMENT QUALIFICATION REQUIREMENTS, and correction factors shall be modified accordingly.

1.11.5 Longitudinal Wave Distance-Amplitude Correction Curve

A distance-amplitude correction curve may be used instead of the calibrated gain control or the electronic circuitry for either the shear or

longitudinal wave system as described below:

a. A shear wave distance-amplitude correction curve shall be constructed and drawn on the face of the cathode ray tube (CRT) for inspection of weldments in excess of 1-1/2 inch thick when the design of the test equipment permits. The reference hole in the secondary standard [SC] [or] [DSC] shall be used to construct the distance-amplitude correction curve for a minimum of three node points, 1, 2, and 3. The sensitivity of the instrument shall be adjusted to produce 50 percent full-scale response for the maximized primary reflection and the reject/repair line shall be constructed at 80 percent of the established distance-amplitude curve.

b. A longitudinal wave distance-amplitude correction curve shall be constructed and drawn on the face of the CRT when longitudinal waves are to be used in the inspection for material thicknesses exceeding 1 inch, if design of the test equipment permits. The reference hole in the secondary standard shall be used. Instrument sensitivity shall be adjusted to 50 percent full-scale of the maximized response from the reference hole at 1/2 maximum inspection distance. A reject/repair line shall be constructed at 80 percent of the established distance-amplitude curve. The reflection amplitudes to define this curve shall be taken from the faces of the secondary sensitivity standards which are 1 inch, 2 inch, and 1/2 maximum inspection distance, and the longest distance obtainable from the secondary standard, respectively, from the reference hole. When a correction curve cannot be drawn on the face of the CRT, one of the distance-amplitude correction methods noted above and submitted under the procedure description shall be applied in accordance with paragraph GENERAL REQUIREMENTS.

1.11.6 Longitudinal Wave Inspections Using Immersion Technique

The reference hole in a secondary standard shall be used for each different inspection distance. Repair/reject limits shall be established by immersing both the search unit and secondary standard in the liquid bath in which the inspection is to be conducted. The procedure noted below shall be used:

a. The longitudinal waves from the search unit shall be directed toward the face of the secondary standard closest to the reference hole.

b. The search unit shall be positioned for maximum response. The amplitude of reflection shall be adjusted to 50 percent full-scale. The top of that indication shall be marked on the CRT with a wax pencil or by other means. This establishes the standard reference level. A point at 80 percent of the standard reference level shall be calculated and marked. This locates the reject/repair point. The above shall be repeated for each different surface-to-hole distance to establish the reject/repair line.

c. With the gain at the same setting and the primary standard and search unit in air, a maximized reflection shall be obtained from the 0.06 inch reference hole in the primary standard (IIW). Then, this gain setting shall be readjusted to obtain a 50 percent full-scale reflection. The readjusted setting shall be recorded as required by paragraph SUBMITTALS, SD-18 Records, to provide a basis for recalibration when the secondary standard is unavailable.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 PREPARATION OF MATERIALS FOR INSPECTION

Surfaces shall be free from the following:

3.1.1 Weld Spatter

Spattering or any roughness that interferes with free movement of the search unit or impairs transmission of the ultrasonic vibrations.

3.1.2 Irregularities

Those which could mask or be confused with defect indications.

3.1.3 Weld Backing Strips

Strips that are not to remain in place shall be removed and all sharp edges and valleys shall be eliminated by grinding or other mechanical means.

3.1.4 Dirt

All loose scale, rust, paint, and dirt shall be removed from the coupling surface.

3.2 INSPECTION PROCEDURE

When possible, all welds shall be examined from both sides of the weld and from one surface. If complete inspection cannot be accomplished from one surface, inspection shall be made from another surface that is part of the same joint. Preliminary scanning techniques using an increased instrument gain shall be used to locate possible defects. When possible, gain shall be increased to a minimum of twice (6 dB) the reference level setting. Final acceptance or rejection shall be evaluated with the equipment properly calibrated and the gain control set at the reference level. The reject/repair line shall be used to evaluate quality of the weld. If a periodic calibration check shows that the equipment is not operating properly or that the system's sensitivity has decreased more than 20 percent (2 dB) from the established sensitivity level, all welds inspected since the prior calibration shall be reexamined. If penetration of the shear waves is questionable, the angle search unit shall be placed in position on one side of the weldment with the waves directed through the weldment. A disconnected angle search unit, plastic or metal wedge or disk, or any good reflector shall be placed in the wave path of the search unit on the far side of the weld to reflect the sound. When good reflections cannot be obtained by either shear or longitudinal waves, the Contractor shall modify the procedures in accordance with paragraph GENERAL REQUIREMENTS.

3.2.1 Test Frequency

The test frequency for ferrous materials shall be as specified in AWS D1.1/D1.1M, Section Inspection, subsection Ultrasonic Equipment, except for thicknesses below 1/2 inch, frequencies between 2.25 and 5 MHz may be used to obtain increased sensitivity. For materials that are difficult to penetrate, any frequency within the operating range of the equipment may be used. The effective depth of penetration and sound beam divergency shall

be demonstrated to the Contracting Officer.

3.2.2 Couplants

The choice of couplant is optional with the Contractor, except as follows:

a. The couplant shall be the same as that used for equipment qualification and calibration.

b. Couplants that may corrode the reference standards and material being tested or leave objectionable residues shall not be used.

c. Oils shall not be used in systems intended to handle liquid oxygen.

d. Couplants shall be of the proper viscosity to give good coupling for the surface roughness.

3.2.3 Shear Wave Inspection

Shear wave inspection shall be performed as follows: The search unit shall be placed on the contact surface at a distance from the weld equal to that used when calibrating the equipment.

3.2.4 Longitudinal Flaws

To detect longitudinal flaws, the search unit shall be slowly moved toward and away from the weld far enough to cover its entire cross section, approximately 90 degrees to the weld centerline. The search unit shall be radially oscillated to the left and right, covering an angle of approximately 30 degrees. During the foregoing movement, the search unit shall be continually advanced parallel to the weld centerline. The rate of movement shall depend on the operator's ability to clearly see and identify all reflections. The amount of movement shall be calculated to ensure that the inspection distance will be great enough to traverse the weld. [For plate thicknesses 2 inches and greater with an unmachined stainless steel overlay covering the welded joint, the inspection distance shall range from a minimum of one thickness (T) or the first node back from the near fusion line to a distance exceeding T plus 2/3, the maximum width of the weld deposit at the surface. The inspection shall be repeated from the other side of the weld on the same surface if accessible or if not, from another surface that is part of the same joint as indicated above. The surface of the weld metal in the joint shall be ground smooth and blended with the base metal.]

3.2.5 Transverse Flaws

To detect transverse flaws when the welded surface is ground flush, the search unit shall be moved along the welded surface in each direction parallel to the centerline of the weld metal with the wave radiating parallel to the weld centerline. To detect transverse flaws when the welded surface is not ground flush, the search unit shall be moved parallel to the weld in each direction, on the adjacent base metal at the top of the weld, with the wave directed at an angle of 30 degrees to the weld centerline.

3.2.6 Longitudinal Wave Inspection

This inspection shall be made as follows:

a. The search unit shall be placed on the contact surface with the wave directed in a straight line through any intervening base metal and through the weldment.

b. The search unit shall then be moved slowly in a direction parallel to the weld centerline and zigzagged across an area equivalent to the welded thickness to make sure that waves penetrate the entire welded cross section.

c. The rate of movement shall be dependent on the operator's ability to clearly see and identify all reflections.

3.3 GENERAL ACCEPTANCE/REJECTION REQUIREMENTS

Discontinuities shall be evaluated only when the ultrasonic equipment is calibrated properly. If discontinuities are detected, the sound beam shall be directed to maximize the signal amplitude. To determine the length of a discontinuity, the search unit shall be moved parallel to the discontinuity axis in both directions from the position of maximum signal amplitude. One-half the amplitude or a 6-dB increase in sensitivity from a point at which the discontinuity signal drops rapidly to the baseline shall be defined as the extremity of the discontinuity. At this point, the scanning surface shall be marked at the position indicated by the center of the transducer. This shall be repeated to determine the other extremity. The length of the discontinuity shall be defined as the distance between these two marks. For discontinuities with signal amplitudes exceeding full screen height, 50 percent of full screen shall be considered half-peak amplitude. At this point, the scanning surface shall be marked at the position indicated by the center of the transducer. This shall be repeated to determine the other extremity. The length of the discontinuity shall be defined as the distance between these two marks. The maximum signal amplitude, length, depth, and position within the inspection zone shall be determined and reported for discontinuities yielding a signal amplitude equal to or exceeding the reject/repair line. The minimum recordable length of a discontinuity shall be 1/8 inch. When evaluating welds joining two members with different thicknesses at the weld, the thickness T shall be the lesser of the two thicknesses. The criteria for acceptance or rejection based on ultrasonic inspection will supplement a visual inspection. The sizes and surface conditions of the welds shall conform to the requirements indicated on the applicable plans and drawings and other sections of the specification. When ultrasonic inspection is used along with radiography, the limits specified under paragraph REFERENCE STANDARDS FOR EQUIPMENT, QUALIFICATIONS, AND CALIBRATION shall [be the primary standard] [supplement the radiographic standards].

3.3.1 Investigation of Questionable Indications

An indication considered doubtful shall be brought to the attention of the Contracting Officer and, at the Contractor's option, the weld shall be repaired or investigated further. Indications detected within 3/8 inch of accessible surfaces shall be investigated further using liquid penetrant in accordance with ASTM E 165 or magnetic particle methods in accordance with ASTM E 709, as applicable, to determine if the surface is penetrated. Failure to locate the flaws by one of these methods shall necessitate further investigation by the other. For nonmagnetic materials, only dye penetrant inspection is required. Other questionable defects shall be further investigated using modifications of the inspection procedure in accordance with paragraph GENERAL REQUIREMENTS.

3.3.2 Inspection of Repairs

All repairs shall undergo the same inspection procedure that originally revealed the discontinuities. Before acceptance, the welds shall meet the standards required for the original weld.

3.4 ACCEPTANCE/REJECTION LIMITS

Welds shall be accepted or rejected by ultrasonic indication in accordance with the following:

3.4.1 Full Penetration Butt Joints and Corner Joints

3.4.1.1 Class I

Welds shall be rejected on the basis of the following:

a. Any evidence of a crack, including any revealed by dye penetrant or magnetic particle in accordance with paragraph GENERAL ACCEPTANCE/ REJECTION REQUIREMENTS.

b. Any indication of a discontinuity such as excessive undercutting, lack of fusion, incomplete penetration, inclusions, or porosity which individually or collectively produce reflections equal to or greater than the established reject/repair line.

c. Any discontinuity with a reflection equal to or exceeding 25 percent of the reject/repair line, up to and including the reject/repair line, shall be rejected where the discontinuity length exceeds 1/2 T or 1 inch.

d. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity. The maximum distance between the outer extremities of any two such discontinuities or the sum of their lengths, whichever is greater, shall not exceed the limits specified.

e. If the total cumulative length of the discontinuities in any 12 inches of weld length exceeds T, that weld length shall be rejected.

3.4.1.2 Class II

Welds shall be rejected on the basis of the following:

a. Any evidence of a crack, including those revealed by dye penetrant or magnetic particle inspection in accordance with paragraph GENERAL ACCEPTANCE/REJECTION REQUIREMENTS.

b. Any discontinuity with a reflection exceeding the established reject/repair line and with a length exceeding 1/4 inch. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity.

c. Any discontinuity with a reflection greater than or equal to or 50 percent of the reject/repair line, up to and including the reject/repair line, shall be rejected if the discontinuity length exceeds T. In no case shall any single discontinuity length exceed 1-1/2 inches.

d. Adjacent discontinuities separated by sound metal with the dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity. The maximum distance between the outer extremities of any two adjacent discontinuities or the sum of their lengths, whichever is greater, shall not exceed the length as specified above.

e. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds 2 T, that weld length shall be rejected.

3.4.1.3 Class III

Welds shall be rejected on the basis of the following:

a. Any discontinuity with a reflection exceeding the established reject/repair line and with a length exceeding 1/2 inch. Adjacent discontinuities separated by sound metal with a dimension less than twice the length of the longest discontinuity shall be considered a single discontinuity.

b. Any discontinuity with a reflection greater than or equal to 50 percent of the reject/repair line, or with the level 8 dB more than the reject/repair line, and with a length (L) exceeding 2 inches or LT, whichever is greater.

c. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds 3 inches or 2 T, whichever is greater, that weld length shall be rejected.

3.4.2 Full Penetration Tee Joints

Full Penetration Tee Joints (for Incomplete Root Penetration): Any discontinuity with the reflection exceeding the established reject/repair line of the applicable class shall be rejected. Any discontinuity with a reflection exceeding 25 percent of the established reject/repair line, up to and including the reject/repair line, shall be rejected if its length exceeds 1/2 T in a direction transverse to the axis of the weld or LT parallel to the axis for all classes. If the total cumulative length of discontinuities in any 12 inches of weld length exceeds the limits of the applicable class, that weld length shall be rejected.

3.4.3 Partial and Full Penetration Tee Joints

Partial and Full Penetration Tee Joint Boundaries: The depth of weld penetration and weld cross section width at the through member surface shall be as indicated by applicable plans or drawings. Limits of discontinuities shall be as specified in preceding paragraphs.

3.4.4 Tee Joint Discontinuities

Tee joint discontinuities extending into the through member shall be rejected if [reflection exceeds the established reject/repair line.] [reflection amplitude is in the range of minus 6 dB of the reject/repair line and the discontinuity extends more than 1/16 inch or more into the through plate.] [the total cumulative length of discontinuities in any 12 inches of weld length exceeds 4 inches].

-- End of Section --

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC 810	(1997) Erection Bracing of Low-Rise Structural Steel Frames
AISC 316	(1989) ASD Manual of Steel Construction
AISC 317	(1992) Manual of Steel Construction, Volume II, Connections
AISC 325	(2001; 3rd Ed) LRFD Manual of Steel Construction
AISC 326	(2002; 3rd Ed) Detailing for Steel Construction
AISC 303	(2000) Code of Standard Practice for Steel Buildings and Bridges
AISC 348	(2000) Structural Joints Using ASTM A325 or A490 Bolts
AISC 335	(1989) Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary
AISC S340	(1992) Metric Properties of Structural Shapes with Dimensions According to ASTM A6M
AISC 341	(2002) Seismic Provisions for Structural Steel Buildings
AISC 350	(1999) Load and Resistance Factor Design Specification for Structural Steel Buildings

ASME INTERNATIONAL (ASME)

ASME B46.1	(2002) Surface Texture (Surface Roughness, Waviness, and Lay)

ASTM INTERNATIONAL (ASTM)

ASTM A 6/A 6M	(2004a) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(2004) Standard Specification for Carbon Structural Steel
ASTM A 53	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 143	(2003) Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2004) Standard Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A 325M	(2004b) Standard Specification for Structural Steel Bolts, Steel, Heat Treated 830 Mpa Minimum Tensile Strength (Metric)
ASTM A 325	(2004b) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 490	(2004) Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	(2003a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(2001) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 563	(2004) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 572/A 572M	(2003ae1) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 780	(2001) Standard Practice for Repair of

	Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 992/A 992M	(2003) Structural Steel Shapes
ASTM C 827	(2001; Rev A) Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
ASTM C 1107	(2005) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM F 436	(2003) Hardened Steel Washers
ASTM F 844	(2000) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959	(2002) Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
ASTM F 1554	(2004 el) Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

1.2 SYSTEM DESCRIPTION

Provide the structural steel system, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with AISC 325 except as modified in this contract.

1.3 MODIFICATIONS TO REFERENCES

Conform to AISC 335, AISC 303, AISC 348, and AISC S340, except as modified in this section.

Conform to AISC 325, AISC 350, AISC 303, AISC 348, and AISC S340, except as modified in this section.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Erection Plan, including description of temporary supports

Fabrication drawings including description of connections

SD-03 Product Data

Welding electrodes and rods

Load indicator washers

Non-Shrink Grout

Load indicator bolts

SD-06 Test Reports

Bolts, nuts, and washers

Supply the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

SD-07 Certificates

Steel

Bolts, nuts, and washers

Galvanizing

AISC Quality Certification

Welding procedures and qualifications

1.5 AISC QUALITY CERTIFICATION

Work shall be fabricated in an AISC certified Category Sbd fabrication plant.

1.6 SEISMIC PROVISIONS

The structural steel system shall be provided in accordance with AISC 341.

1.7 QUALITY ASSURANCE

1.7.1 Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326 . Fabrication drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS A2.4 standard welding symbols. Member substitutions of details shown on the contract drawings shall be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

1.7.2 Certifications

1.7.2.1 Erection Plan

Submit for record purposes. Indicate the sequence of erection, temporary bracing, and a detailed sequence of welding, including each welding

procedure required.

1.7.2.2 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in AWS D1.1/D1.1M.

PART 2 PRODUCTS

2.1 STEEL

2.1.1 Structural Steel

ASTM A 36/A 36M.

2.1.2 High-Strength Structural Steel

2.1.2.1 Low-Alloy Steel

ASTM A 572/A 572M, Grade 50.

2.1.3 Structural Shapes for Use in Building Framing

Wide flange shapes, ASTM A 992/A 992M.

2.1.4 Structural Steel Tubing

ASTM A 500, Grade B; ASTM A 501.

2.1.5 Steel Pipe

ASTM A 53, Type E or S, Grade B, weight class STD (Standard).

2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless indicated otherwise.

2.2.1 Structural Steel, Steel Pipe

2.2.1.1 Bolts

ASTM A 307, Grade A; ASTM A 325, Type 1, ASTM A 490, Type 1. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.2.1.2 Nuts

ASTM A 563, Grade and Style for applicable ASTM bolt standard recommended.

2.2.1.3 Washers

ASTM F 844 washers for ASTM A 307 bolts, and ASTM F 436 washers for ASTM A 325 and ASTM A 490 bolts.

2.2.2 High-Strength Structural Steel and Structural Steel Tubing

2.2.2.1 Bolts

ASTM A 325, Type 1 ASTM A 490, Type 1 or 2.

2.2.2.2 Nuts

ASTM A 563, Grade and Style as specified in the applicable ASTM bolt standard.

2.2.2.3 Washers

ASTM F 436, plain carbon steel.

2.2.3 Foundation Anchorage

2.2.3.1 Anchor Bolts

ASTM F 1554, Grade 36 unless noted.

2.2.3.2 Anchor Nuts

ASTM A 563, Grade A, hex style.

2.2.3.3 Anchor Washers

ASTM F 844.

2.2.4 Load Indicator Washers

ASTM F 959.

2.2.5 Load Indicator Bolts

ASTM A 325, Type 1; ASTM A 490, Type 1, with a manufactured notch between the bolt tip and threads. The bolt shall be designed to react to the opposing rotational torques applied by the installation wrench, with the bolt tip automatically shearing off when the proper tension is obtained.

2.3 STRUCTURAL STEEL ACCESSORIES

2.3.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.3.2 Non-Shrink Grout

ASTM C 1107, with no ASTM C 827 shrinkage. Grout shall be nonmetallic.

2.3.3 Welded Shear Stud Connectors

AWS D1.1/D1.1M, Type B.

2.4 GALVANIZING

ASTM A 123/A 123M or ASTM A 153/A 153M, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.5 FABRICATION

2.5.1 Markings

Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations.

2.5.2 Fireproofing Coated Surfaces

Surfaces to receive sprayed-on fireproofing coatings shall be cleaned and prepared in accordance with the manufacturer's recommendations, and as specified in Section 07810 SPRAY-APPLIED FIREPROOFING.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC 316. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC FCD for Category Conventional Steel Building Structures structural steelwork.

Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inch as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the Structural Engineer.

3.2 ERECTION

a. Erection of structural steel, except as indicated in item b. below, shall be in accordance with the applicable provisions of AISC 325. Erection plan shall be reviewed, stamped and sealed by a licensed Structural Engineer.

b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), the erection plan shall conform to AISC 303 and the structure shall be erected in accordance with AISC 810.

After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.2.1 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

3.3 CONNECTIONS

Except as modified in this section, connections not detailed shall be designed in accordance with AISC 350. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member. Holes shall not be cut or enlarged by burning. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

3.3.1 Common Grade Bolts

ASTM A 307 bolts shall be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Structural Engineer for further instructions.

3.3.2 High-Strength Bolts

Provide load indicator bolts or washers in all ASTM A 325M or ASTM A 490 bolted connections, except provide only load indicator washers for slip critical connections. Direct tension indicator tightening, shall be the only acceptable tightening methods. Use only direct tension indicator tightening for slip critical connections. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

3.3.2.1 Installation of Load Indicator Washers (LIW)

ASTM F 959. Where possible, the LIW shall be installed under the bolt head and the nut shall be tightened. If the LIW is installed adjacent to the turned element, provide a flat ASTM F 436 washer between the LIW and nut when the nut is turned for tightening, and between the LIW and bolt head when the bolt head is turned for tightening. In addition to the LIW, provide flat ASTM F 436 washers under both the bolt head and nut when ASTM A 490 bolts are used.

3.4 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Structural Engineer.

3.5 WELDING

AWS D1.1/D1.1M Grind exposed welds smooth as indicated. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

The Contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using

prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

3.5.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from areas exposed to view.

3.6 GALVANIZING REPAIR

Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A 780 zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. The Structural Engineer shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.7.1.2 Nondestructive Testing

AWS D1.1/D1.1M. Test locations shall be selected by the Structural Engineer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the Structural Engineer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

a. Testing frequency: Provide one of the following types and frequency of tests at full of partial penetration welds:

Test Type	Number of Tests
Radiographic	10%
Ultrasonic	10%
Magnetic Particle	N/A
Dye Penetrant	10%

3.7.2 Load Indicator Washers

3.7.2.1 Load Indicator Washer Compression

Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap when the load indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.005 inch gap when the load indicator washer is placed under the turned element, as required by ASTM F 959.

3.7.2.2 Load Indicator Gaps

In addition to the above testing, an independent testing agency as approved by the Structural Engineer, shall test in place the load indicator gapson 20 percent of the installed load indicator washers to verify that the ASTM F 959 load indicator gaps have been achieved. If more than 10 percent of the load indicators tested have not been compressed sufficiently to provide the average gaps required by ASTM F 959, then all in place load indicator washers shall be tested to verify that the ASTM F 959 load indicator gaps have been achieved. Test locations shall be selected by the Structural Engineer.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in AISC 348, Table 4, depending on bolt size and grade. The bolt tension shall be developed by tightening the nut. A representative of the manufacturer or supplier shall be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements.

3.7.3.2 Inspection

Inspection procedures shall be in accordance with AISC 348, Section 9. Confirm and report to the Structural Engineerthat the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

The Contractor shall inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use; and calibration of torque wrenches for high-strength bolts.

The Contractor shall inspect high-strength bolted connections in accordance with AISC 317.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension

requirements. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations shall be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, shall be tested. Retest new bolts after installation.

3.7.4 Testing for Embrittlement

ASTM A 143 for steel products hot-dip galvanized after fabrication.

-- End of Section --

SECTION 05310

STEEL DECKS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 335	(1989) Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-913	(1991) LRFD Cold-Formed Steel Design Manual
AISI SG-973	(1996) Cold-Formed Steel Design Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel
AWS D1.3	(1998) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2004b) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
ASTM A 108	(2003) Standard Specification for Steel, Carbon and Alloy, Cold-Finished
ASTM A 611/A 611M	(1997) Structural Steel (SS), Sheet, Carbon, Cold-Rolled
ASTM A 653/A 653M	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2001) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM D 1056	(2000) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D 1149	(1999) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D 746	(1998e1) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM E 84	(2005) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM DS 1-28	(2002) Design Wind Loads

STEEL DECK INSTITUTE (SDI)

SDI 30	(2001) Design Manual for Composite Decks, Form Decks, and Roof Decks
SDI DDM02	(1991) Diaphragm Design Manual
SDI DDP	(1987; R 2000) Deck Damage and Penetrations
SDI MOC1	(1991) Manual of Construction with Steel Deck

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2000) Zinc-Rich Coating Type I Inorganic and Type II Organic

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-01	(2000) Load Assumptions for Buildings

UNDERWRITERS LABORATORIES (UL)

UL 580	(1994; Rev thru Feb 1998) Tests for Uplift Resistance of Roof Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings

Metal Floor Deck Units

Metal Roof Deck Units

Cant Strips

Ridge and Valley Plates

Metal Closure Strips

SD-03 Product Data

Accessories

Deck Units

Galvanizing Repair Paint

Mechanical Fasteners

Metal Floor Deck Units

Welder Qualifications

Welding Equipment

Welding Rods and Accessories

Flexible Closure Strips

SD-04 Samples

Metal Roof Deck Units

Flexible Closure Strips

Accessories

SD-05 Design Data

Deck Units

Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

SD-07 Certificates

. Welding Procedures

Wind Storm Resistance

1.3 QUALITY ASSURANCE

1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly engaged in manufacture of steel decking. Provide manufacturer's certificates attesting that the decking material meets the specified requirements.

1.3.2 Qualifications for Welding Work

Follows Welding Procedures in accordance with AWS D1.1/D1.1M. Test specimens shall be made in the presence of Structural Engineer and shall be tested by an approved testing laboratory at the Contractor's expense.

Submit qualified Welder Qualifications in accordance with AWS D1.1/D1.1M, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories.

1.3.3 Regulatory Requirements

1.3.3.1 Wind Storm Resistance

Provide roof construction assembly capable of withstanding uplift pressures shown on design drawings when tested in accordance with the uplift pressure test described in the FM DS 1-28 or as described in UL 580 and in general compliance with UFC 3-310-01.

1.3.4 Fabrication Drawings

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. Must not exceed the design live load. The maximum uniform distributed storage load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of AISI SG-913.

1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Sheet

Flat rolled carbon steel sheets of structural quality, thickness indicated meeting the requirements of AISI SG-973, except as modified herein.

2.1.2 Steel Coating

ASTM A 653/A 653M designation G90 galvanized. Apply coating to both sides of sheet.

2.1.3 Mixes

2.1.3.1 Galvanizing Repair Paint for Floor Decks

Provide a high-zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A 780.

2.1.4 Galvanizing Repair Paint for Roof Decks

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel and shall conform to ASTM A 780.

2.1.5 Flexible Closure Strips for Roof Decks

Provide strips made of elastomeric material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Provide a vulcanized, closed-cell, expanded chloroprene elastomer having approximately 3.5 psi compressive-deflection at 25 percent deflection (limits), conforming to ASTM D 1056, Grade No. SCE 41, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D 746.

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E 84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D 1149.

Provide a elastomeric type adhesive with a chloroprene base as recommended by the manufacturer of the flexible closure strips.

2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and

configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.028 inch thick to close open ends at exposed edges of floors, end walls, eaves, and openings through deck.

2.2.3 Partition Closures

Provide closures for closing voids above interior walls and partitions that are perpendicular to the direction of the configurations. Provide sheet steel closures above fire-resistant interior walls and partitions located on both sides of wall or partition. Provide glass fiber blanket insulation in the space between pairs of closures at acoustical partitions.

2.2.4 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel deck 1/4 inch and over.

2.2.5 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.2.6 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gage thick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

2.2.7 Roof Sump Pans

Sump pans must be provided for roof drains and must be minimum 0.075 inch thick steel, flat type. Shape sump pans to meet roof slope by the supplier or by a sheet metal specialist. Provide bearing flanges of sump pans to overlap steel deck a minimum of 3 inch. Shape, size, and reinforce the opening in bottom of the sump pan to receive roof drain.

2.2.8 Column Closures

Sheet metal, minimum 0.0358 inch thick or metal rib lath.

2.2.9 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.10 Hanger

Provide clips or loops for utility systems and suspended ceilings of one or more of the following types:

a. Lip tabs or integral tabs where noncellular decking is 0.0474 inch thick or more, and a structural concrete fill is used over deck.

b. Slots or holes punched in decking for installation of pigtails.

c. Tabs driven from top side of decking and arranged so as not to pierce electrical cells.

d. Decking manufacturer's standard as approved by the Structural Engineer.

2.2.11 Shear Connectors

Provide shear connectors as headed stud type, ASTM A 108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC 335.

2.2.12 Mechanical Fasteners

Provide mechanical fasteners, such as powder actuated or pneumatically driven fasteners, for anchoring the deck to structural supports and adjoining units that are designed to meet the loads indicated. Provide positive locking-type fasteners standard with the Steel Deck Institute and the steel deck manufacturer, as approved by the Structural Engineer.

2.2.13 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch; cant strip, 0.0295 inch other metal accessories, 0.0358 inch unless otherwise indicated. Accessories must include but not be limited to saddles, fasteners, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

2.3 FABRICATION

Furnish one sample of each type of Metal Floor Deck Units used to illustrate the actual cross section dimensions and configuration.

Furnish sample of Metal Roof Deck Units used to illustrate actual cross section dimensions and configurations.

Furnish one sample of each type Flexible Closure Strips, 12 inch long.

2.3.1 Deck Units

2.3.1.1 Cellular Metal Floor Deck Units

Conform to SDI 30 for deck units. Conform to ASTM A 653/A 653M, SQ, Grade 230, Grade 33 for formed non-cellular decking and accessories. Use panels of maximum possible lengths to minimize end laps. Fabricate deck units in lengths to span 3 or more supports with flush, telescoped, or nested 2 inch laps at ends, and interlocking, or nested side laps, unless otherwise indicated. Deck with cross-sectional configuration differing from the

units indicated may be used, provided that the properties of the proposed units, determined in accordance with AISI SG-973, are equal to or greater than the properties of the units indicated and that the material will fit the space provided without requiring revisions to adjacent materials or systems.

2.3.2 Length of Floor Deck Units

Provide floor deck units of sufficient length to span three or more spacings where possible.

2.3.3 Roof Deck

Conform to ASTM A 611/A 611M or ASTM A 653/A 653M for deck used in conjunction with insulation and built-up roofing. Fabricate roof deck units the steel design thickness required by the design drawings and galvanizedzinc-coated in conformance with ASTM A 653/A 653M, G90 coating class.

2.3.3.1 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

2.3.3.2 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.0359 inch thick before galvanizing. Provide plates of minimum 4-1/2 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

2.3.3.3 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.3.4 Composite Deck

Conform to ASTM A 653/A 653M or ASTM A 1008/A 1008M for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck The steel design thickness required by the design drawings. Zinc-coat in conformance with ASTM A 653/A 653M, G90 coating class.

In addition to resisting shear, provide devices to resist vertical separation between the steel deck and the concrete. Provide one of the following types of shear devices:

a. Mechanically fixed shear devices such as embossments, holes, or welded buttons.

b. Mechanically fixed shear devices such as inverted, triangular-shaped ribs.

2.3.5 Touch-Up Paint

Provide touch-up paint for zinc-coated units of an approved galvanizing repair paint with a high-zinc dust content. Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A 780. Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

For floor decking installation, wire brush, clean, and touchup paint the scarred areas on the top and bottom surfaces of the metal floor decking and on the surface of supporting steel members. Include welds, weld scars, bruises, and rust spots for scarred areas. Touched up the galvanized surfaces with galvanizing repair paint. Touch up the painted surfaces with paint for the repair of painted surfaces.

After roof decking installation, wire brush, clean, and touchup paint the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint. Touchup painted surfaces with repair paint of painted surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

3.2 INSTALLATION

Install steel deck units in accordance with SDI 30, SDI DDM02 and approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Structural Engineer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Ends of floor deck may be lapped or butted. Do not use unanchored deck units as a work or storage platform. Do not fill unanchored deck with concrete. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel roof deck unless indicated. Distribute loads by appropriate means to prevent damage.

3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units by welding with normal 3/4 inch diameter puddle welds as indicated on the design drawings and in accordance with manufacturer's recommended procedure and SDI 30. Clamp or weight deck units to provide firm contact between deck units and structural supports while performing welding or fastening. Anchoring the deck to structural supports with powder-actuated fasteners or pneumatically driven fasteners is prohibited. Attachment of adjacent deck units by button-punching is prohibited on roof deck.

3.2.1.1 Welding

Perform welding in accordance with AWS D1.3 using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.1/D1.1M and AWS D1.3 make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Indicate location, size, and spacing of fastening. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable. Butt deck ends. Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDM02. Attach shear connectors as shown and welded as per AWS D1.1/D1.1M through the steel deck to the steel member or directly to the steel member. Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of coated finish with zinc-dust paint conforming to ASTM A 780.

3.2.1.2 Fastening Floor Deck Units

Fasten floor deck units to the steel supporting members at ends and at all intermediate supports, both parallel and perpendicular to deck span, by welds. Do not exceed spacing of welds of 12 inch on center, with a minimum of two welds per floor deck unit at each support. Provide 3/4 inch minimum diameter fusion welds. Coordinate welding sequence and procedure with the placing of the floor deck units. Blow holes shall be cause for rejection.

Lock sidelaps between adjacent floor deck units together at intervals not exceeding 48 inch on center by welding or button punching for all spans.

3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with SDI DDP. Reinforce holes and openings 6 to 12 inch across by 0.0474 inch thick steel sheet at least 12 inch wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inch on center. Reinforce holes and openings larger than 12 inch by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists. Openings must not interfere with seismic members such as chords and drag struts.

3.2.3 Deck Damage

SDI MOC1, for repair of deck damage.

3.2.4 Accessory Installation

3.2.4.1 Adjusting Plates

Install as shown on shop drawings.

3.2.4.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.4.3 Closures Above Partitions

Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for permanent partitions 4 inch nominal or less in thickness and two-piece closure strips for wider partitions. Provide sheet metal closures above fire-rated partitions at both sides of partition with space between filled with fiberglass insulation. Provide flexible rubber closures above acoustic-rated partitions at both sides of partition with space between filled with blanket insulation.

3.2.4.4 Column Closures

Provide for spaces between floor decking and columns which penetrate the deck. Field cut closure plate to fit column in the field and tack weld to decking and columns.

3.2.4.5 Access Hole Covers

Provide to seal holes cut in decking to facilitate welding of decking to structural supports.

3.2.4.6 Hangers

Provide as indicated to support utility system and suspended ceilings. Space devices so as to provide one device per 6.25 square feet.

3.2.5 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Structural Engineer. Place concrete on metal deck in accordance with Construction Practice of SDI 30.

3.2.6 Preparation of Fire-Proofed Surfaces

Provide deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, galvanized and free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Complete any required cleaning prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

3.3 ROOF SUMP PANS

Place sump pans over openings in roof decking and fusion welded to top surface of roof decking. Do not exceed spacing of welds of 12 inch with not less than one weld at each corner. Field cut opening in the bottom of each roof sump pan to receive the roof drain as part of the work of this section.

3.4 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized

sheet metal screws spaced a maximum 4 inch on center.

3.5 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

3.6 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide a weathertight installation.

3.7 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

3.8 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.9 FIELD QUALITY CONTROL

3.9.1 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges is 1/16 inch; when gap is more than 1/16 inch, provide corrective measures or replacement. Reinspect decking after performing corrective measures or replacement.

-- End of Section --

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 GENERAL

This section covers the structural studs and fasteners used to support the suspended metal soffit at the underside of the Visitor Control Center (VCC) entry canopy.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG02-1	(2001) North American Specification for the Design of Cold-Formed Steel Structural Members
AISI SG03-3	(2002) Cold-Formed Steel Design Manual Set

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3/D1.3M	(2008) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 370	(2007b) Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A 653/A 653M	(2007) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 633	(2007) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C 955	(2007) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of

	Gypsum Panel Products and Metal Plaster Bases
ASTM E 329	(2007a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J78	(1998) Steel Self Drilling Tapping Screws

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Framing Components; G

a. Cross sections, plans, and/or elevations showing component types and locations for each framing application; including shop coatings and material thicknesses for each framing component.

b. Connection details showing fastener type, quantity, location, and other information to assure proper installation.

c. Drawings depicting panel configuration, dimensions, components, locations, and construction sequence if the Contractor elects to install prefabricated/prefinished frames.

SD-03 Product Data

Steel studs

SD-05 Design Data

The material supplier shall design all components, materials, and appurtenant work as required to construct cold-formed metal framing system at the underside of the VCC canopy.

Two copies of written certification, prepared and signed by a Registered Professional Engineer licensed to practice in the State of Georgia, attesting that the metal framing meets the specified loading requirements, requirements of the Building Code, and other requirements as specified.

Metal framing calculations; G

SD-07 Certificates

Load-bearing cold-formed metal framing

Mill certificates or test reports from independent testing agency, qualified in accordance with ASTM E 329, showing that the

steel sheet used in the manufacture of each cold-formed component complies with the minimum yield strengths and uncoated steel thickness specified. Test reports shall be based on the results of three coupon tests in accordance with ASTM A 370.

Welds

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.3/D1.3M.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to job site and store in adequately ventilated, dry locations. Storage area shall permit easy access for inspection and handling. If necessary to store materials outside, stack off the ground, support on a level platform, and protect from the weather as approved. Handle materials to prevent damage. Finish of the framing members shall be maintained at all times, using an approved high zinc dust content, galvanizing repair paint whenever necessary to prevent the formation of rust. Replace damaged items with new, as directed by the Contracting Officer.

1.5 LOAD-BEARING COLD-FORMED METAL FRAMING

Framing members shall have the structural properties indicated. Where physical structural properties are not indicated, they shall be as necessary to withstand all imposed loads. Design framing in accordance with AISI SG03-3.

1.6 DESIGN

All studs and connections, not specifically detailed on the drawings, shall be designed for the spacings and loads indicated on the structural drawings by a professional engineer. Design shall be in accordance with American Iron and Steel Institute (ASI) "Specification for the Design of Cold-Formed Steel Structural Members."

1.7 MAXIMUM DEFLECTION

a. Exterior Studs:

Deflection Criteria	Exterior Finish
L/240	Metal Panels

1.8 QUALITY ASSURANCE

1.8.1 Drawing Requirements

Submit framing components to show sizes, thicknesses, layout, material designations, methods of installation, and accessories.

1.8.2 Design Data Required

Submit metal framing calculations to verify sizes, gages, and spacing of members and connections. Show methods and practices used in installation.

PART 2 PRODUCTS

2.1 STEEL STUDS

Framing components shall comply with ASTM C 955 and the following.

2.1.1 Studs of 16 Gage (0.0598 Inch) and Heavier

Galvanized steel, ASTM A 653/A 653M, SS Grade 50, G60.

2.1.2 Studs of 18 Gage (0.0478 Inch) and Lighter

Studs and Joists of 18 Gage (0.0478 Inch) and Lighter: Galvanized steel, ASTM A 653/A 653M, SS, Grade 50 33,000 psi G60.

2.1.3 Sizes, Gages, Section Modulus, and Other Structural Properties

Size and gage as required.

2.2 MARKINGS

Studs and track shall have product markings stamped on the web of the section. The markings shall be repeated throughout the length of the member at a maximum spacing of 4 feet on center and shall be legible and easily read. The product marking shall include the following:

a. Manufacturer's identification.

b. Minimum delivered uncoated steel thickness.

c. Protective coating designator.

d. Minimum yield strength.

2.3 CONNECTIONS

Screws for steel-to-steel connections shall be self-drilling tapping in compliance with SAE J78 of the type, size, and location as shown on the drawings. Electroplated screws shall have a Type II coating in accordance with ASTM B 633. Screws, bolts, and anchors shall be hot-dipped galvanized in accordance with ASTM A 123/A 123M or ASTM A 153/A 153M as appropriate. Screws bolts, and anchors shall be hot dipped galvanized in accordance with ASTM A 123/A 123M or ASTM A 153/A 153M as appropriate.

2.4 PLASTIC GROMMETS

Supply plastic grommets, recommended by stud manufacturer, to protect electrical wires.

PART 3 EXECUTION

3.1 FASTENING

Fasten framing members together by welding or by using self-drilling or self-tapping screws. Electrodes and screw connections shall be as required and indicated in the design calculations.

3.1.1 Welds

All welding shall be performed in accordance with AWS D1.3/D1.3M, as modified by AISI SG02-1. All welders, welding operations, and welding procedures shall be qualified according to AWS D1.3/D1.3M. All welds shall be cleaned and coated with rust inhibitive galvanizing paint. Do not field weld materials lighter than 18 gage.

3.1.2 Screws

Screws shall be self-drilling self-tapping type, size, and location as required by the design. Screw penetration through joined materials shall not be less than three exposed threads. Minimum spacings and edge distances for screws shall be as specified in AISI SG02-1.

3.1.3 Anchors

Anchors shall be of the type, size, and location as required by the design.

3.2 INSTALLATION

3.2.1 Studs

Install the studs below the structural steel framing of the VCC entry canopy in accordance with the approved design.

3.2.2 Erection Tolerances

Stud alignment shall be maintained in a uniform plane across the face of the studs in both the north/south and east/west directions with a deviation of no more than 1/4 inch in 8 feet in either direction. Where sloped, the studs shall be installed in a consistent uniform slope.

-- End of Section --

SECTION 05500

METAL: MISCELLANEOUS AND FABRICATIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA 46	(1978) Standards for Anodized Architectural Aluminum
AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2005) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.3	(2006) Operations - Safety Requirements for Powder Actuated Fastening Systems

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2006; Errata 2006) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996; Addenda A 1999; Errata 2003; R 2005) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 2005) Standard for Square and Hex Nuts (Inch Series)
ASME B18.21.1	(1999; R 2005) Lock Washers (Inch Series)
ASME B18.22.1	(1965; R 2003) Plain Washers
ASME B18.6.2	(1998; R 2005) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series
ASME B18.6.3	(2003) Machine Screws and Machine Screw Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM A 467/A 467M	(2001) Standard Specification for Machine Coil and Chain
ASTM A 47/A 47M	(1999; R 2004) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 500/A 500M	(2007) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 53/A 53M	(2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2007) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 687	(1993) Standard Specification for High-Strength Nonheaded Steel Bolts and Studs
ASTM A 780	(2001; R 2006) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 924/A 924M	(2007) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 108	(2006) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B 209	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2006) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM B 26/B 26M (2005) Standard Specification for Aluminum-Alloy Sand Castings

ASTM D 1187 (1997; R 2002e1) Asphalt-Base Emulsions for Use as Protective Coatings for Metal

MASTER PAINTERS INSTITUTE (MPI)

MPI 79 (Jan 2004) Alkyd Anti-Corrosive Metal Primer

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 521 (2001) Pipe Railing Manual

NAAMM MBG 531 (2000) Metal Bar Grating Manual

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6 (2000; E 2004) Commercial Blast Cleaning

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.27 Fixed Ladders

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication drawings of structural steel door frames

Expansion joint covers, installation drawings

Metal Bar Gratings

Handrails and Guardrails, installation drawings

Ladders, installation drawings

Ship's ladder (with or without guards), installation drawings

Embedded angles and plates, installation drawings

Roof hatch

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the building construction.

SD-03 Product Data

Expansion joint covers

Handrails and Guardrails

Ladders

Structural steel door frames

Ship's ladder (with or without guards)

Roof hatch

Pallet racks

SD-04 Samples

Expansion joint covers

Samples shall be full size, taken from manufacturer's stock, and shall be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.3 QUALIFICATION OF WELDERS

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

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A 36/A 36M.

2.1.2 Structural Tubing

ASTM A 500/A 500M.

2.1.3 Steel Pipe

ASTM A 53/A 53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A 47/A 47M.

2.1.5 Gratings

a. Metal bar type grating NAAMM MBG 531.

2.1.6 Anchor Bolts

ASTM A 307. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

2.1.6.1 Expansion Anchors, Sleeve Anchors, and Adhesive Anchors

Provide anchors of size and type as indicated on the drawings. Anchors shall be International Code Council approved and shall be installed to the manufacturer's minimum embedment depth unless noted otherwise on the drawings.

2.1.6.2 Lag Screws and Bolts

ASME B18.2.1, type and grade best suited for the purpose.

2.1.6.3 Toggle Bolts

ASME B18.2.1.

2.1.6.4 Bolts, Nuts, Studs and Rivets

ASME B18.2.2 and ASTM A 687 or ASTM A 307.

2.1.6.5 Powder Driven Fasteners

Follow safety provisions of ASSE/SAFE A10.3.

2.1.6.6 Screws

ASME B18.2.1, ASME B18.6.2, and ASME B18.6.3.

2.1.6.7 Washers

Provide plain washers to conform to ASME B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME B18.21.1.

2.1.7 Aluminum Alloy Products

Conform to ASTM B 209 for sheet plate, ASTM B 221 for extrusions and ASTM B 26/B 26M or ASTM B 108 for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.2 FABRICATION FINISHES

2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A 123/A 123M, ASTM A 153/A 153M, ASTM A 653/A 653M or ASTM A 924/A 924M, G90, as applicable.

2.2.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

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

2.2.4 Shop Cleaning and Painting

2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints, but coat with rust preventative applied in the shop.

2.2.4.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On interior surfaces fully concealed in the finished construction, no prime coat is required.

2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.6 Aluminum Surfaces

2.2.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.6.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF-45, or AA 46. Unless otherwise specified, all other aluminum items shall have anodized finish. The thickness of the coating shall be not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF-45. Items to be anodized shall receive a polished satin finish.

2.3 EXPANSION JOINT COVERS

Provide expansion joint covers of the type and style shown on the drawings constructed of extruded aluminum with clear anodized satin aluminum finish for walls and ceilings and with standard mill finish for floor covers and exterior covers. Furnish plates, backup angles, expansion filler strip and anchors as indicated. Expansion joint system shall provide a 1-hour fire rating when installed in a fire-rated assembly.

2.4 METAL BAR GRATINGS

Design steel grating in accordance with NAAMM MBG 531 for bar type grating. Galvanize metal bar floor gratings.

a. Design floor gratings to support a live load of 100 pounds per square foot for the spans indicated, with maximum deflection of L/240.

b. NAAMM MBG 531, band edges of grating with bars of the same size as the bearing bars. Weld banding in accordance with the manufacturer's standard for trim. Design tops of bearing bars, cross or intermediate bars to be in the same plane and match grating finish.

2.5 GUARD POSTS (BOLLARDS/PIPE GUARDS)

Provide 4 inch galvanized standard weight steel pipe as specified in ASTM A 53/A 53M. Anchor posts in concrete as indicated and fill solidly where indicated with concrete with minimum compressive strength of 2500 psi.

2.6 HANDRAILS AND GUARDRAILS

Design handrails and guardrails to resist a concentrated load of 250 lbs in any direction at any point of the top of the rail or 20 lbs per foot applied horizontally to top of the rail, whichever is more severe. NAAMM AMP 521, provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and guardrail and posts.

2.6.1 Steel Handrails and Guard Rails, Including Carbon Steel Inserts

Provide steel handrails and guardrails matching the design shown on the drawings, including inserts in concrete, steel pipe conforming to ASTM A 53/A 53M or structural tubing conforming to ASTM A 500/A 500M, Grade A or B of equivalent strength. Railings to be hot-dip galvanized and shop painted.

a. Fabrication: Joint posts, rail, and corners by one of the following methods:

(1) Flush-type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.

(2) Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

2.7 LADDERS

Fabricate vertical ladders conforming to Section 7 of 29 CFR 1910.27. Use 2 1/2 by 3/8 inch steel flats for stringers and 3/4 inch diameter steel rods for rungs. Rungs to be not less than 16 inches wide, spaced one foot

apart, plug welded or shouldered and headed into stringers. Install ladders so that the distance from the rungs to the finished wall surface will not be less than 7 inches. Provide heavy clip angles riveted or bolted to the stringer and drilled as indicated. Provide intermediate clip angles not over 48 inches on centers.

2.7.1 Ship's Ladder

Fabricate stringers and framing of steel plate or shapes. Bolt, rivet or weld connections and anchor to supporting construction. Provide treads with non-slip surface as specified for safety treads. Design assembly, including tread connections and methods of attachment, to support a live load of 300 pounds per tread. Provide railings as specified for metal handrails and guardrails.

2.8 MISCELLANEOUS PLATES AND SHAPES

Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, and miscellaneous mountings and frames.

Provide angles and plates, ASTM A 36/A 36M, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A 123/A 123M.

2.9 SAFETY CHAINS

Construct safety chains of steel with yellow plastic covering, straight link type, 3/16 inch diameter, with at least twelve links per foot, and with snap hooks on each end. Safety chain shall be tested in accordance with ASTM A 467/A 467M, Class CS. Provide snap hooks of boat type. Provide galvanized 3/8 inch bolt with 3/4 inch eye diameter for attachment of chain, anchored as indicated. Supply chain, 4 inches longer than the anchorage spacing, for each guarded area. Locate safety chain where indicated. Mount the chain 3 feet 0 inches above the floor.

2.10 STRUCTURAL STEEL DOOR FRAMES

a. Provide frames as indicated. If not otherwise shown, construct frames of structural shapes, or shape and plate composite, to form a full depth channel shape with at least 1-1/2 inch outstanding legs.

b. Where track, guides, hoods, hangers, operators, and other such accessories are required, provide support as indicated.

c. Provide jamb anchors near top, bottom, and at not more than 24 inch intervals. Provide the bottom of each jamb member with a clip angle welded in place with two 1/2 inch diameter floor bolts for adjustment.

2.11 ROOF HATCH (SCUTTLES)

Shall be of the manufacturer and model number, as indicated on the drawings or approved equal.

2.12 PALLET RACKS

Pallet racks shall be single and double-sided Cantilever type measuring 8

feet-0 inches in length by 4 feet-0 inches deep plus supports by 12 feet-0 inches high to the top of the supports. Racks shall come with three storage levels per side, 2500 lbs. capacity each level. Each level equipped with two deck support beams and two, 2-1/2 inch x 4 inch mesh pattern wire decks, 2500 pounds capacity each. Cantilever rack is manufactured from high capacity roll form steel. Racks shall be as manufactured by C&S Equipment, Inc., 6675 Amberton Drive, Elkridge, MD 21075 or approved equal.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.Items listed below require additional procedures.

3.2 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.5 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.6 FINISHES

3.6.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D 1187, asphalt-base emulsion.

3.6.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

3.6.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.7 HANDRAILS AND GUARDRAILS

Toeboards and brackets shall be installed where indicated. Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.7.1 Steel Handrails and Guardrails

Install in pipe sleeves embedded in concrete and filled with non-shrink grout or quick setting anchoring cement with anchorage covered with standard pipe collar pinned to post.

3.8 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Secure to masonry or concrete with not less than two 1/2 inch diameter expansion bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete.

3.9 GUARD POSTS (BOLLARDS/PIPE GUARDS)

Where indicated, pipe guards shall be set vertically in concrete piers. Piers shall be constructed of, and the hollow cores of the pipe filled with, concrete specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE. having a minimum compressive strength of 2500 psi.

3.10 SAFETY CHAINS

Safety chains shall be mounted 3 feet 0 inches and 2 feet above the floor.

3.11 STRUCTURAL STEEL DOOR FRAMES

Door frames shall be secured to the floor slab, where possible by means of angle clips and expansion bolts. Any necessary reinforcements shall be made and the frames shall be drilled and tapped as required for hardware.

3.12 PALLET RACKS

Assemble the pallet racks in accordance with the manufacturer's instructions in the configuration shown on the drawings.

-- End of Section --

SECTION 05510

METAL STAIRS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 314	(2004) Standard Specification for Steel Anchor Bolts

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.22.1	(1975; R 2003) Plain Washers

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996; R 2005) Square and Hex Bolts and Screws, (Inch Series)
ASME B18.6.3	(2003) Machine Screws and Machine Screw Nuts

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2005a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 1011/A 1011M	(2005) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
ASTM A 108	(2003) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel

Hardware

ASTM A 27/A 27M	(2005) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A 283/A 283M	(2003) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 307	(2004) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2004b) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM A 449	(2004b) Specification for Hex Cap Screws, Bolts, and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A 47/A 47M	(2004) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 500	(2003a) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 526/A 526M	(1990) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
ASTM A 53/A 53M	(2004a) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 568/A 568M	(2005) Standard Specifications for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A 575	(2002) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A 653/A 653M	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(2004) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

ASTM C 514	(2004) Standard Specification for Nails for the Application of Gypsum Board
ASTM C 636	(2004) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E 488	(1996; R 2003) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 25	(1997; 2004e1) Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel Type I and Type II

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	(2001) Occupational Safety and Health Standards

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication drawings for the following items shall be in accordance with the paragraph entitled, "General Requirements," of this section.

Metal Stairs

SD-03 Product Data

Manufacturer's catalog data shall include two copies of manufacturers specifications, load tables, dimension diagrams, and anchor details for the following items:

Concrete Inserts
Masonry Anchorage Devices
Protective Coating
Metal Stairs

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's MSDS sheets of all site-applied paints and coatings used within the building interior highlighting VOC content in g/l.

SD-07 Certificates

Welding Procedures shall be in accordance with AWS D1.1/D1.1M.

Certificates for Welder Qualification shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

1.3 QUALIFICATIONS FOR WELDING WORK

Section 05090 WELDING, STRUCTURAL applies to work specified in this section.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Give preference to products manufactured within 500 miles of the project site and with high recycled content (>60%).

Complete and detailed fabrication drawings for all metal stairs shall be provided by the Contractor in accordance with the design specifications referenced in this seciton.

Items shall be preassembled in the shop to the greatest extent possible. Units shall be disassembled only to the extent necessary for shipping and handling. Units shall be clearly marked for reassembly and coordinated installation.

For the fabrication of work exposed to view, only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness, shall be used. Blemishes shall be removed by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

2.2 STRUCTURAL STEEL PLATES, SHAPES AND BARS

Structural-size shapes and plates, except plates to be bent or cold-formed, shall conform to ASTM A 36/A 36M, unless otherwise noted.

Steel plates to be bent or cold-formed shall conform to ASTM A 283/A 283M, Grade C.

Steel bars and bar-size shapes shall conform to ASTM A 36/A 36M, unless otherwise noted.

2.3 STRUCTURAL STEEL TUBING

Structural steel tubing, hot-formed, welded or seamless, shall conform to ASTM A 500, Grade B, unless otherwise noted.

2.4 HOT-ROLLED CARBON STEEL BARS

Bars and bar-size shapes shall conform to ASTM A 575, grade as selected by the fabricator.

2.5 COLD-FINISHED STEEL BARS

Bars shall conform to ASTM A 108, grade as selected by the fabricator.

2.6 HOT-ROLLED CARBON STEEL SHEETS AND STRIPS

Sheets and strips shall conform to ASTM A 568/A 568M and ASTM A 1011/A 1011M, pickled and oiled.

2.7 COLD-ROLLED CARBON STEEL SHEETS

Sheets shall conform to ASTM A 1008/A 1008M.

2.8 GALVANIZED CARBON STEEL SHEETS

Sheets shall conform to ASTM A 526/A 526M, with galvanizing conforming to ASTM A 653/A 653M and ASTM A 924/A 924M.

2.9 STEEL PIPE

Pipe shall conform to ASTM A 53/A 53M, type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

2.10 CONCRETE INSERTS

Threaded-type concrete inserts shall consist of galvanized ferrous castings, internally threaded to receive 3/4-inch diameter machine bolts; either malleable iron conforming to ASTM A 47/A 47M or cast steel conforming to ASTM A 27/A 27M, hot-dip galvanized in accordance with ASTM A 153/A 153M.

2.11 MASONRY ANCHORAGE DEVICES

Masonry anchorage devices shall consist of expansion shields complying with AASHTO M 314, ASTM E 488 and ASTM C 514 as follows:

Lead expansion shields shall be provided for machine screws and bolts 1/4 inch and smaller; head-out embedded nut type, single unit class, Group I, Type 1, Class 1.

Lead expansion shields shall be provided for machine screws and bolts larger than 1/4 inch in size; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 2.

Bolt anchor expansion shields shall be provided for lag bolts; zinc-alloy, long shield anchors class, Group II, Type 1, Class 1.

Bolt anchor expansion shields shall be provided for bolts; closed-end bottom bearing class, Group II, Type 2, Class 1.

Toggle bolts shall be tumble-wing type, conforming to ASTM A 325, ASTM A 449 and ASTM C 636, type, class, and style as required.

2.12 FASTENERS

Zinc-coated fasteners shall be galvanized in accordance with ASTM A 153/A 153M and shall be used for exterior applications or where built into exterior walls or floor systems. Fasteners shall be selected for the type, grade, and class required for the installation of steel stair items.

Standard bolts and nuts shall be regular hexagon-head conforming to

ASTM A 307, Grade A.

Lag bolts shall be square-head conforming to ASME B18.2.1.

Machine screws cadmium-plated steel conforming to ASME B18.6.3.

Plain washers shall be round, general-assembly-grade, carbon steel conforming to ANSI B18.22.1.

Lockwashers shall be helical spring, carbon steel conforming to.

2.13 GENERAL FABRICATION

Provide detailed plans and elevations of metal stairs at not less than 1 inch to 1 foot. Drawings shall also provide details of sections and connections at not less than 3 inches to 1 foot. They shall also include detailed setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

Contractor shall use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Materials shall be worked to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Type of materials indicated or specified shall be used for the various components of work.

Exposed work shall be formed true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be eased to a radius of approximately 1/32 inch. Metal corners shall be bent to smallest radius possible without causing grain separation or otherwise impairing the work.

Corners and seams shall be welded continuously and in accordance with the recommendations of AWS D1.1/D1.1M. Exposed welds shall be ground smooth and flush to match and blend with adjoining surfaces.

Exposed connections shall be formed with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Exposed fasteners of the type indicated shall be used or, if not indicated, Phillips flathead (countersunk) screws or bolts shall be used.

Anchorage of the type indicated shall be provided and coordinated with the supporting structure. Anchoring devices shall be fabricated and spaced as indicated and as required to provide adequate support for the intended use of the work.

Hot-rolled steel bars shall be used for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

2.14 PROTECTIVE COATING

Steelwork for interior stairs shall be shop primed with red oxide primer in accordance with SSPC Paint 25.

Steelwork for exterior stairs shall be hot dipped galvanized as indicated in accordance with ASTM A 123/A 123M. Abraded surfaces and cut ends of galvanized members shall be touched up with zinc-dust, zinc-oxide primer,

or an approved galvanizing repair compound.

2.15 METAL STAIRS

2.15.1 General

Welding shall be used for joining pieces together. Units shall be fabricated so that bolts and other fastenings do not appear on finish surfaces. Joints shall be made true and tight, and connections between parts shall be lightproof tight. Continuous welds shall be ground smooth where exposed.

Metal Stairs units shall be constructed to sizes and arrangements indicated. Entire assembly shall be constructed to support a minimum live load of 100 pounds per square foot. Framing, hangers, columns, struts, clips, brackets, bearing plates, and other components shall be provided as required for the support of stairs and platforms.

2.15.2 Stair Framing

Stringers of structural steel channels, or plates, or a combination thereof shall be fabricated as indicated. Closures for exposed ends of strings shall be provided.

Platforms of structural steel channel headers and miscellaneous framing members shall be constructed as indicated. Headers shall be bolted to stringers and newels. Framing members shall be bolted to stringers and headers.

2.15.3 Riser, Subtread, and Subplatform for Steel Pan Stairs

Metal pans shall be formed of 0.1084-inch (12-gage) thick structural steel sheets, conforming to ASTM A 1011/A 1011M, Grade 36. Pans shall be shaped to configuration indicated.

Riser and subtread metal pans shall be constructed with steel angle supporting brackets, of size indicated, welded to stringers. Metal pans shall be secured to brackets with rivets or welds.

Subplatform metal pans shall be secured to platform frames with welds.

2.15.4 Steel Floor Plate Treads and Platforms for Raised Pattern Plate Stairs

Raised pattern steel floor plate used on exterior and spiral stairs shall be fabricated from steel complying with ASTM A 36/A 36M. Pattern shall be provided as indicated or, if not indicated, as selected from manufacturer's standard patterns.

Treads shall be formed of 1/4-inch thick steel floor plate with integral nosing and back edge riser. Steel supporting brackets shall be welded to stringers and treads to brackets. Exterior stair treads shall slope 1/8 inch from back edge to front to provide drainage.

Platforms of steel floor plate shall be fabricated of 1/4 inch minimum thickness or as indicated. Nosing matching that on treads at landings shall be provided. Floor plates shall be secured to platform framing members with welds.

2.15.5 Stair Railings and Handrails

Steel pipe guardrails and handrails, consisting of top rail, bottom rail, pickets,, posts and handrails, shall be provided as shown on the drawings. Unless otherwise indicated, 1-1/2-inch nominal size, standard weight, carbon steel pipe shall be provided and shall conform to ASTM A 53/A 53M, Type E or Type S, Grade B. Railings shall conform to requirements of 29 CFR 1910, Section 23.

Posts, rails, and corners shall be joined by one of the following methods:

Flush-type steel railing fittings, welded and ground smooth, with railing splice locks secured with 3/8-inch hexagonal recessed-head setscrews

Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth, butt railing splices, reinforced by a tight-fitting interior sleeve not less than 6 inches long.

Railings may be bent at corners instead of joining, provided the bends are uniformly formed in jigs with cylindrical cross section of pipe maintained throughout the entire bend.

Kickplates shall be provided between railing posts where indicated, and shall consist of 1/8-inch steel flat bars not less than 6 inches high. Kickplates shall be secured as indicated.

Exterior railings, including pipe, fittings, brackets, fasteners, and other ferrous metal components, shall be galvanized. Black steel pipe shall be provided for interior railings.

2.15.6 Spiral Stairs

The spiral stair located in Room LE68 shall be the standard code compliant product of a spiral stair manufacturer with checkered plate landings and treads. The stair shall be five feet in diameter and extend from floor elevation 80'-6" to elevation 100'-0". The landing at the top of the stairs at elevation 100'-0" shall be bolted to the inside face of the concrete foundation wall. The center column shall extend from the concrete floor below the raised floor in Room LE68 at elevation 75'-6" to the top of the stair. The stair treads need extend only from approximately 7 inches above raised floor elevation of 80'-6" to the top of the stairs.

PART 3 EXECUTION

3.1 STAIR RAILINGS AND HANDRAILS

Railings shall be adjusted prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Posts shall be spaced not more than 8 feet on center. Posts shall be plumbed in each direction. Posts and rail ends shall be secured to building construction as follows:

Where posts are anchored to concrete, they shall be anchored in concrete by means of pipe sleeves set and anchored into concrete. Sleeves of galvanized, standard weight, steel pipe, not less than 6 inches long, and having an inside diameter not less than 1/2-inch greater than the outside diameter of the inserted pipe post shall be

provided. Steel plate closure secured to the bottom of the sleeve shall be provided; closure shall be of width and length not less than 1-inch greater than the outside diameter of the sleeve. After posts have been inserted into sleeves, the annular space between post and sleeve shall be filled with molten lead, sulfur, or a quick-setting hydraulic cement. Anchorage joint shall be covered with a round steel flange welded to the post.

Posts shall be anchored to steel by welding posts to the steel supporting members.

Rail ends shall be anchored into concrete and masonry with steel round flanges welded to rail ends and anchored into the wall construction with lead expansion shields and bolts.

Handrails shall be secured to walls by means of wall brackets and wall return fitting at handrail ends. Brackets of malleable iron castings shall be provided, drilled to receive one 3/8-inch bolt. Brackets shall be located not more than 60 inches on center. Wall return fittings of cast iron castings, flush-type, with the same projection as that specified for wall brackets shall be provided. Wall brackets and wall return fittings shall be secured to building construction as follows:

For concrete and solid masonry anchorage, bolt anchor expansion shields and lag bolts shall be used.

For hollow masonry and stud partition anchorage, toggle bolts having square heads shall be used.

3.2 FIELD WELDING

Procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work shall comply with AWS D1.1/D1.1M.

3.3 TOUCHUP PAINTING

Immediately after installation, field welds, bolted connections, and abraded areas of the shop paint shall be cleaned, and exposed areas shall be painted with the paint used for shop painting. Paint shall be applied by brush or spray to provide a minimum dry-film thickness of 2 mils.

-- End of Section --

SECTION 05700

ORNAMENTAL METAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.13	(1996; R 2003) Screw and Washer Assemblies - Seams (Inch Series)
ANSI B18.22.1	(1975; R 2003) Plain Washers

AMERICAN WELDING SOCIETY (AWS)

AWS A5.3/A5.3M	(1999) Specification for Aluminum and Aluminum-Alloy Electrodes for Shielded Metal Arc Welding
AWS D1.2/D1.2M	(2001; R 2003) Structural Welding Code-Aluminum

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996; R 2005) Square and Hex Bolts and Screws, (Inch Series)
ASME B18.21.1	(1999; R 2005) Lock Washers (Inch Series)
ASME B18.6.3	(2003) Machine Screws and Machine Screw Nuts

ASTM INTERNATIONAL (ASTM)

ASTM B 209	(2004) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 211	(2003) Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM B 221	(2005) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 316/B 316M	(2002) Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading

Wire and Rods

ASTM C 636 (2004) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

ASTM D 1730 (2003) Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting

ASTM G 71 (1981; R 2003} Standard Guide for Conducting and Evaluating Galvanic Corrosion Tests in Electrolytes

ASTM G 82 (1998; R 2003) Standard Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC-01 (1993, 3rd Ed) Good Painting Practice Steel Structures Painting Manual, Volume 1

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication drawings shall be submitted for Ornamental Metal Items in accordance with the paragraph entitled, "Fabrication in General," of this section.

Installation Drawings shall be submitted for the following items in accordance with paragraph entitled, "Fabrication In General," of this section.

Ornamental Metal Items
Shop and Field Connections
Construction Details

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items listing all ornamental metal accessories including casting, forgings, fasteners and anchorage devices.

Installation Materials
Metals for Fabrication
Ornamental Metal Items

SD-04 Samples

Manufacturer's Standard Color Charts for the following items shall be approved by the Architect prior to work.

Shop Paint
Finish Paint

Samples for Aluminum Finishes, one for each type, shall be in accordance with paragraph entitled, "Aluminum Finishes," of this section.

Samples for each type of Anchorage Devices and Fasteners shall be in accordance with paragraph entitled, "Installation Materials," of this section.

Samples for each type of Architectural Metal Items shall be in accordance with paragraph entitled, "Metals for Fabrications," of this section.

Samples for aluminum finishes, two of each type, shall be in accordance with paragraph entitled, "Ornamental Metal Items," of this section.

Samples shall be standard size as used in construction. After approval, full-sized samples may be used in construction, provided each sample is clearly identified and its location recorded.

SD-06 Test Reports

Test reports for Welding Tests shall be in accordance with AWS D1.2/D1.2M, "Qualifications of Procedures and Personnel."

SD-07 Certificates

Welding Procedures shall be in accordance with AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

Certificates for Ornamental Metal Items shall be submitted in accordance with the paragraphs entitled, "Metals For Fabrication" and "Ornamental Metal Items." Certificates of Welder Qualifications shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

SD-08 Manufacturer's Instructions

Preventative Maintenance and Inspection for the following items shall be in accordance with paragraph entitled, "Aluminum Finishes," of this section.

Cleaning Materials
Application Methods

1.3 QUALIFICATIONS FOR WELDING WORK

Welding Procedures and Welding Tests shall be in accordance with AWS D1.2/D1.2M. Test specimens shall be made in the presence of Contracting Officer and tested by an approved testing laboratory at the Contractor's expense.

Certification of Welder Qualifications by tests in accordance with AWS D1.2/D1.2M. In addition, tests shall be performed on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, an immediate retest of two test

welds shall be made. Failure in either of the two immediate retests shall require the welder be retested after further practice or training, and a complete set of test welds shall be made.

1.4 DELIVERY, STORAGE, AND HANDLING

Architectural metal items shall be stored off the ground.

Materials shall be kept free from dirt and grease and shall be protected from corrosion.

Packaged materials shall be stored in their original, unbroken containers in a dry area, until ready for installation.

1.5 FIELD MEASUREMENTS

Records of Existing Conditions shall be provided by the Contracting Officer prior to the start of work. Field measurements shall be taken prior to preparation of shop drawings and fabrication.

PART 2 PRODUCTS

2.1 INSTALLATION MATERIALS

2.1.1 Toggle Bolts

Toggle bolts shall be tumble wing type of the class and style best suited for the work, conforming to ASTM C 636, Type II. Toggle bolts shall be made of corrosion-resistant chromium-nickel steel conforming to AISI Type 302, 303, 304, 305, or 316.

2.1.2 Standard Bolts and Nuts

Standard bolts shall be regular hexagon head, corrosion-resistant steel, coarse thread series, conforming to, Type II.

2.1.3 Lag Bolts

Lag bolts shall be square head, gimlet point or cone point, corrosion-resistant steel, conforming to ASME B18.2.1, Type I, Grade C.

2.1.4 Machine Screws

Machine screws shall be corrosion-resistant steel, cross-recess drive, flat head, conforming to ASME B18.6.3, Type III, Style 2C.

Machine screws shall be corrosion-resistant steel, drive, flat head, conforming to ASME B18.6.3, Type III, Style 3C.

2.1.5 Plain Washers

Plain washers shall be round, general-assembly, corrosion-resistant steel, conforming to ANSI B18.22.1, Type A, Grade I, Class B.

2.1.6 Lock Washers

Lock washers shall be helical spring, corrosion-resistant steel (nonmagnetic), conforming to ANSI B18.13 and ASME B18.21.1.

2.1.7 Welding Filler Metal

Welding filler metal for welding of aluminum alloys shall conform to AWS A5.3/A5.3M. Filler metal shall be the aluminum-alloy recommended by the aluminum producer for the work.

2.2 METALS FOR FABRICATION

2.2.1 Aluminum-Alloy Extrusions

Extrusions shall be 6063, temper T5, conforming to ASTM B 221.

Aluminum-alloy extrusions to receive an integral-color anodized coating shall be the aluminum alloy and temper recommended by the aluminum producer for the specified finish with integral-color anodized coating, and shall have mechanical properties equal to, or exceeding, those of aluminum alloy 6063, temper T5, conforming to ASTM B 221.

2.2.2 Aluminum-Alloy Sheets and Plates

Aluminum-alloy sheets and plates, unless otherwise specified, shall be aluminum alloy 3003, temper H16, conforming to ASTM B 209.

Aluminum-alloy sheets and plates to receive a clear anodized coating shall be aluminum alloy 5005, temper H16, conforming to ASTM B 209.

Aluminum-alloy sheets and plates to receive an integral-color anodized coating shall be the aluminum alloy and temper recommended by the aluminum producer for the specified coating, and shall have mechanical properties equal to, or exceeding, those of alloy 5005, temper H16 of ASTM B 209.

2.2.3 Metals for Fasteners

Aluminum-alloy bolts and screws shall be made from rod conforming to ASTM B 211, alloy 2024 and temper T351.

Aluminum-alloy nuts shall be made from rod conforming to ASTM B 211, alloy 6061 and temper T6.

Aluminum-alloy washers shall be made from sheet conforming to ASTM B 209, alloy 2024 and temper T4.

Aluminum-alloy rivets shall be made from rod or wire conforming to ASTM B 316/B 316M, alloy 6053 and temper T61.

Corrosion-resistant steel fasteners shall be made of chromium-nickel steel, AISI Type 302, 303, 304, 305, or 316, with form and condition best suited for the application.

2.3 ORNAMENTAL METAL ITEMS

2.3.1 Areas to be Covered:

2.3.1.1 Entry Area 1C22

Provide custom manufactured stainless steel emblem attached to glass wall with metal brackets as shown on the drawings. Provide metal rail and/or brackets to hold glass wall as shown on drawings.

Provide metal reveals and trim and metal brackets to attach the MDF panels to the wall as shown on the drawings.

Provide 6 inch high stainless steel base as shown on drawings.

2.3.1.2 Lobby 1C25

Provide metal reveals and trim and metal brackets to attach the wood wallcovered panels to the wall as shown on the drawings.

Provide 6 inch high stainless steel base as shown on drawings.

Provide stainless steel wrap at elevators on all three floors as detailed on drawings.

2.3.1.3 Security OPS Center 1C01

Provide metal mesh on raised platform and projection screen wall. Mesh to be GKD Metal Fabric, Pattern: Tigris PC, Material: AISI Type 316 stainless steel or approved equal.

Provide miscellaneous metal or stainless steel tubes, posts & railing (3 inch and 6 inch), trim, wall, and floor brackets, handrail and supports as detailed on drawings.

Provide metal brackets to attach acoustical and metal panels to wall as shown on drawings.

2.3.1.4 Auditorium

Provide metal reveals and trim and metal brackets to attach the wood wallcovered panels to the wall as shown on the drawings.

2.3.2 Metal Components for Glass Guardrail

Provide stainless steel glass guardrail cap for installation on 3/4 inch glass provided as indicated on the drawings.

Provide two-piece glass wedge dry mount system aluminum base by Wagner or approved equal. Install per manufacturer's instructions.

Provide stainless steel trim to lap over sheet rock at base of guard rail base component as shown on the drawings.

2.4 FABRICATION IN GENERAL

Manufacturer's Standard Color Charts for Shop Paint and Finish Paint shall be approved by the Contracting Officer prior to work.

Installation Drawings for Ornamental Metal Items, Shop and Field Connections and
Construction Details shall show location, dimensions, size, and weight or gage as applicable of each ornamental item; type and location of shop and field connections; and other pertinent construction and erection details. Drawings shall show location and details of anchorage devices embedded in cast-in-place concrete and masonry construction.

2.4.1 Workmanship

Metalwork shall be well formed to shape and size, with lines, angles, and curves true. Necessary rabbets, lugs, and brackets shall be provided so that the work can be assembled. Fasteners shall be concealed where practical.

Welded fabrication shall meet requirements as specified in AWS D1.2/D1.2M. Welds behind finished surfaces shall be made without distortion or discoloration of the exposed side. Welded joints shall be cleaned of flux and shall be dressed on exposed and contact surfaces.

Holes for fasteners shall be drilled or punched. Drilling and punching shall produce clean true lines and surfaces.

Joints shall be milled to a close fit. Corner joints shall be coped or mitered, well formed, and in true alignment. Joints exposed to weather shall be formed and fabricated to exclude water.

Castings shall be sound and free from warp or defects that impair their strength and appearance. Exposed surfaces shall have a smooth finish and sharp well-defined lines and arrises. Joints shall be milled to a close fit.

2.4.2 Holes for Other Work

Holes shall be provided where indicated for securing other work to metal work.

2.4.3 Protection of Aluminum from Dissimilar Materials

Aluminum surfaces that will come in contact with dissimilar metals, or masonry, concrete, or wood, shall be protected with epoxy polyamide conforming to SSPC-01, Chapter 16.2, and topcoated with aliphatic polyurethane conforming to ASTM G 71 and ASTM G 82

Aluminum surfaces to be painted shall be prepared by the acid pickling method conforming to ASTM D 1730, Type B, Method 2 or Method 3.

Paint shall be applied to dry, clean surfaces by brush or spraying to provide a minimum dry-film thickness of 1.5 mils (0.0015 inch).

2.4.4 Aluminum Finishes

Finish of exposed-to-view aluminum surfaces of architectural metal items shall conform to AA DAF-45 and shall have the finish specified for each item as on the drawings.

PART 3 EXECUTION

3.1 GENERAL PROVISIONS

Ornamental metal work shall be installed in accordance with the approved shop drawings and descriptive data for each ornamental metal item, as specified.

Ornamental metal items shall be securely fastened plumb and true to lines and levels.

3.2 ANCHORAGE DEVICES EMBEDDED IN OTHER CONSTRUCTION

Anchorage in the setting drawings, templates, instructions, and directions for the installation of the anchorage items shall be provided.

3.3 FASTENING TO CONSTRUCTION-IN-PLACE

Anchorage devices and fasteners shall be provided where necessary for fastening ornamental metal items to construction-in-place. Fastening shall include; toggle bolts for hollow masonry and stud partitions; lag bolts and wood screws for wood construction; and threaded fasteners for structural steel. Fastening shall be provided as indicated and as specified.

3.4 CUTTING AND FITTING

Cutting, drilling, and fitting required shall be performed for the installation of ornamental metal work. Cutting, drilling, and fitting shall be executed carefully; when required, work shall be fitted in place before fastening.

3.5 WELDING PROCEDURES

Procedures for welding, appearance, and quality of welds made, and the methods used in correcting welding work shall conform to AWS D1.2/D1.2M.

Exposed welds shall be ground smooth.

3.6 THREADED CONNECTIONS

Where exposed to view, bolt and screw heads shall be flat and countersunk, unless otherwise specified. Threaded connections shall be made up tightly so that the threads will be entirely concealed by fitting.

3.7 CLEANING

Before final acceptance, exposed-to-view aluminum surfaces shall be washed with clean water and soap and rinsed with clean water. Acid solutions, steel wool, or other harsh abrasives shall not be used. Stains that remain after washing shall be removed or the finish shall be restored in accordance with the aluminum producer's recommendations.

3.8 INSPECTION AND ACCEPTANCE PROVISIONS

3.8.1 Finished Ornamental Metal Work Requirements

Ornamental metal work will be rejected for any of the following deficiencies:

Finish of exposed-to-view aluminum surfaces having color and appearance that are outside the color and appearance range of the approved samples for aluminum finish

Installed ornamental metal items having stained, discolored, abraded, or otherwise damaged exposed-to-view aluminum surfaces that cannot be removed by cleaning or repairing

Installed ornamental metal items that do not match the approved sample

Aluminum surfaces in contact with dissimilar materials that are not

protected as specified

3.8.2 Repair of Defective Work

Defective work shall be removed and replaced with ornamental metal materials that meet the requirements of this section.

3.9 MAINTENANCE INSTRUCTIONS

Contractor shall submit maintenance instructions as follows:

Aluminum producer's recommended cleaning materials and application methods including precautions in the use of cleaning materials that may be detrimental to the aluminum finish when improperly applied.

-- End of Section --

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

AF&PA T10	(2001) Wood Frame Construction Manual for One- and Two-Family Dwellings
AF&PA T101	(2001) National Design Specification (NDS)for Wood Construction

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.2.1	(1996; Errata 2003) Square and Hex Bolts and Screws Inch Series
ANSI B18.5.2.1M	(1981; R 1995) Metric Round Head Short Square Neck Bolts
ANSI B18.6.1	(1981; R 1997) Wood Screws (Inch Series)

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C1	(2003) All Timber Products - Preservative Treatment by Pressure Processes
AWPA C2	(2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA C9	(2003) Plywood - Preservative Treatment by Pressure Processes
AWPA C20	(2003) Structural Lumber Fire-Retardant Treatment by Pressure Processes
AWPA C27	(2002) Plywood - Fire-Retardant Treatment by Pressure Processes
AWPA C28	(2003) Standard for Preservative Treatment of Structural Glued Laminated Members and Lamination Before Gluing of Southern Pine, Coastal Douglas Fir, Hemfir and Western Hemlock by Pressure Processes
AWPA M2	(2001) Standard for Inspection of Treated Wood Products

AWPA M6 (1996) Brands Used on Forest Products

AWPA P5 (2001; R 2005) Standard for Waterborne Preservatives

AWPA T1 (2004; R 2005) Use Category System: Processing and Treatment Standard

AWPA U1 (2004; R 2005) Use Category System: User Specification for Treated Wood

ASME INTERNATIONAL (ASME)

ASME B18.2.2 (1987; R 1999) Square and Hex Nuts

ASME B18.5.2.2M (1982; R 2000) Metric Round Head Square Neck Bolts

ASTM INTERNATIONAL (ASTM)

ASTM A 307 (2004) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A 687 (1993) High-Strength Nonheaded Steel Bolts and Studs

ASTM D 2898 (1994; R 2004) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

ASTM D 6007 (1996; R 2002) Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

ASTM E 1333 (1990; R 2002) Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

ASTM F 1667 (2003) Driven Fasteners: Nails, Spikes, and Staples

ASTM F 547 (2001) Nails for Use with Wood and Wood-Base Materials

FM GLOBAL (FM)

FM DS 1-49 (2000) Perimeter Flashing

GREEN SEAL (GS)

GS-36 (2000) Commercial Adhesives

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule #1168 (1989; R 2005) Adhesive and Sealant Applications

U.S. DEPARTMENT OF COMMERCE (DOC)

PS-56	(1973) Structural Glued Laminated Timber
PS1	(1995) Construction and Industrial Plywood (APA V995)
PS20	(1999) American Softwood Lumber Standard

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A; Notice 1) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 1) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 1) Shield Expansion (Nail Anchors)
FS FF-B-588	(Rev E) Bolt, Toggle: and Expansion Sleeve, Screw

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17	(2000) Standard Grading Rules

U. S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	(2002) Sustainable Project Rating Tool (SPiRiT), Version 1.4.1

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5	(1998) Western Lumber Grading Rules

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Nailers and Nailing Strips; G

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-03 Product Data

Composite wood and plywood manufacturer's product data for each composite wood and plywood indicating bonding agent used in each contains no added urea-formaldehyde.

Manufacturer's product data or MSDS for all field applied adhesives and sealants indicating adhesives that meet or exceed VOC limits of SCAQMD Rule # 1168 and sealants meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

Manufacturer's product data or MSDS for all field applied coatings indicating coating systems meet or exceed the VOC and chemical component limits of Green Seal requirements.

Local/Regional Materials; (SPiRiT)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Recovered Lumber; (SPiRiT)

Documentation certifying products are from salvaged/recovered lumber sources. Indicate relative dollar value of salvaged content products to total dollar value of products included in project.

Adhesives; (SPiRiT)

Submit manufacturer's product data, indicating VOC content expressed in g/L.

SD-06 Test Reports

Preservative-treated lumber

SD-07 Certificates

Certificates of grade

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

Preservative treatment

SD-10 Operation and Maintenance Data

Take-back program

Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

SD-11 Closeout Submittals

Local/Regional Materials; (SPiRiT)

LEED documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (SPiRiT)

SPiRiT documentation relative to low emitting materials credit in accordance with SPiRiT Reference Guide. Include in LEED Documentation Notebook.

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

1.4.2 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark shall identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with PS1.Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

1.4.3 Preservative-Treated Lumber and Plywood

The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.4 Fire-Retardant Treated Lumber

Mark each piece in accordance with AWPA M6, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber shall be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWPA M6.

1.5 SIZES AND SURFACING

PS20 for dressed sizes of yard and structural lumber. Lumber shall be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:

a. Framing lumber and boards - 19 percent maximum

d. Materials other than lumber - Moisture content shall be in accordance with standard under which the product is produced

1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products shall conform to the requirements of AWPA U1 and AWPA T1. Pressure-treated wood products shall not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products shall not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and shall not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards.lumber and timber in accordance with AWPA C1 and AWPA C2, and plywood in accordance with AWPA C1 and AWPA C9. Treat structural glued laminated timber in accordance with AWPA C1 and AWPA C28.

1.8 FIRE-RETARDANT TREATMENT

Fire-retardant treated wood shall be pressure treated in accordance with AWPA C20 for lumber and AWPA C27 for plywood. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and B and Exterior Type. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898 prior to being tested. Such items which will not be inside a building, and such items which will be exposed to heat or high humidity, shall receive

exterior fire-retardant treatment. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate, and formaldehyde. Items to be treated include the following:

a. Roof edge strips and nailers and all other wood poducts required by code.

1.9 QUALITY ASSURANCE

1.9.1 Certificates of Grade

Submit certificates attesting that products meet the grade requirements specified in lieu of grade markings where appearance is important and grade marks will deface material.

1.10 SUSTAINABLE DESIGN REQUIREMENTS

1.10.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Wood and materials may be locally available.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Virgin Lumber

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible.

2.1.1 Recovered Lumber

Use recovered lumber where practical. Unless otherwise noted, recovered lumber shall be delivered clean and free of contamination. Provide grading certificates for any recovered wood materials used in structural applications.

2.1.2 Engineered Wood Products

Products shall contain no added urea-formaldehyde if exposed to interior spaces. Determine formaldehyde concentrations in air from engineered wood products under test conditions of temperature and relative humidity in accordance with ASTM D 6007 or ASTM E 1333. Products shall not be used if formaldehyde concentration is found to be greater than 0.

2.1.3 Natural Decay- and Insect-Resistant Wood

Naturally durable wood shall be salvaged. An occasional piece with corner sapwood shall be permitted if 90 percent or more of the width of each side on which the sapwood occurs is heartwood.

2.2 LUMBER

2.2.1 Framing Lumber

Framing lumber such as sleepers, nailing strips, and nailers shall be one

of the species listed in the table below. Minimum grade of species shall be as listed. Finger-jointed lumber may be used in the same applications as solid lumber of an equivalent species and grade, provided the finger-jointed lumber meets all the requirements of the certification and the quality control programs of the rules writing agency having jurisdiction and all applicable requirements of PS-56.

Table of Grades for Framing and Board Lumber

Grading Rules	Species	Framing	Board Lumber
WWPA G-5 standard grading rules	Aspen Douglas Fir-Larch Douglas Fir South Hem-Fir	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: No. 3 Common
WCLIB 17 standard grading rules	Douglas Fir-Larch Hem-Fir	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: Standard

2.3 PLYWOOD

PS1, Exterior Type C-C (Plugged Grade).

2.4 OTHER MATERIALS

2.4.1 Miscellaneous Wood Members

2.4.1.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size (inch)
Nailing strips	2 inch stock.

2.4.1.2 Blocking

Blocking shall be standard or number 2 grade.

2.4.2 Adhesives

Comply with applicable regulations regarding toxic and hazardous materials, GS-36, SCAQMD Rule #1168, and as specified. Use water-based adhesives with maximum VOC content of 15 grams/liter for all interior applications. Interior adhesives, sealants, primers and sealants used as filler must meet the requirements of LEED low emitting materials credit.

2.5 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Fasteners shall be fabricated from 100 percent re-melted steel. Fasteners may contain post-consumer or post-industrial recycled content. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs shall be zinc-coated. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather shall be copper alloy.

2.5.1 Bolts, Nuts, Studs, and Rivets

ANSI B18.2.1, ANSI B18.5.2.1M, ASME B18.5.2.2M, ASME B18.2.2, and ASTM A 687.

2.5.2 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

2.5.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices shall be 3/8 inch.

2.5.4 Lag Screws and Lag Bolts

ANSI B18.2.1.

2.5.5 Toggle Bolts

FS FF-B-588.

2.5.6 Wood Screws

ANSI B18.6.1.

2.5.7 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails shall be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T10. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T101. Reasonable judgment backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

2.5.8 Wire Nails

ASTM F 1667.

PART 3 EXECUTION

3.1 MISCELLANEOUS

3.1.1 Wood Roof Nailers, Edge Strips, Crickets, Curbs, and Cants

Provide sizes and configurations indicated or specified and anchored securely to continuous construction.

3.1.1.1 Roof Edge Strips and Nailers

Provide at perimeter of roof, around openings through roof, and where roofs abut walls, curbs, and other vertical surfaces. Except where indicated otherwise, nailers shall be 6 inches wide and the same thickness as the insulation. Anchor nailers securely to underlying construction. Anchor perimeter nailers in accordance with FM DS 1-49.

3.1.1.2 Crickets, Cants, and Curbs

Provide wood saddles or crickets, cant strips, curbs for scuttles and ventilators,and at expansion joints, as indicated, specified, or necessary.

3.1.2 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.1.3 Temporary Closures

Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed, as needed. Cover windows and other unprotected openings, as needed with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas, as required.

3.1.4 Temporary Centering, Bracing, and Shoring

Provide for the support and protection of masonry work during construction as specified in Section 04200 MASONRY. Forms and centering for cast-in-place concrete work are specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

3.2 WASTE MANAGEMENT

In accordance with the Waste Management Plan and as specified. Separate and reuse scrap sheet materials larger than 2 square feet, framing members larger than 16 inches, and multiple offcuts of any size larger than 12 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

Separate composite wood from other wood types and recycle or reuse. Coordinate with manufacturer for take-back program and submit manufacturer's policy statement on program. Set aside scrap and return to

manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials.
Fold up metal banding, flatten, and recycle.

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground. Prevent sawdust and wood shavings from entering the storm drainage system. Compost sawdust. Do not burn scrap lumber that has been pressure treated, or lumber that is less than one year old.

-- End of Section --

SECTION 06220

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

This section includes the wood veneer wall panels located in the Entry Area, Atrium and the Auditorium. It also includes the wood veneer panels located on the inside and outside face and top of the short wall at the perimeter of the SOC Platform. Also included is the casework with transparent finish located in the Command Conference Room.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds	(8th Edition) AWI Quality Standards

ASTM INTERNATIONAL (ASTM)

ASTM E 84	(2008a) Standard Test Method for Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wood Veneer Panels

Submit detailed drawings of wall panels showing dimensioned plans and elevations, sections, and edge details. Indicate methods of attachment to substrate.

Casework with Transparent Finish

Submit detailed drawings showing fabricated casework in plan, section, elevation, and details which indicate materials used, dimensions, details of construction, methods of fastening, and installation methods. Material finishes shall be indicated for all exposed surfaces.

SD-03 Product Data

Wood Veneer Panels

Submit manufacturer's data on wall panels indicating type of

veneer, substrate, and panel backing. Provide installation instructions and data on connection devices.

Casework with Transparent Finish

Provide product data for all hardware items that indicates manufacturer, model number, and finish.

SD-04 Samples

Wood Veneer Panels

Provide a full thickness wood veneer panel sample that shows veneer, substrate, and backing materials. Sample panel shall have finish proposed for final installed product. Include edge banding if used on installed panel.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Wood Veneer Panels

Wood veneer panels shall be stored only in a secured ambient environment with a humidity range of 35 percent to 55 percent and a temperature not to exceed 80 degrees F. Panels shall be stacked flat to prevent panels from distorting. Panels shall be handled with care to prevent damage. All wet work must be completed with windows and doors in place before panels can be unwrapped and installed.

1.4.2 Casework with Transparent Finish

Casework may be delivered to the site knocked down or fully assembled. All units shall be delivered in undamaged condition and stored off the ground in fully enclosed areas protected from damage. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

1.5 QUALITY ASSURANCE

1.5.1 Wood Veneer Panels

Wood veneer panels shall be fabricated in a shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.5.2 Casework with Transparent Finish

Casework shall be manufactured to AWI Qual Stds for custom grade.

PART 2 PRODUCTS

2.1 WOOD VENEER PANELS

2.1.1 Materials

Wood veneer wall panels shall be 3/4 inch thick panels manufactured with an 11/16 inch thick fire retardant particle board core faced on both the front and the back with a 1/32 inch thick natural wood veneer. The veneer on the front face shall be quarter sawn sapele veneer, architectural 'A' grade

with slip matched leaf arrangement. The veneer on the rear of the panel shall be the manufacturer's standard hardwood backing veneer. The particle board core shall have a Class A rating when tested in accordance with ASTM E 84 with a flame spread rating of less than 25.

2.1.2 Fabrication

Where practical, flat wall panels shall be fabricated in full-size standard panels of 3 feet wide by 9 feet high or other size as indicated on the drawings. Panels shall have square edges with factory applied matching veneer edge band.

2.1.3 Finish

Finish shall utilize manufacturer's clear finish with a satin sheen.

2.1.4 Acceptable Manufacturer

Architectural Components Group, Inc., 2525 A East Livingston, Springfield, MO 65803 or approved equal.

2.2 CASEWORK WITH TRANSPARENT FINISH

2.2.1 AWI Quality Grade

Casework shall be fabricated to AWI Qual Stds for custom grade.

2.2.2 Construction

Casework shall be of flush overlay design of the size and configuration shown on the drawings. Casework shall be constructed of 3/4 inch thick formaldehyde-free recycled wood particle board with the specified finish.

2.2.3 Hardware

Hardware items shall match those specified in Section 06410 LAMINATE CLAD ARCHITECTURAL CASEWORK and as indicated on the drawings.

2.2.4 Finish

All exterior surfaces and edges on the cabinet end panels and doors shall be sapele wood veneer with a clear satin sheen finish. All interior surfaces of the cabinets including to top, bottom, and edges on the shelves shall be covered with white melamine. The countertop and backsplash on the casework shall be 1-1/4-inch thick solid surface material as specified in Section 06650 SOLID POLYMER (SOLID SURFACING) FABRICATIONS.

PART 3 EXECUTION

3.1 WOOD VENEER PANELS

Wall mounted wood veneer panels shall be hung plumb and true using z-clips to within manufacturing tolerance of 1/8 inch over 8 feet. Panels shall be installed with a 1/4 inch reveal between adjacent panels both horizontally and vertically. Along a length of straight wall, adjacent panels shall be maintained horizontally in a flat plane for the full length and height of the wall without a variation of more than 1/8 inch over the length of the wall.

On the short wall at the perimeter of the raised platform in the SOC, the wood veneer panels shall be hung using z-clips in front of the gypsum board substrate maintaining tight joints between adjacent panels. The wood grain shall be oriented vertically on the sides and front to rear on the top.

3.2 CASEWORK WITH TRANSPARENT FINISH

Install casework level, tight, and plumb against adjacent wall. Secure cabinets to walls with toggle bolts or with screws to concealed blocking. Secure solid surface top to the base with concealed fasteners.

-- End of Section --

SECTION 06410

LAMINATE CLAD ARCHITECTURAL CASEWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A161.2	(1998) Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure
ANSI A208.1	(1999) Mat-Formed Wood Particle Board
ANSI A208.2	(2002) Medium Density Fiberboard (MDF) For Interior Applications

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds	(8th Edition) AWI Quality Standards

ASTM INTERNATIONAL (ASTM)

ASTM D 1037	(1999) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM F 547	(2001) Nails for Use with Wood and Wood-Base Materials

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.9	(2003) Cabinet Hardware

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(2000) High-Pressure Decorative Laminates

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

WDMA I.S. 1-A	(1997) Architectural Wood Flush Doors

1.2 GENERAL DESCRIPTION

Work in this section includes laminate clad custom casework cabinets as shown on the drawings and as described in this specification. This Section includes high-pressure laminate surfacing and cabinet hardware. The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS. All exposed and semi-exposed surfaces, whose finish is not otherwise noted on the drawings or finish schedule, shall be sanded smooth and shall receive a clear finish of

polyurethane. Wood finish may be shop finished or field applied in accordance with Section 09900 PAINTS AND COATINGS.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings
Installation

Shop drawings showing all fabricated casework items in plan view, elevations and cross-sections to accurately indicate materials used, details of construction, dimensions, methods of fastening and erection, and installation methods proposed. Shop drawing casework items shall be clearly cross-referenced to casework items located on the project drawings. Shop drawings shall include a color schedule of all casework items to include all countertop, exposed, and semi-exposed cabinet finishes to include finish material manufacturer, pattern, and color.

SD-03 Product Data

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Composite wood and plywood manufacturer's product data for each composite wood and plywood product used indicating that bonding agent used contains no urea formaldehyde.

Include MSDS of all field-applied adhesives used within the building interior, highlighting VOC content, expressed in g/L, indicating that adhesives meet or exceed the VOC limits of SCAQMD Rule #1168.

Include MSDS of all field-applied sealants used within the buiding interior, highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51.

Manufacturers' product data for field-applied coating systems, indicating that coating systems meet or exceed VOC and chemical composition limits of Green Seal requirements.

Wood Materials

Descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop

drawings. Data shall provide written verification of conformance with AWI Qual Stds for the quality indicated to include materials, tolerances, and types of construction. Both the manufacturer of materials and the fabricator shall submit available literature which describes re-cycled product content, operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

SD-04 Samples

Plastic Laminates

Two samples of each plastic laminate pattern and color. Samples shall be a minimum of 5 by 7 inches in size.

Cabinet Hardware

One sample of each cabinet hardware item specified to include hinges, pulls, drawer glides.

SD-07 Certificates

Quality Assurance
Laminate Clad Casework

A quality control statement which illustrates compliance with and understanding of AWI Qual Stds requirements, in general, and the specific AWI Qual Stds requirements provided in this specification. The quality control statement shall also certify a minimum of ten years Contractor's experience in laminate clad casework fabrication and construction. The quality control statement shall provide a list of a minimum of five successfully completed projects of a similar scope, size, and complexity.

1.4 QUALITY ASSURANCE

Unless otherwise noted on the drawings, all materials, construction methods, and fabrication shall conform to and comply with the custom grade quality standards as outlined in AWI Qual Stds, Section 400G and Section 400B for laminate clad cabinets. These standards shall apply in lieu of omissions or specific requirements in this specification. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified. Contractor must demonstrate knowledge and understanding of AWI Qual Stds requirements for the quality grade indicated.

1.5 MOCK-UP

Prior to final approval of shop drawings, a full-size mock-up shall be provided of a typical floor cabinet . The mock-up shall include all components and hardware necessary to illustrate a completed unit and shall include a minimum of one door and one drawer assembly. The completed mock-up shall include countertops and back splashes where specified. The mock-up shall utilize specified finishes in the patterns and colors as indicated on the drawings. Upon disapproval, the Contractor shall rework or remake the mock-up until approval is secured. Rejected units shall be

removed from the jobsite. Approved mock-up may remain as part of the finished work.

1.6 DELIVERY AND STORAGE

Casework may be delivered knockdown or fully assembled. All units shall be delivered to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

1.7 SEQUENCING AND SCHEDULING

Work shall be coordinated with other trades. Units shall not be installed in any room or space until painting, and ceiling installation are complete within the room where the units are located. Floor cabinets shall be installed before finished flooring materials are installed.

1.8 PROJECT/SITE CONDITIONS

Field measurements shall be verified as indicated in the shop drawings before fabrication.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

2.1.1 Lumber

a. All framing lumber shall be kiln-dried Grade III to dimensions as shown on the drawings. Frame front, where indicated on the drawings, shall be nominal 3/4 inch hardwood.

2.1.2 Panel Products

2.1.2.1 Plywood

All plywood panels used for framing purposes shall be veneer core hardwood plywood, AWI Qual Stds Grade AA. Nominal thickness of plywood panels shall be as indicated in this specification and on the drawings.

2.1.2.2 Particleboard

All particleboard shall be industrial grade, medium density (40 to 50 pounds per cubic foot), 3/4 inch thick. A moisture-resistant particleboard in grade Type 2-M-2 or 2-M-3 shall be used as the substrate for plastic laminate covered countertops and backsplashes, components as located on the drawings and other areas subjected to moisture. Particleboard shall meet the minimum standards listed in ASTM D 1037 and ANSI A208.1.

2.1.2.3 Medium Density Fiberboard

Medium density fiberboard (MDF) shall be an acceptable panel substrate where noted on the drawings. Medium density fiberboard shall meet the minimum standards listed in ANSI A208.2.

2.2 SOLID POLYMER MATERIAL

Solid surfacing casework components shall conform to the requirements of Section 06650 SOLID POLYMER (SOLID SURFACING) FABRICATIONS.

2.3 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

All plastic laminates shall meet the requirements of NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Design, colors, surface finish and texture, and locations shall be as indicated on the drawings. Plastic laminate types and nominal minimum thicknesses for casework components shall be as indicated in the following paragraphs.

2.3.1 Horizontal General Purpose Standard (HGS) Grade

Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where postforming is not required.

2.3.2 Vertical General Purpose Standard (VGS) Grade

Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where postforming is not required.

2.3.3 Horizontal General Purpose Postformable (HGP) Grade

Horizontal general purpose postformable grade plastic laminate shall be 0.042 inches (plus or minus 0.005 inches) in thithickness. This laminate grade is intended for horizontal surfaces where post forming is required.

2.3.4 Vertical General Purpose Postformable (VGP) Grade

Vertical general purpose postformable grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of components where postforming is required for curved surfaces.

2.3.5 Backing Sheet (BK) Grade

Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate. Backing sheet thickness shall be 0.020 inches. Backing sheets shall be provided for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

2.4 THERMOSET DECORATIVE OVERLAYS (MELAMINE)

Thermoset decorative overlays (melamine panels) shall be used for casework cabinet interior surfaces.

2.5 EDGE BANDING

Edge banding shelving shall be PVC vinyl and shall be 0.125 inch thick. Material width shall be 15/16 inches. Color and pattern shall match exposed door and drawer front laminate pattern and color.

2.6 CABINET HARDWARE

All hardware shall conform to BHMA A156.9, unless otherwise noted, and shall consist of the following components:

a. Door Hinges: Self-Closing type, BHMA No. A156.17 - 2004.

b. Door Pulls: Hafele 106.74.918 or approved equal.

c. Drawer Pulls: Hafele 124.02.920 or approved equal.

d. Drawer Slide: Side mounted type, BHMA No. A156.9 - 2003 with full extension and a minimum 100 pound load capacity. Slides shall include an integral stop to avoid accidental drawer removal.

e. Adjustable Shelf Support System:

1) Recessed (mortised) metal standards, BHMA No. BO4071, finish: zinc die cast. Support clips for the standards shall be open type, BHMA No. B04091, finish: zinc die cast.

2.7 FASTENERS

Nails, screws, and other suitable fasteners shall be the size and type best suited for the purpose and shall conform to ASTM F 547 where applicable.

2.8 ADHESIVES, CAULKS, AND SEALANTS

2.8.1 Adhesives

Adhesives shall be of a formula and type recommended by AWI. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance. Adhesives shall meet local regulations regarding VOC emissions and off-gassing.

2.8.1.1 Wood Joinery

Adhesives used to bond wood members shall be a Type II for interior use urea-formaldehyde resin formula. Adhesives shall withstand a bond test as described in WDMA I.S. 1-A.

2.8.1.2 Laminate Adhesive

Adhesive used to join high-pressure decorative laminate to wood shall be adhesive consistant with AWI and laminate manufacturer's recommendations. PVC edgebanding shall be adhered using a polymer-based hot melt glue.

2.8.2 Caulk

Caulk used to fill voids and joints between laminated components and between laminated components and adjacent surfaces shall be clear, 100 percent silicone.

2.8.3 Sealant

Sealant shall be of a type and composition recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other

locations where unfinished substrate edges may be subjected to moisture.

2.9 ACCCESSORIES

2.10 FABRICATION

Fabrication and assembly of components shall be accomplished at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed the requirements for AWI custom grade unless otherwise indicated in this specification. Cabinet style, in accordance with AWI Qual Stds, Section 400-G descriptions, shall be as indicated on the drawings.

2.10.1 Base and Wall Cabinet Case Body

2.10.1.1 Cabinet Components

Frame members, where used, shall be glued-together, kiln-dried hardwood lumber. Top corners, bottom corners, and cabinet bottoms shall be braced with either hardwood blocks or water-resistant glue. Cabinet components shall be constructed from the following materials and thicknesses:

a. Body Members (Ends, Divisions, Bottoms, and Tops): 3/4 inch particleboard or veneer core plywood panel product.

b. Face Frames and Rails: 3/4 inch particleboard or hardwood lumber.

c. Shelving: 3/4 inch particleboard or veneer core plywood panel product.

d. Cabinet Backs: 3/4 inch particleboard or 1/4 inch veneer core plywood panel product.

e. Drawer Sides, Backs, and Subfronts: 1/2 inch hardwood lumber or plywood.

f. Drawer Bottoms: 1/4 inch veneer core plywood panel product.

g. Door and Drawer Fronts: 3/4 inch particleboard or plywood panel product.

2.10.1.2 Joinery Method for Case Body Members

a. Tops, Exposed Ends, and Bottoms.

1) Doweled, glued under pressure (approx. 4 dowels per 12 inches of joint).

b. Exposed End Corner and Face Frame Attachment.

1) For mitered joint: lock miter or spline or biscuit, glued under pressure (no visible fasteners).

2) For non-mitered joint (90 degree): butt joint glued under pressure (no visible fasteners).

c. Cabinet Backs (Wall Hung Cabinets): Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery

and hanging/mounting mechanisms should transfer the load to case body members. Fabrication method shall be:

1) Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

d. Cabinet Backs (Floor Standing Cabinets).

1) Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

e. Wall Anchor Strips shall be required for all cabinets with backs less than 1/2 inch thick. Strips shall consist of minimum 1/2 inch thick lumber, minimum 2-1/2 inches width; securely attached to wall side of cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.

2.10.2 Cabinet Floor Base

Floor cabinets shall be mounted on a base constructed of nominal 2 inch thick lumber. Base assembly components shall be treated lumber. Finished height for each cabinet base shall be as indicated on the drawings. Bottom edge of the cabinet door or drawer face shall be flush with top of base as indicated on the drawings.

2.10.3 Cabinet Door and Drawer Fronts

Door and drawer fronts shall be fabricated from 3/4 inch particleboard or plywood. All door and drawer front edges shall be surfaced with high pressure plastic laminate, color and pattern as indicated on the drawings.

2.10.4 Drawer Assembly

2.10.4.1 Drawer Components

Drawer components shall consist of a removable drawer front, sides, backs, and bottom. Drawer components shall be constructed of the following materials and thicknesses:

a. Drawer Sides and Backs For Transparent Finish: 1/2 inch thick 7-ply hardwood veneer core plywood (no voids), any species.

b. Drawer Sides and Backs For Laminate Finish: 1/2 inch thick 7-ply hardwood veneer core substrate.

c. Drawer Sides and Back For Thermoset Decorative Overlay (melamine) Finish: 1/2 inch thick medium density particleboard or MDF fiberboard substrate.

d. Drawer Bottom: 1/4 inch thick thermoset decorative overlay melamine panel product.

2.10.4.2 Drawer Assembly Joinery Method

a. Multiple dovetail (all corners) or French dovetail front/dadoed

back, glued under pressure.

b. Doweled, glued under pressure.

c. Lock shoulder, glued and pin nailed.

d. Bottoms shall be set into sides, front, and back, 1/4 inch deep groove with a minimum 3/8 inch standing shoulder.

2.10.5 Shelving

2.10.5.1 General Requirements

Shelving shall be fabricated from 3/4 inch particleboard or veneer core plywood. All shelving top and bottom surfaces and edges shall be finished with white melamine laminate.

2.10.5.2 Shelf Support System

The shelf support system shall be:

a. Recessed (mortised) metal shelf standards. Standards shall be mortised flush with the finished surface of the cabinet interior side walls, two per side. Standards shall be positioned and spaced on the side walls to provide a stable shelf surface that eliminates tipping when shelf front is weighted. Standards shall be installed and adjusted vertically to provide a level, stable shelf surface when clips are in place.

2.10.6 Laminate Clad Countertops

Laminate countertop substrate shall be constructed of 3/4 inch particleboard or veneer core plywood. The substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subjected to liquids. All substrates shall have sink cutout edges sealed with appropriate sealant against moisture. No joints shall occur at any cutouts. A balanced backer sheet is required.

2.10.6.1 Edge Style

Front and exposed side countertop edges shall be in shapes and to dimensions as shown on the drawings. The countertop edge material shall be:

a. Plastic laminate Self Edge. Flat, 90 degree "self " edge. Edge must be applied before top. Laminate edge shall overlap countertop laminate and shall be eased to eliminate sharp corners.

2.10.6.2 Laminate Clad Splashes

Countertop splash substrate shall be 3/4 inch veneer core plywood. Laminate clad backsplash shall be as indicated on the drawings. Side splashes shall be straight profile and provided loose, to be installed at the time of countertop installation. Back and side splash laminate pattern and color shall match the adjacent countertop laminate.

2.10.7 Laminate Application

Laminate application to substrates shall follow the recommended procedures and instructions of the laminate manufacturer and NEMA LD 3, using tools

and devices specifically designed for laminate fabrication and application. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer. Fit corners and joints hairline. All laminate edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corners removed). Clean up at easing shall be such that no overlap of the member eased is visible. Fabrication shall conform to ANSI A161.2. Laminate types and grades for component surfaces shall be as follows unless otherwise indicated on the drawings:

a. Base/Wall Cabinet Case Body.

1) Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade.

2) Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Thermoset Decorative Overlay (melamine).

b. Adjustable Shelving.

1) Top and bottom surfaces and all edges: Thermoset Decorative Overlay (melamine).

c. Fixed Shelving.

1) Top and bottom surfaces and exposed edges: Thermoset Decorative Overlay (melamine).

d. Door, Drawer Fronts, Access Panels.

1) Exterior (exposed) and interior (semi-exposed) faces: HPDL Grade VGP

2) Edges: HPDL Grade VGS.

e. Drawer Assembly.

All interior and exterior surfaces: Thermoset Decorative Overlay (melamine).

f. Countertops and Splashes.

All exposed and semi-exposed surfaces: HPDL Grade HGS

g. Tolerances

Flushness, flatness, and joint tolerances of laminated surfaces shall meet the AWI Qual Stds custom grade requirements.

2.10.8 Finishing

2.10.8.1 Filling

No fasteners shall be exposed on laminated surfaces. All nails, screws, and other fasteners in non-laminated cabinet components shall be countersunk and the holes filled with wood filler consistent in color with

the wood species.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall comply with applicable requirements for AWI Qual Stds custom quality standards. Countertops and fabricated assemblies shall be installed level, plumb, and true to line, in locations shown on the drawings. Cabinets and other laminate clad casework assemblies shall be attached and anchored securely to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

3.1.1 Anchoring Systems

3.1.1.1 Floor

Base cabinets shall utilize a floor anchoring system. Anchoring and mechanical fasteners shall not be visible from the finished side of the casework assembly. Cabinet assemblies shall be attached to anchored bases without visible fasteners as indicated in the drawings. Where assembly abutts a wall surface, anchoring shall include a minimum 1/2 inch thick lumber or panel product hanging strip, minimum 2-1/2 inch width; securely attached to the top of the wall side of the cabinet back.

3.1.1.2 Wall

Cabinet to be wall mounted shall utilize minimum 1/2 inch thick lumber or panel product hanging strips, minimum 2-1/2 inch width; securely attached to the wall side of the cabinet back, both top and bottom.

3.1.2 Countertops

Countertops shall be installed in locations as indicated on the drawings. Countertops shall be fastened to supporting casework structure with mechanical fasteners, hidden from view. All joints formed by the countertop or countertop splash and adjacent wall surfaces shall be filled with a clear silicone caulk. Loose back splashes shall be adhered to both the countertop surface perimeter and the adjacent wall surface with adhesives appropriate for the type of materials to be adhered. Joints between the countertop surface and splash shall be filled with clear silicone caulk in a smooth consistent concave bead. Bead size shall be the minimum necessary to fill the joint and any surrounding voids or cracks.

3.1.3 Hardware

Casework hardware shall be installed in types and locations as indicated on the drawings. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, the use of plastic or synthetic insertion dowels shall be used to receive 3/16 inch "Euroscrews". The use of wood screws without insertion dowels is prohibited.

3.1.4 Doors, Drawers and Removable Panels

The fitting of doors, drawers and removable panels shall be accomplished within target fitting tolerances for gaps and flushness in accordance with AWI Qual Stds custom grade requirements.

3.1.5 Plumbing Fixtures

Sinks, sink hardware, and other plumbing fixtures shall be installed in locations as indicated on the drawings and in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

-- End of Section --

SECTION 06650

SOLID POLYMER (SOLID SURFACING) FABRICATIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.1	(2005) Installation of Ceramic Tile

ASTM INTERNATIONAL (ASTM)

ASTM C 97	(2002) Absorption and Bulk Specific Gravity of Dimension Stone
ASTM C 109	(2005) Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or Cube Specimens)
ASTM C 293	(2002) Flexural Stength of Conctrete (Using Simple Beam with Center-Post Loading)
ASTM C 666	(2003) Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 642	(1997) Density, Absorption, and Voids in Hardened Concrete
ASTM C 1028	(1996) Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
ASTM C 1260	(2005) Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM E 84	(2005) Surface Burning Characteristics of Building Materials

1.2 GENERAL DESCRIPTION

Work in this section includes items utilizing solid polymer (solid surfacing) fabrication as shown on the drawings and as described in this specification. Do not change source of supply for materials after work has started, if the appearance of finished work would be affected. Variation in component size and location of openings to be plus or minus 1/8 inch.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings
Installation

Detail Drawings indicating locations, dimensions, component sizes, fabrication and joint details, attachment provisions, installation details, and coordination requirements with adjacent work.

SD-03 Product Data

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Composite wood and plywood manufacturer's product data for each composit wood and plywood product used indicating that bonding agent used contains no urea formaldehyde.

Include MSDS of all field-applied adhesives used within the building interior, highlighting VOC content, expressed in g/L, indicating that adhesives meet or exceed the VOC limits of SCAQMD Rule #1168.

Include MSDS of all field-applied sealants used within the building interior, highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51.

Manufacturer's product data for field-applied coating systems, indicating that coating systems meet or exceed VOC and chemical composition limits of Green Seal requirements.

Solid surface material
Qualifications
Fabrications

Product data indicating product description, fabrication information, and compliance with specified performance requirements for solid surface material, joint adhesive, sealants, and heat reflective tape. Both the manufacturer of materials and the fabricator shall submit a detailed description of operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting

sustainable design and products.

SD-04 Samples

Material

A minimum 4 by 4 inch sample of each color and pattern for approval. Samples shall indicate full range of color and pattern variation. Approved samples shall be retained as a standard for this work.

Counter and Vanity Tops

A minimum 1 foot wide by 6 inch deep, full size sample for each type of counter top shown on the project drawings. The sample shall include the edge profile and backsplash as detailed on the project drawings. Solid surface material shall be of a pattern and color as indicated on the drawings. Sample shall include at least one seam. Approved sample shall be retained as standard for this work.

SD-06 Test Reports

Solid surface material

Test report results from an independent testing laboratory attesting that the submitted solid surface material meets or exceeds each of the specified performance requirements.

SD-07 Certificates

Fabrications
Qualifications

Solid surface manufacturer's certification attesting to fabricator qualification approval.

SD-10 Operation and Maintenance Data

Clean-up

A minimum of six copies of maintenance data indicating manufacturer's care, repair and cleaning instructions. Maintenance video shall be provided,if available. Maintenance kit for matte finishes shall be submitted.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall not be delivered to project site until areas are ready for installation. Components and materials shall be delivered to the site undamaged, in containers clearly marked and labeled with manufacturer's name. Materials shall be stored indoors and adequate precautions taken to prevent damage to finished surfaces. Protective coverings shall be provided to prevent physical damage or staining following installation, for duration of project.

1.5 QUALIFICATIONS

To insure warranty coverage, solid surface fabricators shall be certified

to fabricate by the solid surface material manufacturer being utilized. All fabrications shall be marked with the fabricator's certification label affixed in an inconspicuous location. Fabricators shall have a minimum of 5 years of experience working with solid surface materials.

1.6 MOCK-UP

The Contractor shall submit Detail Drawings as specified in the Submittals paragraph, under SD-02. Prior to final approval of shop drawings, a full-size mock-up shall be provided of a typical countertop where multiple units are required. The mock-up shall include all solid surface components required to provide a completed unit. The mock-up shall utilize finishes in patterns and colors indicated on the drawings. Should the mock-up not be approved, the Contractor shall re-work or remake it until approval is secured. Rejected units shall be removed from the jobsite. Approved mock-up may remain as part of the finished work.

PART 2 PRODUCTS

2.1 MATERIAL

Solid surface material shall be a 100 percent recycled glass embedded in a cement matrix. Material shall have minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch shall be repairable by sanding or polishing. Material thickness shall be as indicated on the drawings. In no case shall material be less than 1/4 inch in thickness.

2.1.1 Cast,100 Percent Recycled Glass Embedded in Cement Matrix Material

Cast, 100 percent recycled glass embedded in a cement matrix and shall meet the following minimum performance requirements:

Property	Test Procedure	Requirements
Compressive Strength	ASTM C 109	13,000
Flexural Strength	ASTM C 293	890
Specific Gravity	ASTM C 97	2.31
Porosity/Absorption	ASTM C 642	0.18% (unsealed)
Static of Coefficient of Friction	ASTM C 1028	0.78 (dry)
Chemical Durability	ASTM C 1260 For ASR Reactivity	0.05%
Freeze Thaw	ASTM C 666	0.49% expansion, 300 cycles
Stain/Acid Resistance		Yes (use recommended sealants/not resistant to Hydroflouric Acid)
Fire Rating - Class 1 (A)	ASTM E 84	Flame Spread Index 0 Fuel Contribution 0

Property	Test Procedure	Requirements
		Smoke Density Index 0

2.1.2 Material Patterns and Colors

Patterns and colors for all solid surface components and fabrications shall be those indicated on the MATERIAL LEGEND in drawings. Pattern and color shall occur, and shall be consistent in appearance, throughout the entire depth (thickness) of the solid surface material.

2.1.3 Surface Finish

Exposed finished surfaces and edges shall receive a uniform appearance. Exposed surface finish shall be as indicated on the drawings.

2.2 ACCESSORY PRODUCTS

Accessory products, as specified below, shall be manufactured by the solid surface manufacturer or shall be products approved by the solid surface manufacturer for use with the solid surface materials being specified.

2.2.1 Seam Adhesive

Seam adhesive shall be a two-part adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid surface materials and components to create a monolithic appearance of the fabrication. Adhesive shall be approved by the solid surface manufacturer. Adhesive shall be color-matched to the surfaces being bonded where solid-colored, solid surface materials are being bonded together. The seam adhesive shall be clear or color matched where particulate patterned, solid surface materials are being bonded together.

2.2.2 Panel Adhesive

Panel adhesive shall be neoprene based panel adhesive meeting ANSI A108.1, Underwriter's Laboratories (UL) listed. This adhesive shall be used to bond solid surface components to adjacent and underlying substrates.

2.2.3 Silicone Sealant

Sealant shall be a mildew-resistant, FDA and UL listed silicone sealant or caulk in a clear formulation. The silicone sealant shall be approved for use by the solid surface manufacturer. Sealant shall be used to seal all expansion joints between solid surface components and all joints between solid surface components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures.

2.2.4 Mounting Hardware

Provide mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

2.3 FABRICATIONS

Components shall be factory or shop fabricated to sizes and shapes indicated, to the greatest extent practical, in accordance with approved Shop Drawings and manufacturer's requirements. Factory cutouts shall be provided for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii shall be routed to template, with edges

smooth. Defective and inaccurate work will be rejected.

2.3.1 Joints and Seams

Joints and seams shall be formed between solid surface components using manufacturer's approved seam adhesive. Joints shall be inconspicuous in appearance and without voids to create a monolithic appearance.

2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Edge shapes and treatments, including any inserts, shall be as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.3.3 Counter and Vanity Top Splashes

Backsplashes and end splashes shall be fabricated from 1/2 inch thick solid surfacing material and shall be 4 inches high. Backsplashes and end splashes shall be provided for all counter tops and vanity tops. Backsplashes shall be shop fabricated and be loose, to be field attached.

2.3.3.1 End Splashes

End splashes shall be provided loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

2.3.4 Counter and Vanity Tops

All solid surfacing, solid surface counter top and vanity top components shall be fabricated from 1.25 inch thick material. Edge details, dimensions, locations, and quantities shall be as indicated on the Drawings. Counter tops shall be complete with 4 inch high loose back and end splashes at all locations. Attach 2 inch wide reinforcing strip of surface material under each horizontal counter top seam.

2.3.4.1 Counter Top With Sink

A. Vitreous China Sink.

Countertops with sinks shall include cutouts to template as furnished by the sink manufacturer. Manufacturer's standard sink mounting hardware for vitreous china installation shall be provided. Seam between sink and counter top shall be sealed with silicone sealant. Sink, faucet, and plumbing requirements shall be in accordance with Section 15400 PLUMBING,GENERAL PURPOSE.

2.3.4.2 Vanity Tops With Bowls

A. Vitreous China Bowl

Countertops with vitreous china bowls shall include cutouts to template as furnished by the sink manufacturer. Manufacturer's standard sink mounting hardware for vitreous china rimless installation shall be provided. Seam between sink and counter top shall be sealed with silicone sealant. Sink, faucet, and plumbing requirements shall be in accordance with Section 15400 PLUMBING,GENERAL PURPOSE.

2.3.4.3 Cafeteria Counter Tops

Cutouts for cold or hot appliances shall be made to templates furnished by the equipment manufacturers. Joints and cutouts shall be reinforced as recommended by the solid surface manufacturer. Insulation shall be provided between the solid surface and all appliances, hot or cold. Hot applications shall be thermally isolated from cold applications in accordance with the solid surface manufacturer's recommendations.

PART 3 EXECUTION

3.1 COORDINATION

In most instances, installation of solid surface fabricated components and assemblies will require strong, correctly located structural support. To provide a stable, sound, secure installation, close coordination is required between the solid surface fabricator/installer and other trades to insure that necessary structural wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, countertops, shelving, and all other solid surface fabrications to the degree and extent recommended by the solid surface manufacturer. Contractor shall appropriate staging areas for solid surface fabrications.

3.2 INSTALLATION

3.2.1 Components

All components and fabricated units shall be installed plumb, level, and rigid. Field joints between solid surface components to provide a monolithic appearance shall be made using solid surface manufacturer's approved seam adhesives, with joints inconspicuous in the finished work. Metal or vitreous china sinks and lavatory bowls shall be attached to counter tops using solid surface manufacturer's recommended clear silicone sealant and mounting hardware. Solid surface sinks and bowls shall be installed using a color-matched seam adhesive. Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.2.1.1 Loose Counter Top Splashes

Loose splashes shall be mounted in locations as noted on the drawings. Loose splashes shall be adhered to the counter top with a color matched silicone sealant when the solid surface components are solid colors. Adhesion of particulate patterned solid surface splashes to counter tops shall utilize a clear silicone sealant.

3.2.2 Silicone Sealant

A clear, silicone sealant or caulk shall be used to seal all expansion joints between solid surface components and all joints between solid surface components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Sealant bead shall be smooth and uniform in appearance and shall be the minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Bead shall be continuous and run the entire length of the joint being sealed.

3.2.3 Plumbing

Plumbing connections to sinks and lavatories shall be made in accordance with Section 15400 PLUMBING, GENERAL PURPOSE.

3.3 CLEAN-UP

Components shall be cleaned after installation and covered to protect against damage during completion of the remaining project items. Components damaged after installation will be repaired or replaced. The Contractor shall submit maintenance data as specified in the Submittals paragraph, under SD-10.

-- End of Section --

SECTION 07141

ELASTOMERIC SHEET WATERPROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 146	(2004) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D 41	(2005) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 412	(2006a) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 5385	(1993; R 2006) Hydrostatic Pressure Resistance of Waterproofing Membranes
ASTM D 570	(1998; R 2005) Standard Test Method for Water Absorption of Plastics
ASTM D 903	(1998; R 2004) Peel or Stripping Strength of Adhesive Bonds
ASTM E 154	(1999; R 2005) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
ASTM E 96/E 96M	(2005) Standard Test Methods for Water Vapor Transmission of Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Elastomeric waterproofing sheet material

Protection board

Primers, adhesives, and mastics

SD-06 Test Reports

Elastomeric waterproofing sheet material

Certify compliance with performance requirements specified herein.

Protective Covering

SD-08 Manufacturer's Instructions

Primers, adhesives, and mastics

Submit Manufacturer's material safety data sheets for primers, adhesives and mastics.

1.3 QUALITY ASSURANCE

1.3.1 Shop Drawing Requirements

Include description and physical properties; termination details; application details; recommendations regarding shelf life, application procedures; requirements for protective covering; and precautions for flammability and toxicity.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver and store materials out of the weather, in manufacturer's original packaging with brand name and product identification clearly marked. Do not permit uncertified materials in the work area.

1.5 ENVIRONMENTAL CONDITIONS

Do not apply waterproofing during inclement weather or when there is ice, frost, surface moisture, or visible dampness on the surface to receive waterproofing and when ambient and surface temperatures are 40 degrees F or below. The restriction on the application of waterproofing materials when ambient and surface temperatures are below 40 degrees F will be waived if the Contractor devises a means, approved by the Contracting Officer, of maintaining the surface and ambient temperatures above 40 degrees F.

PART 2 PRODUCTS

2.1 MATERIALS

Provide the type of elastomeric waterproofing sheet material and related primers, adhesives, and mastics as specified herein. Ensure compatibility of waterproofing materials within a specific type, with each other, and with the materials on which they will be applied. Materials shall conform to the applicable performance requirements cited below when tested in accordance with the referenced ASTM publications.

2.2 COMPOSITE, SELF-ADHERING MEMBRANE SHEETING

Cold applied composite sheet consisting of rubberized asphalt and cross laminated, high density polyethylene film. Not less than 60 mils minimum thickness is required.

2.2.1 Composite, Self-Adhering Sheeting Performance Requirements

a. Tensile Strength, ASTM D 412, Die C: 250 psi minimum

b. Ultimate Elongation, ASTM D 412, Die C: 200 percent minimum

c. Water Vapor Transmission,ASTM E 96/E 96M 80 Degrees F Permeance, Procedure B: 0.1 perm maximum

d. Pliability Degrees F, ASTM D 146: (180 Degrees Bend Over One Inch Mandrel): No cracks at minus -25 degrees F

e. Cycling Over Crack at Minus 15 Degrees F: Membrane is applied and rolled across two primed concrete blocks with no separation between blocks. Crack opened and closed from zero to 1/4 inch. No effect at 100 cycles

f. Puncture Resistance, ASTM E 154: 40 lb. minimum

g. Lap Adhesion at Minimum Application Temperature, ASTM D1876 Modified, 880 N/m (5 lbs/in.)

h. Peel Strength, ASTM D 903: Modified, 9 lbs/n

i. Resistance to Hydrostatic Head, ASTM D 5385: 200 ft of water

j. Water Absorption, ASTM D 570; 0.1% maximum

2.2.2 Primer

Asphalt composition, ASTM D 41, or synthetic polymer in solvent as recommended by the membrane manufacturer.

2.2.3 Mastic

Polymer modified asphalt in suitable solvent of trowel-grade consistency and as recommended by the membrane manufacturer.

2.3 Protection Board

Provide 0.433 inch thick geocomposite drainage sheet system comprising a hollow studded polystyrene core covered on one side with a non-woven needle punched polypropolene filter fabric and on the other side with a smooth polymeric film.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

Before starting the work, verify that surfaces to be waterproofed are in satisfactory condition. Notify the Contracting Officer of defects or conditions that will prevent a satisfactory application. Do not start application until defects and conditions have been corrected.

3.2 SURFACE PREPARATION

Ensure surfaces to be treated are clean, dry, smooth, and free from deleterious materials and projections. Cut off high spots or grind smooth. Finish top surfaces of projecting masonry or concrete ledges below

grade, except footings, to a steep bevel with Portland cement mortar or a manufacturer's approved membrane system product. Sweep surfaces to be covered before applying waterproofing to remove dust and foreign matter. Cure concrete by a method compatible with the waterproofing system.

3.3 APPLICATION

Follow manufacturer's printed installation instructions. When using solvent welding liquid, avoid prolonged contact with skin and breathing of vapor. Carry waterproofing of horizontal surfaces up abutting vertical surfaces as indicated and adhere solid to the substrate. Avoid wrinkles and buckles in applying membrane and joint reinforcement.

a. Self-Adhering Membrane: Apply composite, self-adhering membrane on surfaces primed at a uniform coverage rate in accordance with membrane manufacturer's printed instructions. Remove release sheet and apply with tacky surface in contact with dried primer.

3.4 Composite, Self-Adhering Membrane

Lap sheets at edges and ends a minimum of 2 inches over the preceding sheet. All side laps shall be minimum 2 inches. Laps shall be self adhesive, mastic as per manufacturer's recommendation. Roll or firmly press to adhere membrane to substrate. Cover corners and joints with two layers of reinforcement by first applying a 12 inch width of membrane centered along the axis. Flash drains and projections with a second ply of membrane for a distance of 6 inches from the projection. Finish exposed, terminated edges of membrane on horizontal or vertical surfaces with a trowelled bead of mastic. Apply mastic around edges of membrane, and drains and projections. Apply mastic at end of each work day.

3.5 FLASHING

Flash penetrations through membrane. Ensure that where reinforcing bars penetrate a waterproofing membrane, each of those penetrations be sealed with the appropriate sealant or mastic flashing component. Embed elastomeric membrane in a heavy coat of adhesive, except for self-adhering membrane.

3.6 PROTECTIVE COVERING

After installation has been inspected and approved by the Contracting Officer, apply a protective covering to the membrane waterproofing prior to backfilling. Protect vertical membrane waterproofing with the specified geocomposite drainage board in accordance with the manufacturer's instructions.

-- End of Section --

SECTION 07212

MINERAL FIBER BLANKET (BATT) INSULATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 665	(2006) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 930	(2005) Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D 3833/D 3833M	(1996; R 2006) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM E 84	(2007) Standard Test Method for Surface Burning Characteristics of Building Materials

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134	Respiratory Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Documentation indicating percentage of post-consumer and post-industrial recycled content. Indicate dollar value of recycled content products included in the project.

Documentation indicating distance between manufacturing facility and the project site.

Blanket insulation

Vapor retarder

Pressure sensitive tape

Accessories

SD-08 Manufacturer's Instructions

Insulation

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

Deliver materials to site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.3.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

1.4 SAFETY PRECAUTIONS

1.4.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.

1.4.2 Smoking

Do not smoke during installation of blanket thermal insulation.

1.4.3 Other Safety Concerns

Consider other safety concerns and measures as outlined in ASTM C 930.

PART 2 PRODUCTS

2.1 BLANKET INSULATION

ASTM C 665, Type I, blankets without membrane coverings with a flame spread rating of 25 or less and a smoke developed rating of 150 or less when tested in accordance with ASTM E 84.

2.1.1 Thermal Resistance Value (R-VALUE)

R-value shall be not less than 11.

2.1.2 Recycled Materials

Provide Thermal Insulation containing recycled materials to the extent practicable, provided the material meets all other requirements of this section. The minimum required recycled materials content by weight are:

Rock Wool: 75 percent slag

Fiberglass: 20 to 25 percent glass cullet

Give preference to products manufactured within 500 miles of the project site.

2.1.3 Prohibited Materials

Do not provide asbestos-containing materials.

2.2 VAPOR RETARDER

Non-perforated aluminum foil with a perm rating of 0.05 or better.

2.3 PRESSURE SENSITIVE TAPE

As recommended by the vapor retarder manufacturer and having a water vapor permeance rating of one perm or less when tested in accordance with ASTM D 3833/D 3833M.

2.4 ACCESSORIES

2.4.1 Adhesive

As recommended by the vapor barrier manufacturer.

Adhesives shall comply with VOC limits of South Coast Air Quality Management District (SCAQMD) Rule #1168.

2.4.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Before installing insulation, ensure that areas that will be in contact with the insulation are dry and free of projections which could cause voids, compressed insulation, or punctured vapor retarders. If moisture or other conditions are found that do not allow the workmanlike installation of the insulation, do not proceed but notify Contractor of such conditions.

3.2 INSTALLATION

3.2.1 Insulation

Install and handle insulation in accordance with manufacturer's instructions. Keep material dry and free of extraneous materials. Ensure personal protective clothing and respiratory equipment is used as required. Observe safe work practices.

3.2.1.1 Electrical wiring

Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

3.2.1.2 Continuity of Insulation

Install blanket insulation to butt tightly against adjoining blankets and

to studs. Provide continuity and integrity of insulation at corners, wall to ceiling joints, roof, and floor. Avoid creating thermal bridges.

3.2.1.3 Insulation without Affixed Vapor Retarder

Provide snug friction fit to hold insulation in place. Stuff pieces of insulation into cracks between studs and other framing, such as at door and window heads, jambs, and sills, band joists, and headers.

3.2.1.4 Sizing of Blankets

Provide only full width blankets when insulating between studs. Size width of blankets for a snug fit where studs are irregularly spaced.

3.2.2 Installation of Separate Vapor Retarder

Adhere continuous vapor retarder as indicated to the inside face of the precast concrete wall panels. Overlap joints at least 4 inches and seal with pressure sensitive tape. Seal at windows, doors and utility penetrations. Repair punctures or tears with pressure sensitive tape.

-- End of Section --

SECTION 07220

ROOF AND DECK INSULATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 1289	(2005) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM E 84	(2005) Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM AS 4470	(1986; R 1992) Class I Roof Covers
FM P7825	(2005) Approval Guide
FM P7825c	(2005) Approval Guide Building Materials
FM P9513	(2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R (1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001)

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(2006) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Tapered roof insulation for crickets

Show a complete description of the procedures for the installation of each phase of the system indicating the type of materials, thicknesses, identity codes, sequence of laying insulation, location of ridges and valleys, special methods for cutting and fitting of insulation, and special precautions. The drawings shall be based on field measurements.

SD-03 Product Data

Include MSDS of all field-applied adhesives used within the building interior, highlighting VOC content, expressed g/L, incating that adhesives meet or exceed the VOC limits of SCAQMD Rule #1168.

Include MSDS of all field-applied sealants used within the building interior, highlighting VOC content, expressed in indicating that sealants meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51.

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Fasteners

Insulation

Include minimum thickness of insulation for steel decks and fastener pattern for insulation on steel decks.

SD-06 Test Reports

Flame spread and smoke developed ratings

Submit in accordance with ASTM E 84.

SD-08 Manufacturer's Instructions

Nails and fasteners

Roof insulation, including field of roof and perimeter attachment requirements.

1.3 MANUFACTURER'S CERTIFICATE

Certificate attesting that the expanded perlite or polyisocyanurate insulation contains recovered material and showing estimated percent of recovered material.

1.4 QUALITY ASSURANCE

1.4.1 Insulation on Steel Decks

Roof insulation shall have a flame spread rating not greater than 75 and a smoke developed rating not greater than 150, exclusive of covering, when tested in accordance with ASTM E 84. Insulation bearing the UL label and listed in the UL Bld Mat Dir as meeting the flame spread and smoke developed ratings will be accepted in lieu of copies of test reports. Compliance with flame spread and smoke developed ratings will not be required when insulation has been tested as part of a roof construction assembly of the type used for this project and the construction is listed

as fire-classified in the UL Bld Mat Dir or listed as Class I roof deck construction in the FM P7825. Insulation tested as part of a roof construction assembly shall bear UL or FM labels attesting to the ratings specified herein.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer;

b. Brand designation;

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification; and

Deliver materials in sufficient quantity to allow continuity of the work.

1.5.2 Storage and Handling

Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

PART 2 PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Roof insulation shall be the following:

a. Polyisocyanurate Board: ASTM C 1289 Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength shall be 20 pounds per square inch (psi).

2.1.2 Recovered Materials

Provide thermal insulation materials containing recycled materials to the extent practical. The required minimum recycled material content for the listed materials are:

Polyisocyanurate/polyurethane: 9 percent recovered material

2.1.3 Insulation Thickness

As necessary to provide a thermal resistance (R value) of 18.5 or more. Thickness shall be based on the "R" value for aged insulation. Insulation

over steel decks shall satisfy both specified R value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature.

2.1.4 Tapered Roof Insulation for Crickets

Provide tapered insulation for the construction of crickets that will provide a minimum slope of 1/8 inch per foot. Provide insulation of a greater slope up to 1/4 inch per foot, wherever adjacent construction will allow.Provide starter and filler blocks as required to provide the total thickness of insulation necessary to meet the specified slope. Mitered joints shall be factory fabricated and shall consist of two diagonally cut boards or one board shaped to provide the required slopes. Identify each piece of tapered insulation board by color or other identity coding system, allowing the identification of different sizes of tapered insulation board required to complete the roof insulation system.

2.2 FASTENERS

Flush-driven through flat round or hexagonal steel or plastic plates. Steel plates shall be zinc-coated, flat round not less than 1 3/8 inch diameter or hexagonal not less than 28 gage. Plastic plates shall be high-density, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fastener head shall recess fully into the plastic plate after it is driven. Plates shall be formed to prevent dishing. Do not use bell-or cup-shaped plates. Fasteners shall conform to insulation manufacturer's recommendations except that holding power, when driven, shall be not less than 120 pounds each in steel deck. Fasteners for steel or concrete decks shall conform to FM P7825c for Class I roof deck construction, and shall be spaced to withstand an uplift pressure of 90 pounds per square foot.

2.2.1 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws conforming to FM AS 4470 and listed in FM P7825c for Class I roof deck construction. Quantity and placement to withstand a minimum uplift pressure of 90 psf conforming to FM P7825.

2.3 WOOD NAILERS

Pressure-preservative-treated as specified in Section 06100 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Surfaces shall be clean, smooth, and dry. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contractor shall inspect and approve the surfaces immediately before starting installation. Prior to installing insulation, perform the following:

a. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top

flanges are flat or slightly convex.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

a. Install wood nailers the same thickness as insulation at locations shown on the drawings.

b. Cover steel decks with a layer of insulation board of sufficient thickness to span the width of a deck rib opening, and conforming to fire safety requirements. Secure with piercing or self-drilling, self-tapping fasteners of quantity and placement conforming to FM P7825. Insulation joints parallel to ribs of deck shall occur on solid bearing surfaces only, not over open ribs.

3.2 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of roofing, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.

3.2.1 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

3.3 PROTECTION

3.3.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with the finished roofing specified in Section 07540 THERMPOLASTIC SINGLE-PLY ROOFING on same day. Do not permit phased construction. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight to conform to indicated live load limits of roof construction. Exposed edges of the insulation shall be protected by cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs shall be as specified in Section 07540 THERMPOLASTIC SINGLE-PLY ROOFING. Fill all profile voids in cut-offs to prevent entrapping of moisture into the area below the membrane. Cutoffs shall be removed when work is resumed.

3.3.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

3.4 INSPECTION

The Contractor shall establish and maintain an inspection procedure to assure compliance of the installed roof insulation with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Quality control shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM P9513.

c. Verification of proper storage and handling of insulation materials before, during, and after installation.

d. Inspection of mechanical fasteners; type, number, length, and spacing.

e. Coordination with other materials, cants, sleepers, and nailing strips.

f. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

g. Installation of cutoffs and proper joining of work on subsequent days.

h. Continuation of complete roofing system installation to cover insulation installed same day.

-- End of Section --

SECTION 07412

METAL ROOF PANELS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3	(2002) Cold-Formed Steel Design Manual Set
AISI/COS/NASPEC	(2001, Supplement 2004) North American Specification for the Design of Cold-Formed Steel Structural Members

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE/SEI 7-05	(2006) Minimum Design Loads for Buildings and Other Structures, Including Supplement No. 1

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M	(2004; Errata 2004) Carbon Steel Electrodes for Shielded Metal Arc Welding
AWS D1.1/D1.1M	(2006; Errata 2006) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2003; Errata 2004) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2007a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM A 463/A 463M	(2006) Standard Specification for Steel Sheet, Aluminum-Coated
ASTM A 653/A 653M	(2007) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or

	Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 755/A 755M	(2003) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM A 792/A 792M	(2006a) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM A 924/A 924M	(2007) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 117	(2007) Standing Practice for Operating Salt Spray (Fog) Apparatus
ASTM C 792	(2004) Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
ASTM C 920	(2005) Standard Specification for Elastomeric Joint Sealants
ASTM D 1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1308	(2002; R 2007) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(2005) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 1667	(2005) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D 2244	(2007) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(2002) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 226	(2006) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 2794	(1993; R 2004) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(2002) Measuring Adhesion by Tape Test

ASTM D 3363	(2005) Film Hardness by Pencil Test
ASTM D 4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4587	(2005) Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
ASTM D 522	(1993a; R 2001) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1999) Standard Test Method for Specular Gloss
ASTM D 5894	(2005) Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM D 610	(2007) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(2002e1) Evaluating Degree of Blistering of Paints
ASTM D 822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D 968	(2005e1) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E 1592	(2005) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E 2140	(2001) Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
ASTM E 84	(2007b) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G 23	(1996) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials

FM GLOBAL (FM)

FM 4471	(1995) Class I Panel Roofs

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA RSDM	(2000) Metal Roofing Systems Design Manual

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0405	(2001; R 2003, 5th Ed) Roofing and Waterproofing Manual
NRCA ASMMRM	(2006) Architectural Sheet Metal and Metal Roofing Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2006) Architectural Sheet Metal Manual, Sixth Edition, Second Printing

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 12	(1982; E 2000) Paint Specification No. 12 Cold-Applied Asphalt Mastic (Extra Thick Film)

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-P-28578	(Rev B; CANC Notice 1) Paint, Water-Borne, Acrylic or Modified Acrylic, Semi-Gloss, for Metal Surfaces

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006) Tests for Uplift Resistance of Roof Assemblies
UL Bld Mat Dir	(2007) Building Materials Directory

1.2 DESCRIPTION OF METAL ROOF SYSTEM

1.2.1 Performance Requirements

Steel panels and accessory components must conform to the following standards:

ASTM A 1008/A 1008M
ASTM A 123/A 123M
ASTM A 36/A 36M

ASTM A 463/A 463M for aluminum coated steel sheet
ASTM A 755/A 755M for metallic coated steel sheet for exterior coil prepainted applications.
ASTM A 924/A 924M for metallic coated steel sheet
ASTM D 522 for applied coatings
UL Bld Mat Dir

1.2.1.1 Hydrostatic Head Resistance

No water penetration when tested according to ASTM E 2140.

1.2.1.2 Wind Uplift Resistance

Provide metal roof panel system that conform to the requirements of ASTM E 1592 and UL 580. Roof assembly shall be classified as Class UL90,

as defined by UL 580.Uplift force due to wind action governs the design for panels. Submit wind uplift test report prior to commencing installation.

Roof system and attachments must resist the wind loads as determined by ASCI/SEI 7-05, in pounds per square foot. Metal roof panels and compnent materials must also comply with the requirements in FM 4471 as part of a panel roofing system as listed in Factory Mutual Guide (FMG) "Approval Guide" for class 1 or noncombustible construction, as applicable. Identify all materials with FMG markings.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing Panels

Flashing and Accessories

Gutter/Downspout Assembly

SD-03 Product Data

Submit manufacturer's catalog data for the following items:

Roof panels

FACTORY-APPLIED COLOR FINISH

Accessories

Fasteners

Pressure Sensitive Tape, if used

UNDERLAYMENTS

Gaskets and Sealing/Insulating Compounds, if used

SD-04 Samples

Roof Panels

Factory-applied Color Finish, samples, 9 inch lengths, full width

Accessories

Fasteners

SD-05 Design Data

Wind Uplift Resistance

SD-06 Test Reports

Wind Uplift Test Report

Factory Finish and Color Performance Requirements

SD-07 Certificates

Roof Panels

Qualification of Manufacturer

Qualification of Applicator

SD-08 Manufacturer's Instructions

INSTALLATION MANUAL

SD-11 Closeout Submittals

Warranties

1.4 QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Submit documentation verifying metal roof panel manufacturer has been in the business of manufacturing metal roof panels for a period of not less than 5 years.

Manufacturer must also provide engineering services by an authorized engineer, currently licensed in the geographic area of the project, with aminimum of five (5) years experience as an engineer knowledgeable in roof wind design analysis, protocols and procedures for MBMA RSDM, ASCE/SEI 7-05, UL 580, and FM 4471. Engineer must provide certified engineering calculations for the project conforming to the stated references.

1.4.1.1 Single Source

Roofing panels, clips, closures, and other accessories must be standard products of the same manufacturer, and the most recent design of the manufacturer to operate as a complete system for the intended use.

1.4.2 Qualification of Applicator

Metal roof system applicator must be approved, authorized, or licensed in writing by the roof panel manufacturer and have a minimum of three years experience as an approved, authorized, or licensed applicator with that manufacturer, approved at a level capable of providing the specified warranty.

1.4.3 Field Verification

Prior to the preparation of drawings and fabrication, verify location of roof framing, roof openings and penetrations, and any other special conditions. Indicate all special conditions and measurements on final shop drawings.

1.4.4 Qualifications for Welding Work

Welding procedures must conform to AWS D1.1/D1.1Mfor steel or AWS D1.2/D1.2M for aluminum.

Operators are permitted to make only those types of weldments for which each is specifically qualified.

1.4.5 Pre-roofing Conference

After approval of submittals and before performing roofing system installation work, hold a pre-roofing conference to review the following:

a. Drawings, specifications, and submittals related to the roof work. Submit, as a minimum, sample profiles of roofing panels, with factory-applied color finish samples, typical fasteners and pressure sensitive tape. Also include data on repair paint and manufacturer's installation manual.

b. Roof system components installation;

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and

e. Quality control plan for the roof system installation;

f. Safety requirements.

Attendance is mandatory for the Contractor, the Contracting Officer's designated personnel, personnel directly responsible for the installation of metal roof system, flashing and sheet metal work, other trades interfacing with the roof work, and representative of the metal roofing manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, HANDLING, AND STORAGE

Deliver, store, and handle panel materials, bulk roofing products, accessories, and other manufactured items in a manner to prevent damage and deformation, as recommended by the manufacturer, and as specified.

1.5.1 Delivery

Package and deliver materials to the site in undamaged condition. Provide adequate packaging to protect materials during shipment. Do not uncrate materials until ready for use, except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, deformation, dampness, and staining. Remove affected materials from the site and immediately replace. Remove moisture from wet materials not otherwise affected, restack and protect from further moisture exposure.

1.5.2 Handling

Handle materials in a manner to avoid damage. Select and operate material handling equipment so as not to damage materials or applied roofing.

1.5.3 Storage

Stack materials stored on site on platforms or pallets, and cover with tarpaulins or other weathertight covering which prevents trapping of water or condensation under the covering. Store roof panels so that water which may have accumulated during transit or storage will drain off. Do not store panels in contact with materials that might cause staining. Secure coverings and stored items to protect from wind displacement.

1.6 PROJECT CONDITIONS

Weather Limitations: Proceed with installation only when existing and forcast weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements, and specified safety requirements.

1.7 FABRICATION

Fabricate and finish metal roof panels and accessories on a factory stationary industrial type rolling mill to the greatest extent possible, per manufacturer's standard procedures and processes, and as necessay to fulfill indicated performance requirements. Comply with indicated profiles, dimensional and structural requirements.

Provide panel profile, as indicated on drawings including major ribs for full length of panel. Fabricate panel side laps with factory installed captive gaskets providing a weather tight seal and preventing metal-to metal contact, and minimizing noise from movements within the panel assembly.

1.7.1 Finishes

Finish quality and application processes must conform to the related standards specified within this section. Noticeable variations within the same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize any contrasting variations.

1.7.2 Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 as applicable to the design, dimensions, metal, and other characteristics of the item indicated.

a. Form exposed sheet metal accessories which are free from excessive oil canning, buckling, and tool marks, and are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

c. Sealed Joints: Form non-expansion, but movable joints in metal to accomodate elastomeric sealant to comply with SMACNA 1793.

d. Conceal fasteners and expansion provisions where possible.

e. Fabricate cleats and attachments devices of size and metal thickness recommended by SMACNA or by metal roof panel manufacturer for application, but not less than the thickness of the metal being secured.

1.8 WARRANTIES

Provide metal roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to manufacturer's standard warranty as required to comply with the specified requirements.

1.8.1 Manufacturer's Finish Warranty

Provide a manufacturer's no-dollar-limit 20 year warranty for the roofing system. Issue the warranty directly to the Government at the date of Government acceptance.warranting that the factory color finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of 8 when measured in accordance with ASTM D 4214; or fade or change colors in excess of 5 NBS units as measured in accordance with ASTM D 2244.

1.8.2 Metal Roof System Installer Warranty

Provide roof system installer warranty for a period of not less than two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof panel installation, flashing, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Issue warranty directly to the Government. Correction of defective workmanship and replacement of damaged or affected materials is the responsibility of the metal roof system installer. All costs associated with the repair or replacement work are the responsibility of the installer.]

1.9 CONFORMANCE AND COMPATIBILITY

The entire metal roofing and flashing system must be in accordance with specified and indicated requirements, including wind resistance requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the MBMA RSDM, NRCA 0405, the metal panel manufacturer's published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

PART 2 PRODUCTS

2.1 ROOF PANELS

This specification covers the standing seam metal roof and soffit canopies located along the north and south walls of the Warehouse and the canopy located over the exterior dog kennels at the Kennel. It also covers the flat seam metal roof to be installed on top of the exterior portion of the entry canopy at the Operations Building.

2.1.1 Steel Sheet Panels

Roll-form steel sheet roof panels to the specified profile, with fy = 50 ksi,24 gauge and depth as indicated.
Material must be plumb and true, and within the tolerances listed:

a. Galvanized steel sheet conforming to ASTM A 653/A 653M and AISI SG03-3 or aluminum-zinc alloy coated steel sheet conforming to ASTM A 792/A 792M and AISI SG03-3.

b. Individual panels to have continuous length sufficient to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not a part of the panel profile and free from damage to the finish coating system.

c. Provide panels with thermal expansion and contraction consistent with the type of system specified, and the following profile:.

1. profile to be a 1-3/4 inch high standing seam, 16 or 18 inch coverage with mechanical crimping or snap-together seams with concealed clips and fasteners.

2. profile to be smooth, flat surface.

2.2 FACTORY FINISH AND COLOR PERFORMANCE REQUIREMENTS

All panels are to receive a factory applied polyvinylidene fluoride (Kynar 500/Hylar 5000) finish consisting of a baked topcoat with a manufacturer's recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with an acid rinse, and thorough drying.

b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 + 0.05 mils. The prime coat must be oven cured prior to application of the finish coat.

c. Exterior Finish Coating: Apply the exterior finish coating over the primer by roll coating to a dry film thickness of 0.80 + 0.05 mils (3.80 + 0.05 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 +0.10 mils (4.00 + 0.10 mils for Vinyl Plastisol). This exterior finish coat must be oven-cured.

d. Interior finish coating: Apply a wash coat on the reverse side over primer by roll coating to a dry film thickness of 0.30 + 0.05 mils for a total dry fill thickness of 0.50 +0.10 mils. The wash coat must be oven cured.

e. Color: The exterior finish chosen from the manufacturer's standard color chart.

f. Physical Properties: Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

General: SSPC Paint 12, MIL-P-28578, ASTM D 5894, and ASTM D 4587.

Abrasion: ASTM D 968
Adhesion: ASTM D 3359
Chalking: ASTM D 4214
Chemical Pollution: ASTM D 1308
Color Change and Conformity: ASTM D 2244
Creepage: ASTM D 1654

Cyclic Corrosion Test: ASTM D 5894
Flame Spread: ASTM E 84
Flexibility: ASTM D 522
Formability: ASTM D 522
Gloss at 60 and 85 degrees: ASTM D 523
Humidity: ASTM D 2247 and ASTM D 714
Oxidation: ASTM D 610
Pencil Hardness: ASTM D 3363
Reverse Impact: ASTM D 2794
Salt Spray: ASTM B 117
Weatherometer: ASTM G 23 and ASTM D 822

2.2.1 Specular Gloss

Finished roof surfaces to have a specular gloss value of 30 plus or minus 5 at an angle of 60 degrees when measured in accordance with ASTM D 523.

2.3 MISCELLANEOUS METAL FRAMING

2.3.1 General

Provide cold formed metallic-coated steel sheet conforming to ASTM A 653/A 653M, AISI/COS/NASPEC, and as specified in 05400 COLD-FORMED METAL FRAMING unless otherwise indicated.

2.3.2 Fasteners and Miscellaneous Metal Framing

Provide compatible type, corrosion resistant, of sufficient size and length to penetrate the supporting element a minimum of one inch with other required properties to fasten miscellaneous metal framing members to substrates in accordance with the roof panel manufacturer's and ASCE/SEI 7-05 requirements.

2.3.2.1 Screws

Provide corrosion resistant screws, coated steel of the type and size recommended by the manufacturer to meet the performance requirements.

2.3.2.2 Rivets

Provide closed-end type rivets, corrosion resistant coated steel where watertight connections are required.

2.3.2.3 Attachment Clips

Provide hot-dip galvanized, conforming to ASTM A 653/A 653M, clips. Size, shape, thickness and capacity must meet the thickness and design load criteria specified.

2.3.3 Electrodes for Manual, Shielded Metal Arc Welding

Electrodes for manual, shielded metal arc welding must meet the requirements of AWS D1.1/D1.1M, and be covered, mild-steel electrodes conforming to AWS A5.1/A5.1M.

2.4 ACCESSORIES

Accessories must be compatible with the metal roof panels. Sheet metal flashing, trim, metal closure strips, caps, and similar metal accessories

must be not less than the minimum thicknesses specified for roof panels. Provide exposed metal accessories to match the panels furnished. Molded foam rib, ridge and other closure strips must be closed-cell or solid-cell synthetic rubber or neoprene premolded to match configuration of the panels and not absorb or retain water.

2.4.1 Pre-manufactured Accessories

Pre-manufactured accessories must be manufacturer's standard for intended purpose, compatible with the metal roof system and approved for use by the metal roof panel manufacturer.

2.4.2 Metal Closure Strips

Provide factory fabricated steel closure strips of the same gauge, color, finish and profile as the specified roof panel.

2.4.3 Rubber Closure Strips

Provide closed-cell, expanded cellular rubber closure strips conforming to ASTM D 1056 and ASTM D 1667, extruded or molded to the configuration of the specified roof panel profile and in lengths supplied by roof panel manufacturer.

2.5 JOINT SEALANTS

2.5.1 Sealants

Sealants are to be an approved gun type for use in hand or air pressure caulking guns at temperatures above 40 degrees F (or frost-free application at temperatures above 10 degrees F) with a minimum solid content of 85 percent of the total volume. Sealant must dry with a tough, durable surface skin which permits it to remain soft and pliable underneath, providing a weather tight joint. No migratory staining, in conformance with to ASTM C 792, is permitted on painted or unpainted metal, stone, glass, vinyl or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the roof panel manufacturer.

2.5.1.1 Shop Applied Sealants

Sealant for shop-applied caulking must be an approved gun grade, non-sag one-component polysulfide or silicone conforming to ASTM C 792 and ASTM C 920, Type II, with a curing time which ensures the sealants plasticity at the time of field erection. Color to match panel color.

2.5.1.2 Field Applied Sealants

Sealants for field-applied caulking must be an approved gun grade, non-sag on-component polysulfide or two component polyurethane with an initial maximum Shore A durometer hardness of 25, conforming to ASTM C 920, Type II. Color to match panel color.

2.5.1.3 Tape Sealants

Provide pressure sensitive, 100 percent solid tape sealant with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the roof panel manufacturer.

2.5.2 Sheet Metal Flashing and Trim

2.5.2.1 Fabrication, General

Custom fabricate sheet metal flashing and trim to comply with recommendations within the SMACNA 1793 that apply to design, dimensions, metal type, and other characteristics of design indicated. Shop fabricate items to the greatest extent possible. Obtain and verify field measurements for accurate fit prior to shop fabrication. Fabricate flashing and trim without excessive oil canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

2.5.2.2 Roof Drainage Sheet Metal Fabrications

Provide gutters and downspouts as specified in Section 07600 FLASHING AND SHEETMETAL.

2.6 UNDERLAYMENTS

2.6.1 Felt Underlayment

Provide No. 30 asphalt-saturated organic , non-perforated felt underlayment in compliance with ASTM D 226, Type II, or ASTM D 4869.

2.7 GASKETS AND SEALING/INSULATING COMPOUNDS

Gaskets and sealing/insulating compounds must be nonabsorptive and suitable for insulating contact points of incompatible materials. Sealing/insulating compounds must be non-running after drying.

2.8 FINISH REPAIR MATERIAL

Only use repair and touch-up paint supplied by the roof panel manufacturer and is compatible with the specified system.

PART 3 EXECUTION

At the canopies at the Warehouse and Kennel, the standing seam metal roof shall be installed directly over the metal roof deck with concealed anchor clips and fasteners. Soffit panels shall be installed at the underside of the canopy framing to provide a finished appearance.

At the roof of the Operations Building entry canopy, the standing seam metal roof shall be installed using concealed clips and fasteners over the felt underlayment, plywood deck, and metal roof deck. Upon completion of installation, standing seams shall be flattened to the overlapped side of the seam with the joint between the flattened seam and the roof surface sealed with sealant.

3.1 EXAMINATION

Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the work. Ensure surfaces are suitable, dry and free of defects and projections which might affect the installation.

Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural support members for panels and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer, UL, ASTM, and ASCE/SEI-7-05 requirements.

Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking; and that installation is within flatness tolerances required by metal roof panel manufacturer.

3.2 INSTALLATION

Installation must meet specified requirements and be in accordance with the manufacturer's installation instructions and approved shop drawings. Do not install damaged materials. Dissimilar materials which are not compatible when contacting each other must be insulated by means of gaskets or sealing/insulating compounds. Keep all exposed surfaces and edges clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Remove stained, discolored, or damaged materials from the site.

3.2.1 Preparation

Clean all substrate substances which may be harmful to roof panels including removing projections capable of interfering with with roof panel attachment.

Install sub-purlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.2.2 Underlayment

Install underlayment according to roof panel manufacturer's written recommendations and recommendation in NRCA "The NRCA Roofing and Waterproofing Manual".

3.2.2.1 Double Layer Felt Underlayment

Where indicated, install double layer of felt underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses a minimum of 72 inches. Fasten with felt underlayment roofing nails.

3.2.2.2 Slip Sheet

Apply specified slip sheet at time of roof panel installation when felt or other underlayment is used that may be in direct contact with and adhere to or adversely impact the underside of roof panels, and as otherwise recommended by the roof panel manufacturer.

3.3 PROTECTION OF APPLIED MATERIALS

Do not permit storing, walking, wheeling, and trucking directly on applied roofing/insulation materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing/insulation materials, and to distribute weight to conform to indicated live load limits of roof construction.

3.4 FASTENER INSTALLATION

Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions.

3.4.1 Welding

Procedures for manual, shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work must be in accordance with AWS D1.1/D1.1M.

3.5 FLASHING, TRIM, AND CLOSURE INSTALLATION

3.5.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently water tight and weather resistant. Work is to be accomplished to form weather tight construction without waves, warps, buckles, fastening stresses or distortion, and to allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accomplish the work must conform to the manufacturers written instructions.

3.5.2 Metal Flashing

Install exposed metal flashing at building corners, rakes, eaves, junctions between metal siding and roofing, valleys and changes off slope or direction in metal roofing, building expansion joints and gutters.

Exposed metal flashing must be the same material, color, and finish as the specified metal roofing panels. Furnish flashing in minimum 8 foot lengths. Exposed flashing must have 1 inch locked and blind soldered end joints, with expansion joints at intervals of no greater than 16 feet.

Fasten flashing at not more than 8 inches on center for roofs, except where flashing is held in place by the same screws used to secure panels. Exposed flashing and flashing subject to rain penetration must be bedded in specified joint sealant. Flashing which is contact with dissimilar metals must be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Form drips to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.6 ROOF PANEL INSTALLATION

Provide metal roof panels of full length from eave to ridge or eave to wall as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels or other components of the Work securely in place, with provisions for thermal and structural movement in accordance with NRCA ASMMRM.

Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions. Provide all blocking and nailers as required.

Metal Protection: Where dissimilar metals contact each other or possibly corrosive substrates, protect against galvanic action by permanent separation as recommended by the metal roof panel manufacturer.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and required for weatherproof performance of metal roof panel system. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

3.6.1 Handling and Erection

Erect roofing system in accordance with the approved erection drawings, printed instructions and safety precautions of the manufacturer.

Do not subject panels to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective panels. Damaged panels must be replaced and removed from the site at the contractors expense. Erect panels true, plumb, and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with indicated rake, eave, and curb overhang. Allow for thermal movement of the roofing, movement of the building structure, and provide permanent freedom from noise due to wind pressure.

Do not permit storage, walking, wheeling or trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to the installed roofing materials, and to distribute weight to conform to the indicated live load limits of the roof construction.

Roof panels must be laid with corrugations in the direction of the roof slope. End laps of exterior roofing must not be less than 8 inches; side laps of standard exterior corrugated panels must not be less than 2-1/2 corrugations.

Field cutting of metal roof panels by torch is not permitted. Field cut only as recommended by manufacturer's written instructions.

3.6.2 Closure Strips

Install metal closure strips at open ends of metal ridge rolls; open ends of corrugated or ribbed pattern roofs, and at intersection of wall and roof, unless open ends are concealed with formed eave flashing; rake of metal roof unless open end has a formed flashing member; and in other required areas.

Install closure strips at intersection of the wall with metal roofing; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.6.3 Workmanship

Make lines, arises, and angles sharp and true. Free exposed surfaces from any visible wave, warp, buckle and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the

application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and as necessary to make the work watertight.

3.7 ACCEPTANCE PROVISIONS

3.7.1 Erection Tolerances

Erect metal roofing straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions. Horizontal lines must not vary more than 1/8 inch in 40 feet.

3.7.2 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials and as recommended by the metal roof panel manufacturer. Finished repaired surfaces must be uniform and free from variations of color and surface texture. Repaired metal surfaces that are not acceptable to the project requirements are to be immediately removed and replaced with new material.

3.8 CLEAN UP AND DISPOSAL

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces must be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating. Touch up scratches in panel finish with manufacturer supplied touch-up paint system to match panel finish.

Collect all scrap/waste materials and place in containers. Promptly dispose of demolished and scrap materials. Do not allow scrap/waste materials to accumulate on-site; transport immediately from the government property and legally dispose of them.

-- End of Section --

SECTION 07413

METAL WALL PANELS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 755/A 755M	(2004a) Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM A 792/A 792M	(2003) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM D 1654	(1992; R 2000) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(2002e1) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(2002) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993; R 2004) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(2002) Measuring Adhesion by Tape Test
ASTM D 4214	(1998) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4587	(2001) Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
ASTM D 522	(1993a; R 2001) Mandrel Bend Test of Attached Organic Coatings
ASTM D 5894	(1996) Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)

ASTM D 610	(2001) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(2002) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993; R 2001) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM G 154	(2000ae1) Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

1.2 DESCRIPTION OF WALL PANEL SYSTEM

Factory color finished, galvanized or aluminum-zinc alloy-coated steel metal wall panel system with exposed fastener attachment. Panel profile shall be as indicated in Paragraph WALL PANEL.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Siding; G

Drawings consisting of catalog cuts, panel configuration, system assembly, attachment details, flashing details, design and erection drawings, shop coating and finishing specifications, and other data as necessary to clearly describe design, materials, sizes, layouts, construction details, fasteners, and erection. Drawings shall be accompanied by engineering design calculations for the siding panels. Drawings shall be approved by the metal wall panel manufacturer prior to submission.

SD-03 Product Data

Wall panels; G

Closures

Flashing

Accessories

Fasteners

SD-04 Samples

WALL PANEL

One piece of each type and finish to be used, 9 inches long, full width.

Accessories;

One sample of each type of flashing, trim, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Fasteners;

Two samples of each type to be used with statement regarding intended use. If so requested, random samples of bolts, nuts, and washers as delivered to the jobsite shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Sealant;

One sample, approximately 1 pound , and descriptive data.

SD-06 Test Reports

Salt Spray Test;

SD-07 Certificates

Wall Panels

Accessories;

SD-08 Manufacturer's Instructions

INSTALLATION

Submit manufacturer's printed installation manual and instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle panel materials, bulk products, accessories, and other manufactured items in a manner to prevent damage and deformation, as recommended by the manufacturer, and as specified.

1.4.1 Delivery

Deliver materials to the site in dry and undamaged condition. Provide adequate packaging to protect materials during shipment. Crated materials shall not be uncrated until ready for use, except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, deformation, dampness, and staining. Remove affected materials from the site. Remove moisture from wet materials not otherwise affected, restack and protect from further moisture exposure.

1.4.2 Storage

Stack materials stored on site on platforms or pallets, and cover with tarpaulins or other weathertight covering which prevents trapping of water or condensation under the covering. Store wall panels so that water which may have accumulated during transit or storage will drain off. Do not store panels in contact with materials that might cause staining. Storage accommodations for metal wall panels shall provide good air circulation and

protection from surface staining. Secure coverings and stored items to protect from wind displacement.

1.4.3 Handling

Handle materials in a manner to avoid damage. Select and operate material handling equipment so as not to damage materials or installation.

1.5 WARRANTIES

The Contractor shall provide a weathertight material and workmanship warranty for the metal wall panel system installation for a period of 5 years and to include a manufacturer's 10 year warranty against cracking, peeling, or delamination of the color finish and corrosion of the base metal, and 10 year warranty against the corrosion of fasteners caused by ordinary wear and tear by the elements. The warranties shall start upon final acceptance of the work or the date the Government takes possession, whichever is earlier.

PART 2 PRODUCTS

2.1 WALL PANEL

Panels shall be steel and shall have a factory-applied color finish. Panel shall be Morin Corporation BR7-35 or approved equal. Panels shall be 22 gauge on the curved north wall and adjacent straight walls of the building and 18 gauge on the stairwells and penthouses. Wall panels shall have edge configurations for overlapping adjacent sheets. Width of sheets with overlapping configurations shall provide not less than 35 inchesof coverage in place. Wall panels shall be fastened to framework using exposed fasteners. Length of panels shall be sufficient to cover the entire height of any unbroken wall surface. Panels shall be formed without warping, waviness, or ripples that are not a part of the panel profile and shall be free of damage to the finish coating system.

2.1.1 Steel Panels

Zinc-coated steel conforming to ASTM A 653/A 653M, Structural Grade 40 and minimum G90 galvanized smooth metallic coating or aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 55 or 50 coating. Prepainted steel sheet shall also comply with ASTM A 755/A 755M. Wall panel material shall be minimum 18 or 22 gage thick, as specified above prior to coating application. Panels shall be within 95 percent of the nominal thickness.

2.2 FACTORY COLOR FINISH

Panels shall have a factory applied Valspar MICA Fluropon Classic II PVDF color finish or approved equal on the exposed side. The exterior finish shall consist of a baked-on finish coat with an appropriate prime coat. Total color coating system thickness shall be not less than 1 mil and with any additional primer and finish coat thickness required to meet the color finish performance requirements specified. The exterior coating shall be a nominal 1 mil thickness consisting of a topcoat of not less than 0.75 mil dry film thickness and the paint manufacturer's recommended primer of not less than 0.2 mil. The interior color finish shall consist of a 0.2 mil thick prime coat. Finish coat color shall be Weathered Zinc or approved equal. The exterior color finish shall meet the performance requirements specified.

2.2.1 Salt Spray Test

A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2014 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; no rusting, as determined by ASTM D 610; and a rating of less than 7, 1/16 inch creepage from scribe as determined by ASTM D 1654.

2.2.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of fracturing to the naked eye.

2.2.3 Accelerated Weathering, Chalking Resistance and Color Change

Coating sample shall withstand weathering test of 5000 hours, in accordance with ASTM D 4587 and ASTM G 154, Type D using without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating with an adhesion rating of less than 4B when tested in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.2.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.2.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.50 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.2.6 Abrasion Resistance Test

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.3 ACCESSORIES

Flashing, trim, metal closure strips, caps, and similar metal accessories shall be the manufacturer's standard products or approved equal. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chlorided premolded

to match configuration of the panels and shall not absorb or retain water.

2.4 FASTENERS

Fasteners for steel panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for attaching wall panels to supports shall provide both tensile and shear strength of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard or approved equal. Exposed wall fasteners shall be color finished or provided with plastic color caps to match the panels. Include rubber washers, as required to provide a watertight system.

2.4.1 Screws

Screws shall be as recommended by the manufacturer.

2.5 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt, as recommended by the wall panel manufacturer. Silicone based sealants are prohibited, unless approved otherwise by the panel manufacturer and the Architect. Exposed sealant shall be colored to match adjacent components and shall cure to a rubberlike consistency. Concealed sealant shall be non-hardening type. Sealant placed in the panel seams shall be provided in accordance with the manufacturer's recommendations.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall meet specified requirements and be in accordance with the manufacturer's installation instructions and approved shop drawings. Correct defects or errors in materials and installation. Do not install damaged materials. Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, panels with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged materials shall be removed from the site.

3.1.1 Wall Panels and Accessories

Wall panels shall be applied with the longitudinal configurations in the vertical position. Provide panels in full wall heights from base to eave with no horizontal joints except at junctions of door frames, window frames, louver panels, and similar locations. Side laps shall be standard overlap or interlocking ribs based on manufacturer's standard. Seal side laps with joint-sealing material. Flash wall panels at base and at top, around windows, door frames, framed louvers, and other similar openings. Place closures, flashing, and sealing materials to achieve complete water tightness. Accessories shall be fastened into framing members, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction.

3.1.1.1 Lap Type Panels with Exposed Fasteners

Side laps shall be laid away from the prevailing winds. Spacing of fasteners shall present an orderly appearance and shall be as indicated on the drawings. Side and end laps of wall panels and joints at accessories shall be sealed. Fasteners shall be installed in straight lines within a tolerance of 1/2 inch in the length of a bay. Fasteners shall be driven normal to the surface and to a uniform depth to seat the gasketed washers properly.

3.2 CLEAN UP AND FINISH TOUCH-UP

Clean exposed sheet metal work at completion of installation. Remove metal shavings and filings. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating. Touch up scratches in panel finish with manufacturer supplied touch-up paint system to match panel finish.

3.3 CORRECTION OF DEFICIENCIES

Where any form of deficiency is found, additional measures shall be taken as deemed necessary by the Contractor's Quality Control Team who will determine the extent of the deficiency and corrective actions to be taken.

3.4 FIELD QUALITY CONTROL

3.4.1 Construction Monitoring

Contractor shall make visual inspections as necessary to ensure compliance with specified requirements. Additionally, verify the following:

Materials comply with the specified requirements.

All materials are properly stored, handled and protected from damage. Damaged materials are removed from the site.

Framing and substrates are in acceptable condition, in compliance with specification, prior to application of wall panels.

Panels are installed without buckles, ripples, or waves and in uniform alignment and modulus.

Side laps are formed, sealed, fastened or seam locked as required.

The proper number, type, and spacing of attachment clips and fasteners are installed.

Installer adheres to specified and detailed application parameters.

Associated flashings and sheet metal are installed in a timely manner in accord with the specified requirements.

-- End of Section --

SECTION 07540

THERMOPLASTIC (TPO) SINGLE-PLY ROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 6878	(2006a) Thermoplastic Polyolefin Based Sheet Roofing
ASTM E 408	(2002) Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

FM GLOBAL (FM)

FM P7825a	(2005) Approval Guide Fire Protection
FM P9513	(2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R (1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001)

UNDERWRITERS LABORATORIES (UL)

UL 580	(1994; Rev thru Feb 1998) Tests for Uplift Resistance of Roof Assemblies
UL 790	(2004) Test Methods for Fire Tests of Roof Coverings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing System

Drawings showing arrangement of sheets, seam locations, and flashing details including waterproofing of joints where sheet metal flashings change direction. Shop drawings drawn by the manufacturer and certified by the Contractor for the specified system.

SD-03 Product Data

Installation

Manufacturer's instructions for preparing and installing the membrane, flashing, seams, insulation, nailers, and other accessories.

Protection of Finished Roofing

A protection plan showing areas to be protected, type of material used, a procedure to protect the membrane from damage until completion of work by other trades, and a description of the method of repairing the roofing.

Inspection

The inspection procedure for substrate suitability including decks, curbs and insulation installation, prior to start of the work. Inspection procedures during and after placement of the membrane, and after completion of work by other trades.

SD-07 Certificates

Materials

Certificates of compliance attesting that the materials meet specification requirements. The certificates shall list the components required for the specified rating.

Qualifications

Contractor's qualifications as specified.

1.3 GENERAL REQUIREMENTS

Thermoplastic polyolefin (TPO) roofing shall be mechanically fastened to the roof surfaces indicated. Roofing membrane sheet widths shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical to minimize joints. Membrane shall be free of defects and foreign material. Flashing work shall be coordinated to permit continuous roof-surfacing operations. Insulation shall be applied and weatherproofed on the same day.

1.3.1 Delivery and Storage

Materials shall be delivered to the jobsite in the manufacturer's original unopened packages, clearly marked with the manufacturer's name, brand name, description of contents, and label for compliance with UL requirements. Time limited materials shall be used before shelf life expires. Materials shall be stored in clean, dry areas. Storage temperatures shall be as specified by the manufacturer. A maximum of one day's supply of materials may be stored on the roof when distributed so as not to exceed the roof live load limit. These materials shall be kept dry and clean until application.

1.3.2 Fire Resistance

The roofing system fire resistance shall be rated Class A as determined by

UL 790 or Class 1 as determined by FM P7825a. Compliance of each component of the roofing system shall be evidenced by label or by written certification from the manufacturer.

1.3.3 Wind Uplift Requirements

Wind uplift resistance of the complete roof assembly shall be rated Class I-90 in accordance with FM P9513 or Class 90 in accordance with UL 580.

1.3.4 Warranty

Manufacturer's standard warranty for 20 years shall be furnished. Warranty shall provide for repair or replacement of the complete roofing system, including insulation and flashings, if leaking is caused by defects in materials or workmanship.

1.3.5 Qualifications

The Contractor shall submit documentation verifying that the Contractor has a minimum of 2 years experience with TPO roofing systems and has been certified by the TPO roofing manufacturer as an approved Installer for the specified TPO roofing system.

PART 2 PRODUCTS

2.1 SOLVENTS AND SEALANTS

Adhesives, welding solvents, and sealants shall be as recommended by the membrane manufacturer.

2.2 FASTENERS

Fasteners for sheet-metal flashing shall be corrosion-resistant steel annular-ring type nails, or screws. Fasteners for anchoring the roofing membrane shall be as approved by the membrane manufacturer and identical to those used to obtain the wind uplift rating.

2.3 FLASHINGS

Flashings shall be ultra-violet resistant materials furnished by the membrane manufacturer, except as otherwise specified. Shaped flashing components shall be prefabricated. Sheared edges of metal flashings that will contact the membrane shall be turned into a tight hem.

2.4 MEMBRANE

The smooth type, polyester scrim reinforced, low emissivity thermoplastic polyolefin membrane shall be at least 60 mils thick, and shall meet or exceed the requirements of ASTM D 6878. Membrane color shall be white with an initial light reflectance of .65 and a three year-aged reflectance of at least .5 when tested in accordance with ASTM E 408 for a minimum of 75 percent of the roof surface.

2.5 PREFABRICATED ACCESSORIES

Pipe seals and expansion joint covers shall be types and sizes recommended by the membrane manufacturer. Expansion joint covers shall be Johns Manville Expand-O-Flash Style EJ/WC or approved equal sized as required to span joint.

2.6 WALKWAYS

Walkways shall be concrete pavers, at least 1-1/2 inches thick, with a non-skid top surface. Pavers for walkways less than 4 feet wide around mechanical equipment, or other features except drains, may rest directly on the membrane unless underlayment is specified by the manufacturer. Alternate walkway material may be used if recommended by the manufacturer and approved by the Contractor.

PART 3 EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

Membrane shall not be installed in high wind, inclement weather or when there is visible ice, frost or moisture on the deck or membrane. Unless otherwise specified by the manufacturer, membrane shall not be installed when air temperature is below 40 degrees F or within 5 degrees F of the dew point.

3.2 PREPARATION

The substrate of any bay or section of the building shall be complete and suitable for insulation and membrane installation before roofing is begun. Insulation under roofing shall comply with Section 07220 ROOF AND DECK INSULATION. Surfaces on or against which membrane is applied shall be smooth, clean, and free from oil, grease, sharp edges, standing water, and construction debris. Joints over 1/4 inch wide shall be filled with insulation material. Wood nailers shall comply with Section 06100 ROUGH CARPENTRY.

3.3 INSTALLATION

Installation shall comply with the manufacturer's approved instructions except as otherwise specified.

3.3.1 Membrane

Unless otherwise specified by the manufacturer, the membrane shall be rolled out on the surface and allowed to relax for at least 1/2 hour when ambient temperature is 60 degrees F or higher or 2 hours when ambient temperature is below 60 degrees F prior to other installation activities. Membrane shall be overlapped a minimum of 5 inches at sides and minimum 3 inches at ends. Direction of laps shall allow water to flow over and not into the lap. Membrane joints shall be free of wrinkles and fishmouths. The entire length of joints shall be probe-tested and corrected during the day of installation. Defective areas shall be re-sealed. Wrinkles, fishmouths, or damaged areas shall be cut out and the area covered with membrane using a 3 inch seam on all sides. Repairs shall be probe-tested for continuity. Bonded areas of seams shall be a minimum 3 inches wide for bonded seams and 2 inches wide for heat-welded seams.

3.3.2 Nailing

Membrane shall be fastened to nailers in accordance with the membrane manufacturer's approved instructions. Unless otherwise specified, nails shall be staggered on 4 inch centers maximum; screws for sheet metal shall be staggered on 8 inch centers maximum; and a row of fasteners shall be at least 1/2 inch from edges of sheet metal.

3.3.3 Flashing

Roof edges, projections through the roof and changes in roof planes shall be flashed. The seam between the flashing and the membrane shall be completed before the flashing is bonded to vertical surfaces. The seam shall be sealed a minimum of 3 inches beyond the fasteners which attach the membrane to nailers. The installed flashings shall be secured at the top of the flashing a maximum of 12 inches on centers under the counterflashing or cap. Where possible, prefabricated components shall be used for pipe seals and flashing accessories.

3.3.4 Expansion Joints

Expansion joints shall be covered using Prefabricated covers or elastomeric flashing in accordance with the recommendations of the manufacturer.

3.3.5 Cutoffs

If work is terminated prior to weatherproofing the entire roof, the membrane shall be sealed to the roof deck. Flutes in metal decking shall be sealed off along the cutoff edge. Membrane shall be pulled free or cut to expose the insulation when resuming work and cut insulation sheets used for fill-in shall be removed. Asphalt or coal-tar products shall not be used for sealing.

3.3.6 Walkways

Walkways shall be installed on a loose-laid pad of the membrane material extending at least 1 inch beyond the walkway material, and as specified by the manufacturer.

3.4 PROTECTION OF FINISHED ROOFING

The roofing membrane shall be protected from damage by other trades. After completion of work by other trades, the protection shall be removed and the roof shall be inspected. Any damage shall be repaired in accordance with the recommendation of the roofing manufacturer.

3.5 INSPECTION

If non-destructive surveys by the Government indicate presence of wet insulation during the first year after completion of the work, the Contractor shall take samples to verify the extent of the moisture, and shall replace wet insulation and the defective membrane.

-- End of Section --

SECTION 07600

FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M	(2001; R 2003) Structural Welding Code-Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(2004) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM B 209	(2004) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 32	(2004) Standard Specification for Solder Metal

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA Arch. Manual	(2003e6) Architectural Sheet Metal Manual

1.2 General Requirements

Finished sheet metalwork will form a weathertight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction. Sheet metal mechanic is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous roofing operations.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Gutters

Downspouts

Expansion joints

Fascias

Splash pans

Reglets

Scuppers

Conductor heads

Indicate thicknesses, dimensions, fastenings and anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

SD-03 Product Data

Manufacturer's product data for steel products including percentages of post-consumer recycled content and post-industrial recycled content. Provide manufacturer's letter certifying that steel produces specified as regionally manufactured materials contain locally recovered recycled content and were manufactured within 500 miles of the project site. Provide written statement of the cost of the steel products.

SD-11 Closeout Submittals

Quality Control Plan

Submit for sheet metal work in accordance with paragraph entitled "Field Quality Control."

1.4 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:

Provide steel products with a minimum of 30% recycled content. Give preference to regional materials.

2.1.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascias; cap, valley, steeped, base, and eave flashings and related accessories.

2.1.2 Stainless Steel

ASTM A 167, Type 302 or 304, 2B Mill Finish, fully annealed, dead-soft temper.

2.1.3 Aluminum Alloy Sheet and Plate

ASTM B 209, form alloy, and temper appropriate for use.

2.1.3.1 Finish

Exposed exterior sheet metal items of aluminum must have a baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film thickness of 0.8 to 1.3 mils, and color of shall be as indicated.

2.1.4 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.5 Fasteners

Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA Arch. Manual, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

3.1.2 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inch. Confine nailing of flashing to one edge only. Space

nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

3.1.3 Cleats

Provide cleats for sheet metal 18 inch and over in width. Space cleats evenly not over 12 inch on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inch wide by 3 inch long and of the same material and thickness as the sheet metal being installed. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pretin cleats for soldered seams.

3.1.4 Bolts, Rivets, and Screws

Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inch or less in thickness.

3.1.5 Seams

Straight and uniform in width and height with no solder showing on the face.

3.1.5.1 Flat-lock Seams

Finish not less than 3/4 inch wide.

3.1.5.2 Lap Seams

Finish soldered seams not less than one inch wide. Overlap seams not soldered, not less than 3 inch.

3.1.5.3 Loose-Lock Expansion Seams

Not less than 3 inch wide; provide minimum one inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8 inch thick bed.

3.1.5.4 Flat Seams

Make seams in the direction of the flow.

3.1.6 Soldering

Where soldering is specified, apply to stainless steel items. Pretin edges of sheet metal before soldering is begun. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.6.1 Edges

Treat with soldering acid flux the edges of stainless steel to be pretinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.7 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

3.1.7.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

3.1.7.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inch maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inch from the end of the overlapping sheet.

3.1.8 Protection from Contact with Dissimilar Materials

3.1.8.1 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

3.1.8.2 Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.1.8.3 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

3.1.9 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.

3.1.10 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1 1/4 inch, as approved.

3.1.11 Fascias

Prefabricate in the shapes and sizes indicated and in lengths not less that 8 feet. Provide prefabricated, mitered corners internal and external corners. Install fascias after the roofing membrane has been applied.

3.1.11.1 Edge Strip

Hook the lower edge of fascias at least 3/4 inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inch maximum on center. Where fastening is made to concrete or masonry, use screws spaced 12 inch on center driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over 1/16 inch thick compatible spacer or washers.

3.1.11.2 Joints

Leave open the section ends of fascias 1/4 inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inch set laps in plastic cement. Face nailing will not be permitted. Install prefabricated fascias in accordance with the manufacturer's printed instructions and details.

3.1.12 Gutters

The type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Bead with hemmed edge or reinforce the outer edge of gutter with a stiffening bar not less than 3/4 by 3/16 inch of material compatible with gutter. Fabricate gutters in sections not less than 8 feet. Lap the sections a minimum of one inch in the direction of flow or provide with concealed splice plate 6 inch minimum. Join the gutters, other than aluminum, by riveted and soldered joints. Join aluminum gutters with riveted sealed joints. Provide expansion-type slip joints midway between outlets. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters as indicated. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from metals.

3.1.13 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the precast concrete substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.

3.1.13.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines. Where shown on the drawings, provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

3.1.14 Scuppers

Line interior of scupper openings with sheet metal. Extend the lining through and project outside of the wall to form a drip on the bottom edge and form to return not less than one inch against the face of the outside wall at the top and sides. Fold outside edges under 1/2 inch on all sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required, form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.

3.1.15 Conductor Heads

Type indicated and fabricated of the same material as the downspouts. Set the depth of top opening equal to two-thirds of the width. Provide outlet tubes not less than 4 inch long. Flat-lock solder the seams. Where conductor heads are used in conjunction with scuppers, set the conductor a minimum of 2 inch wider than the scupper. Attach conductor heads to the wall with masonry fasteners, and loose-lock to provide conductor heads with screens of the same material. Securely fasten screens to the heads.

3.1.16 Splash Pans

Install splash pans where downspouts discharge on roof surfaces and at other locations as indicated. Unless otherwise shown, provide pans not less than 24 inch long by 18 inch wide with metal ribs across the bottom of the pan. Form the sides of the pan with vertical baffles not less than one inch high in the front, and 4 inch high in the back doubled over and formed continuous with horizontal roof flanges not less than 4 inch wide. Bend the rear flange of the pan to contour of cant strip and extend up 6 inch under the side wall covering or to height of base flashing under counterflashing. Bed the pans and roof flanges in plastic bituminous cement and strip-flash as specified.

3.1.17 Expansion Joints

Provide expansion joints for roofs, walls, and floors as indicated.

3.1.17.1 Roof Expansion Joints

Roof expansion joints are specified in Section 07540 THERMOPLASTIC (TPO) SINGLE-PLY ROOFING.

3.1.17.2 Floor and Wall Expansion Joints

Provide expansion joints of the type and size shown on the drawings.

3.2 PAINTING

Field-paint sheet metal for separation of dissimilar materials.

3.3 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.4 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

3.5 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

3.5.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contractor's Quality Control Team at the end of each day.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Aluminum, Inch	Stainless Steel, Inch
Downspouts and leaders	.032	.015
Downspout clips and anchors	.040 clip .125 anchor	- -
Downspout straps, 2-inch	.060	.050
Conductor heads	.032	.015

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Aluminum, Inch	Stainless Steel, Inch
Scupper lining.....	.032	.015
Strainers, wire diameter or gage....	.144 diameter	.109 diameter
Cap (Counter-flashing)	.032	.015
fascias:		
Extrusions	.075	-
Sheets, corrugated	.032	.015
Sheets, smooth	.050	.018
Gutters:		
Gutter section.....	.032	.015
Continuous cleat.....	.032	.015
Hangers, dimensions.....	1 inch x .080 inch	1 inch x .037 inch
Joint Cover plates... (See Table II)	.032	.015
Reglets (c).....	-	.010
Splash pans.....	.040	.018

TABLE II. SHEET METAL JOINTS

Item Designation	TYPE OF JOINT		
	Stainless Steel	Aluminum	Remarks
Joint cap for building expansion seam, cleated joint at roof	1.25 inch single lock, standing seam, cleated	1.25 inch single lock, standing	- - -

TABLE II. SHEET METAL JOINTS

Item Designation	TYPE OF JOINT		
	Stainless Steel	Aluminum	Remarks
Reglets	Butt joint	- - -	Seal reglet groove with joint sealing compound.
Extrusions	- - -	Butt with 1/2 inch space	Use sheet flashing beneath and a cover plate.
Sheet, smooth	Butt with 1/4 inch space	Butt with 1/4 inch space	Use sheet flashing backup plate.
Gutters	1.5 inch lap, riveted and soldered	One inch flat locked, riveted, and sealed	Aluminum producers recommended hard setting sealant for locked aluminum joints.

-- End of Section --

SECTION 07721

FLOOR HATCHES

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Catalog Data

Manufacturer's catalog data indicating materials and details of construction.

PART 2 PRODUCTS

2.1 FLOOR HATCHES

Give preference to products manufactured within 500 miles of the project site.

Provide floor hatches for flush installation within concrete opening. Size of floor hatches shall be as indicated on the drawings. Hatches shall be FHP Series Steel Angle Frame floor hatches as manufactured by Nystrom or approved equal and shall meet the following requirements.

2.1.1 Materials

Door shall be of 3/16 inch steel with diamond-pattern tread plate. Frame shall 3/16 inch structural steel angle frame with welded or mechanically fastened and sealed corner joints. Hinges shall be stainless steel butt hinges. Latch shall be stainless steel slam latch with an inside lever handle and an outside removable key handle.

2.1.2 Finish

Phosphate dipper and prime coated.

2.1.3 Operating Mechanisms

Springs shall be stainless steel compression springs enclosed in tubes, which counterbalance the door to require no more than 10-30 pounds of opening force. Hold-open arm shall have stainless steel handle that automatically locks the door at 90 degrees when opened. Handle shall be released with one hand for easy operation.

2.1.4 Hatch Load Capacity

The hatch load capacity shall be 300 psf.

PART 3 EXECUTION

3.1 INSTALLATION

Install floor hatch within concrete floor so that top of hatch is flush with adjacent floor.

-- End of Section --

SECTION 07810

SPRAY-APPLIED FIREPROOFING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASSOCIATION OF THE WALL AND CEILING INDUSTRIES - INTERNATIONAL (AWCI)

AWCI TM 12-A	(1997) Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; An Annotated Guide

ASTM INTERNATIONAL (ASTM)

ASTM E 1042	(2002) Acoustically Absorptive Materials Applied by Trowel or Spray
ASTM E 119	(2000a) Fire Tests of Building Construction and Materials
ASTM E 605	(1993; R 2000) Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E 736	(2000) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E 759	(1992; R 2000) Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 760	(1992; R 2000) Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 761	(1992; R 2000) Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E 859	(1993; R 2000) Air Erosion of Sprayed Fire-Resistive Materials (SFRMS) Applied to Structural Members
ASTM E 937	(1993; R 2000) Corrosion of Steel by

	Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM G 21	(1996; R 2002) Determining Resistance of Synthetic Polymeric Materials to Fungi

UNDERWRITERS LABORATORIES (UL)

UL 263	(2003) Fire Tests of Building Construction and Materials
UL Fire Resist Dir	(2006) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fireproofing Material; G

Data identifying performance characteristics of fireproofing material. Data shall include recommended application requirements and indicate thickness of fireproofing that must be applied to achieve each required fire rating.

Documentation indicting percentage of post-industrial and post-consumer recycled content per unit of product. Indicate dollar value of recycled content products included in project. Indicate location of manufacturer and distance between manufacturing facility and the project site. Indicate distance of raw material origin from project site.

SD-06 Test Reports

Fire Resistance Rating; G

Reports and test records, attesting that the fireproofing material conforms to the specified requirements. Each test report shall conform to the report requirements specified by the test method.

Field Tests; G

Test reports documenting results of tests on the applied material in the project. Report shall include defects identified, repair procedures, and results of the retests when required.

1.3 DELIVERY AND STORAGE

Packaged material shall be delivered in the original unopened containers, marked to show the brand name, the manufacturer, and the UL markings. Fireproofing material shall be kept dry until ready to be used, and shall be stored off the ground, under cover and away from damp surfaces. Damaged or opened containers will be rejected. Material with shelf-life shall be applied prior to expiration of the shelf-life.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Substrate and ambient air temperatures shall be maintained above 40 degrees F during application and for 24 hours before and after application. Relative humidity shall be maintained within the limits recommended by the fireproofing manufacturer.

1.4.2 Ventilation

Adequate ventilation shall be provided to properly dry the fireproofing after application. In enclosed areas, a minimum of 4 air exchanges per hour shall be provided by forced air circulation.

1.5 INSTALLER QUALIFICATIONS

Engage an experienced installer that is certified, licensed, or otherwise qualified by the spray-on fireproofing manufacturer as having the necessary experience, staff, and training to install the manufacturer's products in accordance with specified requirements. Each installer of fireproofing material shall be trained, have a minimum of 3 years experience and a minimum of three installations using fireproofing of the type specified. A manufacturer's willingness to sell its products to the Contractor or installer does not infer qualification of the buyer.

1.6 FIRE RESISTANCE RATING

Fire resistance ratings shall be in accordance with the fire rated assemblies listed in UL Fire Resist Dir. Proposed materials not listed in UL Fire Resist Dir shall have fire resistance ratings at least equal to the UL Fire Resist Dir ratings as determined by an approved independent testing laboratory, based on tests specified in UL 263 or ASTM E 119. Fireproofing shall be applied to structural steel members, with the following hourly fire resitance rating and in accordance with the following UL design or approved equivalent. Use unrestrained fire resistance ratings, unless the architect/engineer has specified that the degree of thermal restraint of the construction meets or exceeds the degree of thermal restraint of the tested assembly. Performance tests shall be in accordance with ASTM E 119.

Fire Rating Schedule

Element	Hourly Rating	UL Design Reference
Columns	1	X772
Floor beams	1	D916

1.7 EXTENT OF FIREPROOFING

In the areas indicated on the drawings, the structural steel beams and columns supporting the composite floor system shall be protected with spray-applied fireproofing to a fire resistance hour-rating as indicated in the preceding paragraph.

1.8 PRE-INSTALLATION CONFERENCE

The Contractor shall hold a meeting with the installer, field testing

agency, the manufacturer, subcontractors, and the Contracting Officer prior to the installation of any fireproofing material to review the substrates for acceptability, method of application, applied thickness, patching, repair, inspection and testing procedures.

PART 2 PRODUCTS

2.1 SPRAY-APPLIED FIREPROOFING

Spray-applied fireproofing material, including sealer, shall conform to ASTM E 1042, Class (a), Category A, either Type I or Type II, except that the dust removed shall not exceed 0.0025 gram per square foot of fireproofing material applied as specified in the project. Material shall be asbestos free, and shall resist fungus for a period of 28 days when tested in accordance with ASTM G 21. Material shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84.

Provide products manufactured within a 500 mile radius of the project site. Provide products with a minimum 17 percent post-consumer recycled content and a minimum 4 percent post-industrial recycled content.

2.1.1 Dry Density and Cohesion/Adhesion

Fireproofing shall have a minimum ASTM E 605 dry density and ASTM E 736 cohesion/adhesion properties as follows:

2.1.1.1 Concealed Structural Components

Fireproofing for structural components concealed above the ceiling, or within a wall, chase, or furred space, shall have a average applied dry density of 15 pounds per cubic foot and a cohesion/adhesion strength of 200 psf.

2.1.1.2 Exposed Structural Components

Fireproofing for exposed structural components, except where otherwise specified or indicated, shall have a minimum applied dry density of 22 pounds per cubic foot and a cohesion/adhesion strength of 434 psf.

2.1.1.3 Mechanical Rooms and Storage Areas

Fireproofing for structural components located in mechanical rooms and storage areas shall have a minimum applied dry density of 40 pcf and a cohesion/adhesion strength of 7,000 psf.

2.1.2 Deflection

Spray-applied fireproofing shall not crack, spall, or delaminate when backing to which it is applied is subject to downward deflection 1/120 of 10 foot clear span, when tested in accordance with ASTM E 759.

2.1.3 Bond-Impact

Spray-applied fireproofing material shall not crack, spall or delaminate when tested in accordance with ASTM E 760.

2.1.4 Compressive Strength

The minimum compressive strength shall be 1000 psf when tested in accordance with ASTM E 761.

2.1.5 Corrosion

Spray-applied fireproofing material shall not contribute to corrosion of test panels when tested as specified in ASTM E 937.

2.1.6 Air Erosion

Dust removal shall not exceed 0.025 gram per square foot when tested in accordance with ASTM E 859.

2.1.7 Basis of Design Manufacturer and Product

Grace Monokote Type MK-6.

2.2 SEALER

If required by the product used, sealer shall be the type approved by the manufacturer of the fireproofing material, shall be fungus resistant, shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84, and shall be white color.

2.3 WATER

Water used for material mixing and surface preparation shall be potable.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be fireproofed shall be thoroughly cleaned of dirt, grease, oil, paint, primers, loose rust, rolling lubricant, mill scale or other contaminants that will interfere with the proper bonding of the sprayed fireproofing to the substrate. Painted/primed steel substrates shall be tested in accordance with ASTM E 736, with specified sprayed fireproofing material, to provide the required fire-resistance rating; painted or primed steel surfaces may require a fireproofing bond test to determine if the paint formulation will impair proper adhesion. The Contractor shall certify the acceptability of surfaces to receive sprayed-applied fireproofing and submit a Surface Preparation Report accordingly. Overhead areas to be fireproofed shall be cleared of all obstructions interfering with the uniform application of the spray-applied fireproofing. Hardware such as support sleeves, inserts, clips, hanger attachment devices and the like shall be installed prior to the application of the fireproofing. Condition of the surfaces shall be acceptable to the manufacturer prior to application of spray-applied fireproofing. Applications listed for use on primed surfaces shall be in accordance with the manufacturer's recommendations and standards, and detailed in submittal item SD-03 Product Data.

3.2 PROTECTION

Surfaces not to receive spray-applied fireproofing shall be covered to prevent contamination by splatter, rebound and overspray. Exterior openings in areas to receive spray-applied fireproofing shall be covered

prior to and during application of fireproofing with tarpaulins or other approved material. Surfaces not to receive fireproofing shall be cleaned of fireproofing and sealer.

3.3 MIXING

Fireproofing material shall be mixed in accordance with the manufacturer's recommendations.

3.4 APPLICATION

3.4.1 Sequence

Prior to application of fireproofing, the manufacturer shall inspect and approve application equipment, water supply and pressure, and the application procedures. Fireproofing material shall be applied prior to the installation of ductwork, piping and conduits which would interfere with uniform application of the fireproofing.

3.4.2 Application Technique

Water pressure and volume shall be maintained to manufacturer's recommendations throughout the fireproofing application. Fireproofing material shall be applied to the thickness and density established for the specified fire resistance rating, in accordance with the procedure recommended by the manufacturer, and to a uniform density and texture. Fireproofing material shall not be tamped to achieve the desired density.

3.4.3 Sealer Application

If sealer is required by the product used, it shall be applied after field testing has been conducted and after corrective measures and repairs, if required, have been completed.

3.4.4 Applied Thickness

Thicknesses shall not be less than required to achieve designated fire resistance ratings. If the specified thickness is greater than or equal to 1 inch, any individual measurement shall not be less than the specified thickness minus 0.25 inches. If the specified thickness is less than 1 inch, any individual measurement shall not be less than the specified thickness minus 25 percent.

3.5 FIELD TESTS

The applied fireproofing shall be tested by an approved independent testing laboratory employed by the Contractor. The tests shall be performed in approved locations: for density in accordance with ASTM E 736, cohesion/adhesion in accordance with ASTM E 736, and for thickness in accordance with ASTM E 605. Determine densities in accordance with ASTM E 605 or Appendix A, "Alternate Method for Density Determination" of AWCI TM 12-A. Take density determinations at the beam bottom flange, beam web, column, and an equivalent area from the top of the lower beam flange. Areas showing a density less than specified will be rejected. A test sample shall be located every 10,000 square feet of floor area where the fireproofing has been applied or two for each floor, whichever produces the greatest number of test areas. Any area showing less than minimum requirements shall be corrected. Proposed corrective measures, in writing, shall be approved before starting the corrective action. Corrected work

shall be retested.

3.5.1 Structural Components

Each structural component type shall be tested. Minimum average thickness shall be as required by UL Fire Resist Dir. Density and cohesion/adhesion shall be as specified.

3.5.2 Repair

Additional fireproofing material may be added to provide proper thickness. Rejected areas of fireproofing shall be corrected to meet specified requirements by adding fireproofing material to provide the proper thickness, or by removing defects and respraying with new fireproofing material. Repairs shall use same type of fireproofing material as originally applied or patching materials recommended by the manufacturer. Repaired areas shall be retested and reinspected. Fireproofing material shall be applied to voids or damaged areas by hand-trowel, or by respraying.

3.5.3 Visual Inspections

Inspections shall be made by the certified independent laboratory prior to closure of concealed areas. These inspections may be phased, but shall not occur less than 5 working days prior to the enclosure of the fireproofing. Sprayed areas shall receive a final inspection. Fireproofed surfaces shall be inspected after mechanical, electrical, and other work in contact with fireproofing material has been completed and before sprayed material is covered. Any locations missing fireproofing shall be patched in accordance with the manufacturer's requirements.

3.5.4 Manufacturer's Inspection

The manufacturer shall inspect the fireproofing work after the work is completed on each floor or area, including testing, repair and clean-up, and shall certify that the work complies with the manufacturer's criteria and recommendations. Before the sprayed material is covered, and after all of the fireproofing work is completed, including repair, testing, and clean-up; and after mechanical, electrical and other work in contact with fireproofing material has been completed, the manufacturer shall re-inspect the work and certify that the entire project complies with the manufacturer's criteria and recommendations. The Contractor shall obtain and submit the Manufacturer's Inspection Report and certifications of approval.

3.5.5 Patching

Patching and repairing of damaged fireproofing is the responsibility of the Contractor. The patching material shall be the same as that specified for that area.

3.6 CLEANUP

Surfaces not indicated to receive fireproofing shall be thoroughly cleaned of sprayed material within a 24 hour period after application.

-- End of Section --

SECTION 07840

FIRESTOPPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 119	(2000a) Fire Tests of Building Construction and Materials
ASTM E 1399	(1997; R 2000) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
ASTM E 1966	(2001) Fire-Resistive Joint Systems
ASTM E 814	(2002) Fire Tests of Through-Penetration Fire Stops
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM AS 4991	(2001) Approval of Firestop Contractors
FM P7825a	(2005) Approval Guide Fire Protection

UNDERWRITERS LABORATORIES (UL)

UL 1479	(2003) Fire Tests of Through-Penetration Firestops
UL 2079	(2004) Tests for Fire Resistance of Building Joint Systems
UL 723	(2003) Test for Surface Burning Characteristics of Building Materials
UL Fire Resist Dir	(2006) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping Materials.

Detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resist Dir or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgement, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal shall indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" and "T" ratings, and type of application.

SD-03 Product Data

SPiRiT Data

Manufacturers' product data indicating VOC content expressed in g/L.

SD-07 Certificates

Firestopping Materials.

Certificates attesting that firestopping material complies with the specified requirements. In lieu of certificates, drawings showing UL classified materials as part of a tested assembly may be provided. Drawings showing evidence of testing by an alternate nationally recognized independent laboratory may be substituted.

Installer Qualifications.

Documentation of training and experience.

Inspection.

Manufacturer's representative certification stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

1.3 GENERAL REQUIREMENTS

Firestopping shall consist of furnishing and installing tested and listed firestop systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint. Gaps requiring firestopping include gaps between

the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above.

1.4 DELIVERY AND STORAGE

Materials shall be delivered in the original unopened packages or containers showing name of the manufacturer and the brand name. Materials shall be stored off the ground and shall be protected from damage and exposure to elements. Damaged or deteriorated materials shall be removed from the site.

1.5 INSTALLER QUALIFICATIONS

The Contractor shall engage an experienced Installer who is:

a. FM Research approved in accordance with FM AS 4991, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures.

1.6 COORDINATION

The specified work shall be coordinated with other trades. Firestopping materials, at penetrations of pipes and ducts, shall be applied prior to insulating, unless insulation meets requirements specified for firestopping. Firestopping materials at building joints and construction gaps shall be applied prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Firestopping materials shall consist of commercially manufactured, asbestos-free, noncombustible products FM P7825a approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

2.1.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resist Dir or by a nationally recognized testing laboratory.

2.1.2 Toxicity

Material shall be nontoxic to humans at all stages of application or during fire conditions. Provide sealants that contain less than 250 g/L of VOCs.

2.1.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resist Dir listed or FM P7825a approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Firestop systems shall also have "T" rating where required.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph GENERAL REQUIREMENTS, shall provide "F" and "T" fire resistance ratings in accordance with ASTM E 814 or UL 1479. Fire resistance ratings shall be as follows:

a. Penetrations of Fire Resistance Rated Walls and Partitions: F Rating = Rating of wall or partition being penetrated.

b. Penetrations of Fire Resistance Rated Floors, Floor-Ceiling Assemblies and the ceiling membrane of Roof-Ceiling Assemblies: F Rating = 1 hour, T Rating = 1 hour.

2.1.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph GENERAL REQUIREMENTS, and gaps such as those between floor slabs or roof decks and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested per ASTM E 119, ASTM E 1966 or UL 2079 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E 1399 or UL 2079.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement shall be sound and capable of supporting device. Surfaces shall be prepared as recommended by the manufacturer.

3.2 INSTALLATION

Firestopping material shall completely fill void spaces regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Firestopping shall be installed in accordance with manufacturer's written instructions. Tested and listed firestop systems shall be provided in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through fire-resistance rated floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of fire-resistance rated vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of fire-resistance rated floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Thermal insulation shall be replaced with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Fire dampers shall be installed and firestopped in accordance with Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM.

3.2.3 Data and Communication Cabling

Cabling for data and communication applications that are Contractor installed shall be sealed with re-enterable firestopping products that do not cure over time. Firestopping shall be modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, adds or changes without the need to remove or replace any firestop materials.

3.3 INSPECTION

For all projects, the firestopped areas shall not be covered or enclosed until inspection is complete and approved. The firestopping shall be inspected to verify the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements. The Contractor shall submit written reports indicating locations of and types of penetrations and types of firestopping used at each location; type shall be recorded by UL listed printed numbers.

-- End of Section --

SECTION 07920

JOINT SEALANTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2006) Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 734	(2001) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 919	(2002) Use of Sealants in Acoustical Applications
ASTM C 920	(2005) Standard Specification for Elastomeric Joint Sealants
ASTM D 1056	(2000) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 217	(2002) Cone Penetration of Lubricating Grease
ASTM E 84	(2005e1) Standard Test Method for Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealants

Primers

Bond breakers

Backstops

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). Provide a copy of the Material Safety Data Sheet for each

solvent, primer or sealant material.

Manufacturer's product data for sealants, including printed statement of VOC content.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS

Apply sealant when the ambient temperature is within manufacturer's recommended range.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Lable elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures outside manufacturer's recommended range.

1.5 QUALITY ASSURANCE

1.5.1 Compatibility with Substrate

Verify that each of the sealants are compatible for use with joint substrates.

1.5.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

1.5.3 Mock-Up

Project personnel is responsible for installing sealants in mock-up prepared by other trades, using materials and techniques approved for use on the project.

1.6 SPECIAL WARRANTY

Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

PART 2 PRODUCTS

2.1 SEALANTS

All sealants used as filler must meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

2.1.1 Interior Sealant

Provide ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) and color(s) of sealant for the following:

	LOCATION	COLOR
a.	Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.	As selected
b.	Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	As selected
c.	Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	As selected
d.	Joints between edge members for acoustical tile and adjoining vertical surfaces.	As selected
e.	Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	As selected
f.	Joints between ceramic tile; joints between shower receptors and ceramic tile; joints formed where nonplaner tile surfaces meet.	As selected
g.	Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occuring where substrates change.	As selected
h.	Behind escutcheon plates at valve pipe penetrations and showerheads in showers.	As selected

2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C 920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

	LOCATION	COLOR
a.	Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	Match adjacent surface color
b.	Expansion and control joints.	Match adjacent surface color

	LOCATION	COLOR
c.	Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	Match adjacent surface color
d.	Voids where items pass through exterior walls.	Match adjacent surface color
e.	Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.	Match adjacent surface color
f.	Metal-to-metal joints where sealant is indicated or specified.	Match adjacent surface color
g.	Joints between ends of gravel stops, fascias, copings, and adjacent walls.	Match adjacent surface color

2.1.3 Floor Joint Sealant

ASTM C 920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

	LOCATION	COLOR
a.	Seats of metal thresholds for exterior doors.	Gray
b.	Control and expansion joints in floors, slabs, ceramic tile, and walkways.	As selected

2.1.4 Acoustical Sealant

Rubber or polymer-based acoustical sealant conforming to ASTM C 919 must have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant must have a consistency of 250 to 310 when tested in accordance with ASTM D 217, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and must be non-staining. Sealant shall have a VOC content of no more than 100 g/L.

2.1.5 Preformed Sealant

Provide preformed sealant of polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, the sealant must be non-bleeding and no loss of adhesion.

2.1.5.1 Tape

Tape sealant: Provide cross-section dimensions of 3/4 inch.

2.1.5.2 Foam Strip

Provide foam strip of polyurethane foam; with cross-section dimensions of 3/4 inch. Provide foam strip capable of sealing out moisture, air, and

dust when installed and compressed as recommended by the manufacturer. Service temperature must beminus 40 to plus 275 degrees F. Furnish untreated strips with adhesive to hold them in place. Do not allow adhesive to stain or bleed into adjacent finishes. Saturate treated strips with butylene waterproofing or impregnated with asphalt.

2.2 PRIMERS

Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.4 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.4.1 Rubber

Conform to ASTM D 1056, Type 2, closed cell, Class A, Grade 2A3, round cross section.

2.4.2 Synthetic Rubber

Conform to ASTM C 509, Option I, Type I preformed rods.

2.4.3 Neoprene

Conform to ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2.

2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that may be in contact with sealant.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths. When resealing an existing joint, remove existing calk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical

or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

3.1.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.1.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Laitance, remove efflorescence and loose mortar from the joint cavity.

3.1.4 Wood Surfaces

Keep wood surfaces to be in contact with sealants free of splinters and sawdust or other loose particles.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete or masonry		
1/4 inch (minimum)	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
Over 1/2 inch to 2 inch	1/2 inch	5/8 inch
Over 2 inch.	(As recommended by sealant manufacturer)	

b. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding is not required on metal surfaces.

3.3.2 Masking Tape

Place masking tape on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Remove masking tape within 10 minutes after joint has been filled and tooled.

3.3.3 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated.

b. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".

3.3.4 Primer

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

3.3.5 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

3.3.6 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

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

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains

and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

-- End of Section --

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.6	(1997) Hardware on Standard Steel Doors (Reinforcement - Application)
ANSI A250.8	(1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 653	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 578	(2004a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(2001) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(2000a) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM D 2863	(2000) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA))

BHMA A115	(1991) Steel Door Preparation Standards (Consisting of A115.1 through A115.6 and A115.12 through A115.18)

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM HMMA HMM	(1992) Hollow Metal Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2001) Standard for Fire Doors and Fire Windows
NFPA 105	(2003) The Installation of Smoke-Control Door Assemblies
NFPA 252	(2003) Standard Methods of Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDI)

SDI 105	(1998) Recommended Erection Instructions for Steel Frames
SDI 111-F	Recommended Existing Wall Anchors for Standard Steel Doors and Frames
SDI 113	(1979) Apparent Thermal Performance of STEEL DOOR and FRAME ASSEMBLIES

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies
UL 752	(2005; Rev thru Dec 2006) Bullet-Resisting Equipment

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors

Frames

Accessories

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of doors

Schedule of frames

Submit door and frame locations.

SD-03 Product Data

Doors

Frames

Accessories

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to ANSI A250.8 requirements.

Manufacturers' product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturers' letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturers' MSDS sheets of all site-applies paints and coatings used within the building interior highlighting VOC content in g/l.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 GENERAL

Give preference to products manufactured within 500 miles of the project site and with high recycled content (>60 percent).

2.2 STANDARD STEEL DOORS

ANSI A250.8, except as specified otherwise. Prepare doors to receive door hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

Exterior doors and frames shall be constructed of hot-dipped zinc-coated steel sheet, complying with ASTM A 653, Type B, minimum A60 coating weight and shall be factory-primed. Anchors and accessories shall be zinc-coated.

2.2.1 Classification - Level, Performance, Model

2.2.1.1 Heavy Duty Doors

All interior steel doors shall comply with ANSI A250.8, Level 2, physical performance Level B, Model 2, with core construction as required by the manufacturer for interior doors of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners shall be filled with mineral board insulation.

2.2.1.2 Extra Heavy Duty Doors

All non-blast resistant exterior steel doors shall comply with ANSI A250.8, Level 3, physical performance Level A, Model 2 with core construction as required by the manufacturer for indicated exterior doors, of size(s) and design(s) indicated. Where vertical stiffenercores are required, the space between the stiffeners shall be filled with mineral board insulation.

2.3 CUSTOM HOLLOW METAL DOORS

Provide custom hollow metal doors where nonstandard steel doors are indicated. At the Contractor's option, custom hollow metal doors may be provided in lieu of standard steel doors. Door size(s), design(s), materials, construction, gages, and finish shall be as specified for standard steel doors and shall comply with the requirement of NAAMM HMMA HMM. Fill all spaces in doors with insulation. Close top and bottom edges with steel channels not lighter than 16 gage. Close tops of exterior doors flush with an additional channel and seal to prevent water intrusion. Prepare doors to receive hardware specified in Section 08710 DOOR HARDWARE. Undercut doors where indicated. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

2.4 SOUND RATED STEEL DOORS

Doors shall be of the sound transmission classification as indicated in the DOOR SCHEDULE included in the Drawing.

2.5 ACCESSORIES

2.5.1 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08710 DOOR HARDWARE provide overlapping steel astragals with the doors. For interior pairs of fire rated and smoke control doors, provide stainless steel astragals complying with NFPA 80 for fire rated assemblies and NFPA 105 for smoke control assemblies.

2.5.2 Moldings

Provide moldings around glass of interior doors. Provide nonremovable moldings on corridor side of doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings.

2.6 INSULATION CORES

All exterior doors shall have insulated cores. Insulated cores shall provide an apparent U-factor of .48 in accordance with SDI 113 and shall conform to:

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

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

c. Mineral board: ASTM C 612, Type I.

2.7 STANDARD STEEL FRAMES

ANSI A250.8, Level 2, 16 gauge for interior doors and Level 3, 14 gauge for non-blast resistant exterior doors. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors and sidelights, unless otherwise indicated.

2.7.1 Welded Frames

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

Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, AWS D1.1/D1.1M and in accordance with the practice specified by the producer of the metal being welded.

2.7.2 Special Frame Requirements

2.7.2.1 Grouted Frames

All frames installed in masonry or concrete openings shall have bituminous back-coating and plaster guards and shall be grouted solid.

2.7.2.2 Insulated Frames

All frames with STC rated doors installed in gypsum board walls shall be filled with acoustical batt insulation.

2.7.3 Mullions

Mullions shall be closed or tubular construction and be a member with heads and jambs butt-welded thereto. Bottom of door mullions shall have adjustable floor anchors and spreader connections.

2.7.4 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.7.5 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated, not lighter than 18 gage.

2.7.5.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped.

b. Stud partitions: Weld or otherwise securely fasten anchors to

backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding.

c. Completed openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI 111-F.

2.7.5.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member.

2.8 FIRE AND SMOKE DOORS AND FRAMES

NFPA 80 and NFPA 105 and this specification. The requirements of NFPA 80 and NFPA 105 shall take precedence over details indicated or specified.

2.8.1 Door and Frame Labels

Fire doors and frames shall bear the label of Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10B. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer. Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.8.2 Oversized Doors

For fire doors and frames which exceed the size for which testing and labeling are available, furnish certificates from the manufacturer stating that the doors and frames are identical in design, materials, and construction to a door which has been tested and meets the requirements for the class indicated.

2.8.3 Astragal on Fire and Smoke Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements. On smoke control doors, conform to NFPA 105.

2.9 BULLET RESISTANT DOORS

Provide galvanized flush steel doors and frames meeting the requirements for UL 752, Level 3 bullet-resistant doors.

2.10 WEATHERSTRIPPING

As specified in Section 08710 DOOR HARDWARE.

2.11 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch door frames , with the exception of frames that will

have weatherstripping or soundproof gasketing, to receive a minimum of three rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.12 FINISHES

2.12.1 Factory-Primed Finish

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in ANSI A250.8. Where coating is removed by welding, apply touchup of factory primer. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion.

2.13 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive calking compound.

2.13.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Where frames require ceiling struts or overhead bracing, anchor frames to the struts or bracing. Backfill frames with mortar. Coat inside of frames to be installed in concrete or masonry openings with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in ANSI A250.8. After erection and glazing, clean and adjust hardware.

3.1.3 Fire and Smoke Doors and Frames

Install fire doors and frames, including hardware, in accordance with

NFPA 80. Install fire rated smoke doors and frames in accordance with NFPA 80 and NFPA 105.

3.2 PROTECTION

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

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION 08210

WOOD DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds	(1999; 7th Ed) Architectural Woodwork Quality Standards and Quality Certification Program

ASTM INTERNATIONAL (ASTM)

ASTM E 90	(2004) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E 2074	(2004) Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2001) Standard for Fire Doors and Fire Windows
NFPA 252	(2003) Standard Methods of Fire Tests of Door Assemblies

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

WDMA I.S. 1-A	(1999) Architectural Wood Flush Doors
WDMA I.S. 4	(1994) Water-Repellent Preservative Non-Pressure Treatment for Millwork
WDMA TM-5	(1990) Split Resistance Test
WDMA TM-7	(1990) Cycle - Slam Test
WDMA TM-8	(1990) Hinge Loading Resistance Test

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-02 Shop Drawings

Doors; G

Submit drawings or catalog data showing each type of door unit. Drawings and data shall indicate door type and construction, sizes, thickness, and glazing.

SD-03 Product Data

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's MSDS sheets of all site-applied paints and coatings used within the building interior highlighting VOC content in g/l.

Manufacturer's product data and MSDS sheets for interior flush wood doors including printed statement that binders and veneer adhesives contain no added urea-formaldehyde.

Doors

Accessories

Water-resistant sealer

Sample warranty

Sound transmission class rating

Fire resistance rating

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

Door finish

Submit a minimum of three samples of the specified finish.

SD-06 Test Reports

Split resistance

Cycle-slam

Hinge loading resistance

Submit split resistance test report for doors tested in accordance with WDMA TM-5, cycle-slam test report for doors tested in accordance with WDMA TM-7, and hinge loading resistance test report for doors tested in accordance with WDMA TM-8.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 4 inch thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete and masonry work are dry. Replace defective or damaged doors with new ones.

1.4 WARRANTY

Warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

PART 2 PRODUCTS

2.1 GENERAL

Give preference to products manufactured within 500 miles of the project site.

Provide wood doors produced with no added urea-formaldehyde binders or adhesives.

2.2 DOORS

Provide doors of the types, sizes, and designs indicated.

2.2.1 Flush Doors

Conform to WDMA I.S. 1-A for flush doors. Hardwood stile edge bands of doors receive a natural finish, compatible with face veneer. Provide mill option for stile edge of doors scheduled to be painted. No visible finger joints will be accepted in stile edge bands. When used, locate finger-joints under hardware.

2.2.1.1 Interior Flush Doors

Provide 5-PLY, particleboard core, Type II flush doors conforming to WDMA I.S. 1-A with faces of MDO for painted finish and premium grade natural fir for transparent finish. Hardwood veneers shall be quarter sliced and slip matched.

2.2.2 Acoustical Doors

WDMA I.S. 1-A, solid core, constructed to provide the Sound Transmission

Class rating, as indicated for each door in the DOOR SCHEDULE included in the drawings when tested in accordance with ASTM E 90.

2.2.3 Fire Doors

Provide doors indicated to have a fire resistance rating conforming to the requirements of UL 10B, ASTM E 2074, or NFPA 252 for the class of door indicated. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

2.3 ACCESSORIES

2.3.1 Door Light Openings

Provide glazed openings with the manufacturer's standard wood moldings. Provide moldings for doors to receive natural finish of the same wood species and color as the wood face veneers. Lip type moldings for flush doors.

2.3.2 Additional Hardware Reinforcement

Provide the minimum lock blocks to secure the specified hardware. The measurement of top, bottom, and intermediate rail blocks are a minimum 5 inch by full core width. Comply with the manufacturer's labeling requirements for reinforcement blocking, but not mineral material similar to the core.

2.4 FABRICATION

2.4.1 Marking

Stamp each door with a brand, stamp, or other identifying mark indicating quality and construction of the door.

2.4.2 Quality and Construction

Identify the standard on which the construction of the door was based , identify the standard under which preservative treatment was made, and identify doors having a Type I glue bond.

2.4.3 Preservative Treatment

Treat doors scheduled for restrooms, janitor closets and other possible wet locations with a water-repellent preservative treatment and so marketed at the manufacturer's plant in accordance with WDMA I.S. 4.

2.4.4 Adhesives and Bonds

WDMA I.S. 1-A. Use Type II bond for interior doors. Provide a nonstaining adhesive on doors with a natural finish.

2.4.5 Prefitting

Provide factory prefinished and factory prefitted doors for the specified hardware, door frame and door-swing indicated. Machine and size doors at the factory by the door manufacturer in accordance with the standards under which the doors are produced and manufactured. The work includes sizing, bevelling edges, mortising, and drilling for hardware and providing necessary beaded openings for glass and louvers. Provide the door

manufacturer with the necessary hardware samples, and frame and hardware schedules to coordinate the work.

2.4.6 Finishes

2.4.6.1 Field Painting of Doors to be Painted

Factory prime or seal doors, and field paint.

2.4.6.2 Factory Finish of Door to Have Transparent Finish

Provide doors finished at the factory by the door manufacturer as follows: AWI Qual Stds Section 1500, specification for System No. 4 Conversion varnish alkyd urea or System No. 5 Vinyl catalyzed. The coating is AWI Qual Stds premium, medium rubbed sheen, open grain effect. Use stain when required to produce the finish specified for color. Seal edges, cutouts, trim, and wood accessories, and apply two coats of finish compatible with the door face finish. Touch-up finishes that are scratched or marred, or where exposed fastener holes are filled, in accordance with the door manufacturer's instructions. Match color and sheen of factory finish using materials compatible for field application.

2.4.6.3 Color

Provide western red cedar door finish to match finish on wood veneer lobby walls.

2.4.7 Water-Resistant Sealer

Provide manufacturer's standard water-resistant sealer compatible with the specified finish.

2.5 SOURCE QUALITY CONTROL

Meet or exceed the following minimum performance criteria of stiles of "B" and "C" label fire doors utilizing standard mortise leaf hinges:

a. Split resistance: Averages of ten test samples not less than 500 pounds load when tested in accordance with WDMA TM-5.

b. Cycle-slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of WDMA TM-7.

c. Hinge loading resistance: Averages of ten test samples not less than 700 pounds load when tested for direct screw withdrawal in accordance with WDMA TM-8 using a No. 12, 1-1/4 inch long, steel, fully threaded wood screw. Drill 5/32 inch pilot hole, use 1-1/2 inch opening around screw for bearing surface, and engage screw full, except for last 1/8 inch. Do not use a steel plate to reinforce screw area.

PART 3 EXECUTION

3.1 INSTALLATION

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors

with a 1/16 inch minimum, 1/8 inch maximum clearance at sides and top, and a 3/16 inch minimum, 1/4 inch maximum clearance over thresholds. Provide 3/8 inch minimum, 7/16 inch maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 1/8 inch in 2 inch. Door warp shall not exceed1/4 inch when measured in accordance with WDMA I.S. 1-A.

3.1.1 Fire Doors

Install fire doors in accordance with NFPA 80. Do not paint over labels.

-- End of Section --

SECTION 08330

OVERHEAD ROLLING DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE Fundamentals Handbook	(2005) Fundamentals Handbook

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(1996; R 2004) Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures
NEMA MG 1	(2003; R 2004) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

1.2 DESCRIPTION

Overhead rolling doors shall be spring counterbalanced, rolling type, with interlocking slats, complete with guides, fastenings, hood, brackets, and operating mechanisms, and shall be designed for use on openings as indicated. Each door shall be provided with a permanent label showing the manufacturer's name and address and the model/serial number of the door.

1.2.1 Wind Load Requirements

Doors and components shall be designed to withstand the minimum design wind

load of 20 psf. Doors shall be constructed to sustain a superimposed load, both inward and outward, equal to 1-1/2 times the minimum design wind load. Calculations shall be provided that prove the door design meets the design windload requirements. Recovery shall be at least 3/4 of the maximum deflection within 24 hours after the test load is removed. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested.

1.2.2 Operational Cycle Life

All portions of the door and door operating mechanism that are subject to movement, wear, or stress fatigue shall be designed to operate through a minimum number of 10 cycles per day. One complete cycle of door operation is defined as when the door is in the closed position, moves to the full open position, and returns to the closed position.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings
Installation

Drawings showing the location of each door including schedules. Drawings shall include elevations of each door type, details and method of anchorage, details of construction, location and installation of hardware, shape and thickness of materials, details of joints and connections, and details of guides, power operators, controls, and other fittings.

SD-03 Product Data

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Overhead Rolling Doors

Manufacturer's catalog data, test data, and summary of forces and loads on the walls/jambs.

Manufacturer's preprinted installation instructions.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

Six copies of the system operation manual and system maintenance and repair manual for each type of door and control system.

1.4 DELIVERY AND STORAGE

Doors shall be delivered to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Doors shall be stored in a dry location that is adequately ventilated and free from dirt and dust, water, and other contaminants, and in a manner that permits easy access for inspection and handling.

1.5 OPERATION AND MAINTENANCE MANUALS

Operating instructions outlining the step-by-step procedures required for motorized door operation for the overhead rolling door unit shall be provided. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, troubleshooting guides, and simplified diagrams for the equipment as installed shall be provided. A complete list of parts and supplies, source of supply, and a list of the high mortality maintenance parts shall be provided.

PART 2 PRODUCTS

2.1 OVERHEAD ROLLING DOORS

Doors shall be surface-mounted type with guides at jambs set back a sufficient distance to clear the opening. Exterior doors shall be mounted as indicated.

Give preference to products manufactured within 500 miles of the project site and with high recycled content (60%).

2.1.1 Curtains

The curtains shall roll up on a barrel supported at the head of opening on brackets, and shall be balanced by helical torsion springs. Steel slats for doors less than 15 feet wide shall be minimum bare metal thickness of 0.0281 inches. Steel slats for doors from 15 to 21 feet wide shall be minimum bare metal thickness of 0.0344 inches. Slats shall be of the minimum bare metal decimal thickness required for the width indicated and the wind pressure specified above.

2.1.1.1 Insulated Curtains

The slat system shall supply a minimum R-value of 4 when calculated in accordance with ASHRAE Fundamentals Handbook. Slats shall be of the flat type as standard with the manufacturer. Slats shall consist of a urethane or polystyrene core not less than 11/16 inch thick, completely enclosed within metal facings. Exterior face of slats shall be gauge as specified for curtains. Interior face shall be not lighter than 0.0219 inches. The insulated slat assembly shall have a flame spread rating of not more than 25 and a smoke development factor of not more than 50 when tested in accordance with ASTM E 84.

2.1.2 Endlocks and Windlocks

The ends of each alternate slat for interior doors shall have steel or iron endlocks of manufacturer's stock design. In addition to endlocks,

non-rated exterior doors shall have the manufacturer's standard windlocks as required to withstand the wind load. Windlocks shall prevent the curtain from leaving guides because of deflection from specified wind pressure.

2.1.3 Bottom Bar

The curtain shall have a standard bottom bar consisting of two hot-dip galvanized steel angles for steel doors. A sensing edge shall be attached to the bottom bar of doors that are electric-power operated.

2.1.4 Guides

Guides shall be steel structural shapes or formed steel shapes, of a size and depth to provide proper clearance for operation and resistance under the design windload. Guides shall be attached to adjoining construction with fasteners recommended by the manufacturer. Spacing of fasteners shall be as required to meet the minimum design windload.

2.1.5 Barrel

The barrel shall be steel pipe or commercial welded steel tubing of proper diameter for the size of curtain. Deflection shall not exceed 0.03 inch per foot of span. Ends of the barrel shall be closed with metal plugs, machined to fit the pipe. Aluminum plugs are acceptable on non-fire door barrels.

2.1.6 Springs

Oil tempered helical steel counter-balance torsion springs shall be installed within the barrel and shall be capable of producing sufficient torque to assure easy operation of the door curtain. Access shall be provided for spring tension adjustment from outside of the bracket without removing the hood.

2.1.7 Brackets

Brackets shall be of steel plates to close the ends of the roller-shaft housing, and to provide mounting surfaces for the hood. An operation bracket hub and shaft plugs shall have sealed prelubricated ball bearings.

2.1.8 Hoods

Hoods shall be steel with minimum bare metal thickness of 0.0219 inches formed to fit contour of the end brackets, and shall be reinforced with steel rods, rolled beads, or flanges at top and bottom edges. Multiple segment and single piece hoods shall be provided with support brackets of the manufacturer's standard design as required for adequate support.

2.1.9 Weatherstripping

Exterior doors shall be fully weatherstripped. A compressible and replaceable weather seal shall be attached to the bottom bar. Weather seal at door guides shall be continuous vinyl or neoprene, bulb or leaf type, or shall be nylon-brush type. A weather baffle shall be provided at the lintel or inside the hood. Weatherstripping shall be easily replaced without special tools.

2.1.10 Operation

Doors shall be operated by means of electric power with auxiliary chain hoist. Equipment shall be designed and manufactured for usage in non-hazardous areas.

2.1.10.1 Electric Power Operator With Auxiliary Chain Hoist Operation

Electric power operators shall be heavy-duty industrial type. The unit shall operate the door through the operational cycle life specified. The electric power operator shall be complete with electric motor, auxiliary operation, necessary means of reduction for medium-duty doors, brake, mounting brackets, push button controls, limit switches, magnetic reversing starter, and all other accessories necessary to operate components specified in other paragraphs of this section. The operator shall be so designed that the motor may be removed without disturbing the limit-switches settings and without affecting the emergency chain operator. Doors shall be provided with an auxiliary operator for immediate emergency manual operation of the door in case of electrical failure. Auxiliary operation shall be by means of galvanized endless chain extending to within 3 feet of the floor. The emergency manual operating mechanism shall be so arranged that it may be operated from the floor without affecting the settings of the limit switches. A mechanical device shall be included that will disconnect the motor from the drive operating mechanism when the auxiliary operator is used. Where control voltages differ from motor voltage, a control voltage transformer shall be provided in and as part of the electric power operator system. Control voltage shall not exceed 120 volts.

a. Motors: Drive motors shall conform to NEMA MG 1, shall be high-starting torque, reversible type, and shall be of sufficient horsepower and torque output to move the door in either direction from any position at a speed range of 6 to 8 inches per second without exceeding the rated capacity. Motors shall be suitable for operation on 480 volts, 60 hertz, 3-phase current and shall be suitable for across-the-line starting. Motors shall be designed to operate at full capacity over a supply voltage variation of plus or minus 10 percent of the motor voltage rating. Motors shall be provided with overload protection.

b. Controls: Control equipment shall conform to NEMA ICS 2. Enclosures shall conform to NEMA ICS 6, Type 12 (industrial use), Type 7, in accordance with NFPA 70. Control station shall be provided on only interior side of door control station shall be of the three position button type, marked "OPEN," "CLOSE," and "STOP." The "OPEN" and "STOP" controls shall be of the momentary contact type with seal-in contact. The "CLOSE" control shall be of the constant pressure type. When the door is in motion and the "STOP" control is pressed, the door shall stop instantly and remain in the stop position; from the stop position, the door shall be operable in either direction by the "OPEN" or "CLOSE" controls. Controls shall be of the full-guarded type to prevent accidental operation. Readily adjustable limit switches shall be provided to automatically stop the doors at their fully open and closed positions.

c. Sensing Edge Device: The bottom edge of electric power operated doors shall have an electric or a pneumatic sensing edge for non-hazardous areas that will reverse the door movement upon contact with an obstruction and cause the door to return to its full open position. The sensing edge shall not substitute for a limit switch. Exterior doors shall be provided with a combination compressible weather seal and sensing edge.

d. Electrical Work: Conduit and wiring necessary for proper operation shall be provided under Section 16402 INTERIOR DISTRIBUTION SYSTEM. Flexible connections between doors and fixed supports shall be made with flexible type SJO cable, except in hazardous locations where wiring shall conform to NFPA 70, as appropriate. The cable shall have a spring-loaded automatic take up reel or a coil cord equivalent device.

2.1.11 Inertia Brake

Overhead rolling door shall have a mechanical inertia brake device which will stop the door from free fall in any position, should there be a failure in the motor operator brake or roller chain drive. The unit shall be capable of being reset with a back drive action.

2.1.12 Locking

Locking for motor operated doors shall consist of self-locking gearing with chain lock for emergency hand chain.

2.1.13 Finish

Steel slats and hoods shall be hot-dip galvanized G90 in accordance with ASTM A 653/A 653M, and shall be treated for paint adhesion and shall receive a factory baked-on finish coat . Surfaces other than slats, hood, and faying surfaces shall be cleaned and treated to assure maximum paint adherence and shall be given a factory dip or spray coat of rust inhibitive metallic oxide or synthetic resin primer. Color shall be as selected by the Architect from the manufacturer's standard finishes.

PART 3 EXECUTION

3.1 INSTALLATION

Doors shall be installed in accordance with approved detail drawings and manufacturer's instructions. Anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories shall be accurately located. Upon completion, doors shall be free from warp, twist, or distortion. Doors shall be lubricated, properly adjusted, and demonstrated to operate freely.

-- End of Section --

SECTION 08331

METAL ROLLING COUNTER DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 240/A 240M	(2007e1) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Rolling Counter Doors

Manufacturer's descriptive data and catalog cuts, indicating materials and details of construction.

Installation
Cleaning

Manufacturer's preprinted installation and cleaning instructions.

1.3 GENERAL REQUIREMENTS

Furnish rolling counter doors of the type, size, and design indicated on the drawings. Provide the standard product of a manufacturer regularly engaged in the production of rolling counter doors. Provide each door with a permanent label showing the manufacturer's name and address and the model number of the door.

PART 2 PRODUCTS

2.1 BASIC COMPONENTS

2.1.1 Curtain

Fabricate the curtain of Type 304 stainless steel slats conforming to ASTM A 240/A 240M, Type 304 or Type 430. Provide thickness of slat material as required by width of opening. Use slats approximately 1-1/4 to 1-1/2 inch wide with a depth of crown of 1/2 inch. Fit alternate slats with end locks to maintain curtain alignment. Provide bottom of curtain

with angle or tubular bar reinforcement matching the curtain, and fitted with a resilient bottom seal.

2.1.2 Jamb Guides

Furnish guides of 13 gauge minimum thickness stainless steel conforming to ASTM A 240/A 240M, Type 304 or Type 430.

2.1.3 Counterbalance Shaft Assembly

Furnish the curtain coiled around a steel tube of sufficient thickness and diameter to prevent deflection exceeding 0.03 inch per foot. Provide a barrel containing oil tempered helical steel torsion springs capable of sufficient torque to counterbalance the weight of the curtain. Calculate the springs to provide a minimum of 7,500 operating cycles (one complete cycle of door operation will begin with the door in the closed position, move to the full open position and return to the closed position).

2.1.4 Brackets

Furnish brackets of a minimum 12 gauge thickness steel if flat plate, or 16 gauge thickness if there are a minimum of 3 returns of 3/4 inch width, mill finish #28.

2.1.5 Hood

Provide a hood of 24 gauge stainless steel conforming to ASTM A 240/A 240M, Type 304 or Type 430.

2.1.6 Locks

Lock the curtain at each side of the bottom bar by an integral slide bolt suitable for padlocks by others. Locate lock capability (for a padlock) on the coiling side of the counter door.

2.2 FACE OF WALL ROLLING COUNTER DOORS (NON-RATED)

2.2.1 Counter Doors in Warehouse and Vehicle Inspection building

Construct rolling counter doors, insulated curtains, guides and hood components of stainless steel conforming to the requirements specified herein. Provide counter doors with the highest STC rating available.

2.3 INTEGRAL FRAME ROLLING COUNTER DOOR (NON-RATED)

2.3.1 Counter Door in Operations Building

Furnish integral frame and counter rolling counter door of stainless steel. Form jambs to create guides for the curtain. Provide head and jambs of 16 gauge thickness. Provide counter of 14 gauge thickness.

2.4 OPERATION

2.4.1 Manual Operation

Provide curtain operated by means of manual push-up with lift handles or continuous full width lift bar.

2.5 FINISH

Exposed parts of the counter door, including the curtain, bottom rail, guides, and hood must be of uniform finish and appearance. Furnish stainless steel with a No. 4 finish. Give all other steel parts a shop finish standard with the manufacturer, unless noted otherwise.

PART 3 EXECUTION

3.1 INSTALLATION

Install doors in accordance with approved detail drawings and manufacturer's instructions. Accurately locate anchors and inserts for guides, brackets, hardware, and other accessories. Upon completion, doors shall be free from warp, twist, or distortion. Lubricate, properly adjust, and demonstrate doors to operate freely.

3.2 CLEANING

Clean stainless steel doors in accordance with manufacturer's approved instructions.

-- End of Section --

SECTION 08390

BLAST RESISTANT DOORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-971-Spec	(2001) Specification and Commentary for the Design of Cold-Formed Steel Structural Members and Commentary; includes SG-2000-1 Supp 1 to 1996 Spec, dated 2000

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1998) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2006) Structural Welding Code - Steel
AWS D1.3	(1998) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 242/A 242M	(2004) High-Strength Low-Alloy Structural Steel
ASTM A 307	(2004) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2004b) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 354	(2004) Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A 36/A 36M	(2005) Carbon Structural Steel
ASTM A 449	(2004b) Quenched and Tempered Steel Bolts and Studs
ASTM A 490	(2004a) Structural Bolts, Alloy Steel,

	Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A 500	(2003a) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(2001) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 514/A 514M	(2000a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 529/A 529M	(2005) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 563	(2004a) Carbon and Alloy Steel Nuts
ASTM A 572/A 572M	(2004) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 574	(2004) Alloy Steel Socket-Head Cap Screws
ASTM A 588/A 588M	(2005) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 606	(2004) Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A 618	(2004) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 653	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 792/A 792M	(2003) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM B 221	(2005) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 90	(2004) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

ASTM F 436	(2004) Hardened Steel Washers
ASTM F 568M	(2004) Carbon and Alloy Steel Externally Threaded Metric Fasteners
ASTM F 835	(2004) Alloy Steel Socket Button and Flat Countersunk Head Cap Screws

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2005; Errata 2006; TIA 2006; TIA 2006) Life Safety Code
NFPA 252	(2003) Fire Tests of Door Assemblies
NFPA 80	(1999) Fire Doors and Fire Windows
NFPA 80A	(2001) Protection of Buildings from Exterior Fire Exposures

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G

For special doors or standard doors with appreciable modifications, detailed fabrication and assembly drawings indicating the door location and showing dimensions, materials, fabrication methods, hardware, and accessories in sufficient detail to enable the Contractor to check compliance with contract documents. Weld symbols used shall conform to AWS A2.4. These drawings need not be submitted for standard doors for which manufacturer's catalog data is submitted.

SD-03 Product Data

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's MSDS sheets of all site-applied paints and coatings used within the building interior, highlighting VOC content, expressed in grams/liter.

Door Description; G

Data on standard blast doors consisting of catalog cuts, brochures, circulars, specifications, and product data that show

complete dimensions and completely describe overpressure ratings, rebound ratings, doors, frames, anchors, hardware, and accessories.

Design Requirements; G

Detailed structural analysis and design calculations demonstrating resistance to blast when blast resistance is not demonstrated by prototype tests. Design calculations shall demonstrate adequacy under the blast effects specified or indicated. Design calculations shall include a sketch of the overpressure waveform; dimensioned sketches of blast resisting elements such as door members, frame members, latches, and hinges; section properties for blast resisting members including built-up sections; the standard under which steel is produced; static and dynamic material strength properties; the resistance, stiffness, mass, elastic natural period, and elastic deflection for flexural members; and the peak deflection, peak support rotation, and time to peak deflection for door members in flexure. Design calculations shall cover initial response, rebound, and all secondary items such as shear, welds, local buckling, web crippling, hinges, and latches.

SD-06 Test Reports

Fire Rating Test and Inspection

In lieu of a UL listing for fire door assemblies, a letter may be submitted by the testing laboratory which identifies the submitted product by manufacturer and type or model and certifies that it has tested a sample assembly and issued a current listing.

SD-07 Certificates

Materials

Steel mill reports covering the number, chemical composition, and tension properties for structural quality steels. When blast resistance is demonstrated by calculations, a certificate stating that the door assembly provided was manufactured using the same materials, dimensions, and tolerances shown in the calculations. When blast resistance is demonstrated by prototype testing, a certificate stating that door and frame provided was manufactured using the same materials, dimensions, and tolerances as the tested prototype and listing the hardware and frame anchors required to achieve blast resistance. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturer and shall identify the door assembly and date of shipment or delivery to which the certificate applies.

Fire-Rated Door Assemblies

Certificate of inspection conforming to NFPA 80, NFPA 80A, and NFPA 101 for fire doors exceeding the size for which label service is available.

Thermal Insulation
Sound Rating Test

Certification or test report for thermal insulated doors listing

the type of hardware used to achieve the rating.

1.3 DOOR DESCRIPTION

Hollow metal and aluminum and glass blast-resistant doors shall be flush mounted in frames. Doors shall be the manually operated, side hinged, swinging type. Each door assembly shall include the door, frame, anchors, hardware, and accessories and shall be provided by a single manufacturer. Frames and anchors shall be capable of transferring blast and rebound reactions to the adjacent supporting structure. Resistance to blast shall be demonstrated either by design calculations or tests on prototype door assemblies.

1.3.1 Design Requirements

1.3.1.1 Static Material Strength

The static values for minimum yield strength (or yield point) and (ultimate) tensile strength for steel shall be obtained from the applicable material specification. For tensile strength specified in terms of a tensile strength range, the lowest tensile strength specified shall be selected for design. Structural steel having a minimum static yield strength (or yield point) less than 50 ksi shall be designed using an average yield strength computed as 1.1 times the minimum static yield strength or yield point. If the minimum static yield for structural steel exceeds 50 ksi, the expected yield strength used for design shall be equal to the minimum specified static yield strength or yield point without increase. The expected yield stress for steel sheet and strip used in design shall be computed as 1.21 times the specified static yield point.

1.3.1.2 Dynamic Material Strength

The dynamic material strength shall be computed by applying a dynamic increase factor that accounts for the increase in material strength due to strain rate effects. The dynamic increase factor for structural steel in flexure shall be applied to the average yield strength and shall be 1.29, 1.19, and 1.09 for structural steel having a minimum yield strength (or yield point) of 36, 50, and 100 ksi, respectively. The dynamic increase factor for structural steel having a minimum yield strength (or yield point) between these values shall be obtained by interpolation. Optionally, for structural steel in these yield ranges, the dynamic increase factor shall be determined by a detailed analysis that accounts for the time to yield. The dynamic increase factor for structural steel having a minimum yield exceeding 100 ksi shall be 1.0. The dynamic increase factor for steel sheet and strip used in flexure shall be 1.1 applied to the average yield stress.

1.3.1.3 Structural Member Design

Hollow metal doors shall be designed in accordance with AISI SG-971-Spec except that for blast design, the dynamic yield strength shall be substituted for the static yield point.

1.3.1.4 Dynamic Analysis and Deformation

The door shall be designed using an equivalent single degree of freedom or other approved dynamic analysis method. The maximum door deformation shall be selected by the door manufacturer except that the maximum deformation in flexure shall not exceed the deformation limits specified or indicated.

The deformation of structural steel members having a minimum yield strength or yield point greater than 65 ksi shall not exceed the elastic deflection. The ductility ratio for flexural members in hollow metal doors shall not exceed 2.0.

1.3.1.5 Rebound Resistance

Rebound resistance shall be the specified or indicated percentage of the door resistance at initial peak response.

1.3.2 Blast Effects

1.3.2.1 Overpressure

The spatial distribution of overpressure shall be uniform unless otherwise specified or indicated. For overpressure specified or indicated with duration only, the waveform shall be a triangle with a zero rise time.

1.3.2.2 Overpressure Direction

For overpressure identified as seating and for overpressure directions not otherwise specified or indicated, the positive phase overpressure shall be in the direction that causes the door to seat toward the frame.

1.3.3 Blast Door Operation

The force required to set the door in motion shall be measured from the 90-degree open position, and the force required to engage and release the latches shall be measured at the latch handle with the door in the normal closed position.

1.4 QUALIFICATIONS

Welders, welding operators, and weld inspectors shall be qualified in accordance with AWS D1.1/D1.1M except that welders performing arc welding of steel sheet and strip shall be qualified in accordance with AWS D1.3.

1.5 DELIVERY AND STORAGE

Door assemblies delivered and placed in storage shall be stored with protection from weather and dirt, dust, and contaminants.

1.6 WARRANTY

Warranty shall provide for repair and replacement of the blast door assembly and individual hardware and accessory items in the event of malfunction due to defects in design, materials, and workmanship except that the warranty need not cover finishes provided by others.

PART 2 PRODUCTS

2.1 GENERAL

Give preference to products manufactured within 500 miles of project site and with high recycled content (>60%).

2.2 MATERIALS

Only structural quality steel materials for which tension properties have

been obtained shall be used to resist blast except that commercial quality steel sheet and strip shall be permitted for prototype tested hollow metal doors. Steel used in the door, door frame, and door frame anchors and non stainless steel fasteners that resist blast shall be selected from the materials specified.

2.2.1 Structural Tubing

Structural tubing shall conform to ASTM A 500, ASTM A 501, or ASTM A 618.

2.2.2 Structural Steel

Structural steel bars, plates, and shapes shall conform to ASTM A 36/A 36M, ASTM A 242/A 242M, ASTM A 529/A 529M, ASTM A 572/A 572M, or ASTM A 588/A 588M. Quenched and tempered steel plate shall conform to ASTM A 514/A 514M.

2.2.3 Steel Sheet and Strip

Steel sheet and strip shall conform to ASTM A 653, Grades A, B, C, D, and F; ASTM A 653; ASTM A 606; or ASTM A 792/A 792M, Grades 33, 37, 40, and 50.

2.2.4 Fasteners

Steel studs and bolts shall conform to ASTM A 307, ASTM A 325, ASTM A 354, ASTM A 449, or ASTM A 490 as applicable. Steel nuts shall conform to ASTM A 563. Hardened circular, beveled, and clipped washers shall conform to ASTM F 436. Steel hex cap screws shall conform to ASTM F 568M. Steel socket-headed cap screws shall conform to ASTM A 574. Steel button and flat-headed countersunk cap screws shall conform to ASTM F 835. Use hard aluminum or stainless steel fasteners for aluminum doors and frames.

2.2.5 Aluminum Alloy for Doors and Frames

ASTM B 221, Alloy 6063-T5 for extrusions.

2.3 GLAZING

Glazing used in the aluminum and glass doors shall be the blast-resistant insulated glass specified in Section 08800 GLAZING.

2.4 HARDWARE

Hardware shall be as specified in Section 08710 DOOR HARDWARE.

2.5 ACCESSORIES

2.5.1 Subframe

At the Contractor's option, a subframe can be provided and built into the structure prior to installation of the frame. The subframe and subframe anchors shall be capable of transferring blast and rebound reactions to the adjacent structure, and the frame shall be capable of transferring these reactions to the subframe. The subframe shall be fabricated in the same manner specified for the frame.

2.5.2 Nameplate

Each door assembly shall have a permanently affixed nameplate that displays

the manufacturer's name, place and year of manufacture, and the applicable peak overpressure, impulse, and rebound rating.

2.6 FABRICATION OF HOLLOW METAL DOORS AND FRAMES

2.6.1 Shop Assembly

Hollow metal door frames shall be pressed steel or structural steel with welded joints. Steel frames or subframes installed in masonry walls shall be provided with adjustable anchors. Hollow metal doors shall be of unitized grid construction with welded grid junctions and shall have flat, one-piece face sheets spot welded to each face of the grid system. The edges of hollow metal doors shall be closed with seams continuously welded. Top edge of doors shall be closed flush and sealed to prevent water intrusion. Hollow metal doors shall be neat in appearance, free from warpage and buckle, and suitable reinforcing shall be provided for hardware.

As a minimum, hollow metal doors and frames shall meet the requirements for exterior doors, as specified in Section 08110 STEEL DOORS AND FRAMES.

2.6.2 Mullion

Mullions for double doors shall be fabricated in the same manner specified for frames. Removable mullions shall be attached to the frame with mechanical fasteners that are accessible for mullion removal. Doors shall seat directly against the mullion, and the mullion shall be capable of transferring the door reactions to the frame.

2.6.3 Thermal Insulation

The interior cells between the unitized grid shall be completely filled with thermal insulation material. The U value through the door (panel) shall not exceed 0.24 Btu per square foot per hour per degree F.

2.6.4 Shop Finishing

Exterior doors and frames shall be constructed of hot-dipped zinc-coated steel sheet, complying with ASTM A 653, Type B, minimum A60 coating weight and shall be factory-primed. Anchors and accessories shall be zinc-coated.

2.6.5 Clearance

The lateral clearance between hollow metal doors and frames shall not exceed 1/8 inch at the head and jambs and the clearance between the meeting edges of pairs of doors shall not exceed 1/4 inch. The clearance between the door bottom and threshold shall not exceed 3/4 inch.

2.7 FABRICATION OF ALUMINUM AND GLASS DOOR AND FRAMES

2.7.1 Aluminum Frames

Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 12 inches on center. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically.

2.7.2 Aluminum Doors

Of type, size, and design indicated and not less than 1-3/4 inch thick. Minimum wall thickness shall be as required to provide blast resistance, except beads and trim, 0.050 inch. Door sizes shown are nominal and shall include standard clearances as follows: 0.093 inch at hinge and lock stiles, 0.125 inch between meeting stiles, 0.125 inch at top rails, 0.187 inch between bottom and threshold, and 0.687 inch between bottom and floor. Bevel single-acting doors 0.063 or 0.125 inch at lock, hinge, and meeting stile edges.

2.7.2.1 Full Glazed Stile and Rail Doors

Doors shall have stiles and rails of the size required to meet specified blast resistance. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 3/8 or 1/2 inch diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.

2.7.2.2 Provisions for Glazing

Provide extruded aluminum snap-in glazing beads on interior side of doors. Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior side of doors. Glazing beads shall have vinyl insert glazing gaskets. Design glazing beads to receive glass of thickness indicated or specified.

2.7.3 Finishes

Provide exposed aluminum surfaces with factory finish of anodic coating.

2.7.3.1 Anodic Coating

Clean exposed aluminum surfaces and provide an anodized finish conforming to AA DAF-45. Finish shall be clear (natural), designation AA-M10-C22-A41, Architectural Class I 0.7 mil or thicker).

2.8 BLAST DOOR ASSEMBLIES

2.8.1 Blast-Resistance Requirements

The blast-resistant hollow metal and aluminum and glass door assemblies shall, as a minimum, resist the blast pressures included in the following table. Each door location was calculated for both maximum incident and maximum reflected pressure based on the actual standoff distances to determine the controlling load condition. The resulting controlling loads for each door are shown in the following table. In the table, the doors are identified by door number as indicated on the drawings. Refer to the DOOR SCHEDULE included in the drawings for door type and size.

Operations Building Doors:

Door Number	Incident (I)/ Reflective (R)	Pressure (psi)	Impulse (psi-msec)
LE01	R	2.43	40.68

LE59/2	R	2.43	40.68
LE72	R	1.04	20.71
LW55	R	1.55	28.37
1E03/4	R	2.43	40.68
1E03/5	R	2.43	40.68
1E10	R	1.87	32.91
1E14/1	---	0.55	3.44
1E14/2	---	0.55	3.44
1E14/4	R	1.87	32.91
1E31/1	R	2.28	38.66
1E52/1	R	2.28	38.66
1W34/2	R	1.92	33.63
1W58/2	R	2.43	40.68
1C01/1	R	1.24	23.74
1C01/2	R	0.86	18.07
1C04-1	R	0.86	18.07
1C22/1	R	1.73	30.93
1C22/2	R	1.73	30.93
1C22/3	R	1.73	30.93
1C22/4	R	1.73	30.93
1C22/5	R	1.73	30.93
1C22/6	R	1.73	30.93
2E55	R	0.81	29.74
2W50	R	0.81	29.74
PE01	I	0.89	17.82
PE02	R	0.82	17.62
PE03	I	0.85	17.16
PW01	R	0.85	18.07
PW02	I	0.94	18.54

Chilled Water Plant 1:

Door Number	Incident (I)/ Reflective (R)	Pressure (psi)	Impulse (psi-msec)
101A	R	3.46	53.69
101B	R	3.46	53.69

Chilled Water Plant 2:

Door Number	Incident (I)/ Reflective (R)	Pressure (psi)	Impulse (psi-msec)
101A	R	3.46	53.69
101B	R	3.46	53.69

Antenna Farm Building

Door Number	Incident (I)/ Reflective (R)	Pressure (psi)	Impulse (psi-msec)
101B	I	7.38	100.1
109	I	7.38	100.1

The operating forces required to set the doors in motion and swing to the open position shall be in accordance with NFPA 101.

2.9 TESTS, INSPECTIONS, AND VERIFICATIONS

2.9.1 Air Leakage Test

Each door assembly for which door seals or thermal insulation are specified shall be factory tested for air leakage rate in accordance with ASTM E 283. The rate of air leakage per unit length of crack shall not exceed 0.20 cfm using a pressure difference of 1.57 psf. Prototype tests can be substituted for door assembly tests when the prototype door, frame, and hardware tested are equivalent to that provided or when otherwise approved.

2.9.2 Sound Rating Test

The sound transmission class (STC) rating shall be determined in accordance with ASTM E 90.

2.9.3 Fire Rating Test and Inspection

Fire-rated door assemblies shall bear the listing identification label of the UL, or other nationally recognized testing laboratory qualified to perform tests of fire door assemblies in accordance with NFPA 252 and having a listing for the tested assemblies. Doors exceeding the size for which listing label service is offered shall be inspected in accordance with NFPA 80, NFPA 80A, and NFPA 101.

PART 3 EXECUTION

3.1 INSTALLATION

Doors and frames shall be installed in accordance with the manufacturer's written instructions. Pressed steel frames for hollow metal doors shall have bituminous back coating and plaster guards and shall be fully grouted. Exposed surfaces shall be finish painted in accordance with Section 09900 PAINTS AND COATINGS. Galvanized surfaces damaged prior to final acceptance shall be repaired in accordance with ASTM A 780 to the same thickness as the original galvanizing.

-- End of Section --

SECTION 08630

METAL FRAMED SKYLIGHTS (Blast Resistant Applications)

PART 1 GENERAL

1.1 SUMMARY

a. Section Includes metal-framed skylights for applications using flat glass, including below:

1. Structural design, engineering and fabrication of complete metal framed skylight system, including aluminum framing, integral closures, trim, perimeter flashing and surface regrets as required shown on drawings.

2. Glass and glazing for metal framed skylight system, including gaskets, sealants, spacers, blocking and related materials.

3. Fasteners, shear blocks, anchors and related reinforcement of framing system, as required to resist design and impact loading.

4. Installation of entire metal framed skylight system.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2006) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 794	(2006) Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
ASTM C 864	(2005) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 1036	(2006) Flat Glass
ASTM C 1048	(2004) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM D 1149	(1999) Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 331	(2000) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure

Difference

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501	(2005) Methods of Test for Exterior Walls
AAMA 501.1	(1994) Test Methods for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure
AAMA 611	(1998) Voluntary Specification for Anodized Architectural Aluminum

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(2004) Glazing Manual

1.3 SYSTEM DESCRIPTION

a. Performance Requirements: Provide metal-framed skylights which have been manufactured, fabricated, and installed to withstand the environmental loading required by the 2006 edition of the International Building Code and blast resistance to provide performance criteria required by these specifications without defects, damage or failure.

b. Skylight Performance Requirements:

1. Design framing system including glazing material to support the following load requirements with maximum allowable deflection of any glazing support member not to exceed L/60 of the unsupported span for the blast loading; and L/180 of the unsupported span for the environmental (live, snow, wind) loading.

a) 20 psf uniform live load plus dead load.

b) Plus 13 psf positive wind load plus dead load.

c) Minus 36 psf negative wind load plus dead load.

d) Concentrated live load of 250 pounds applied to any framing member at a location that will produce the most severe stress or deflection.

e) Thermal load of plus or minus 50 degrees F from ambient temperature.

2. Air and Water Resistance:

a) ASTM E 283: Allowable air infiltration shall not exceed 0.06 cfm through the total glazed surface area when system is tested in accordance with ASTM E 283 at a static pressure of 6.24 psf.

b) ASTM E 331: No uncontrolled water leakage shall occur when system is tested in accordance with ASTM E 331 at a static pressure of 12 psf.

c) AAMA 501: No uncontrolled water leakage shall occur when system is tested for dynamic water resistance in accordance with AAMA 501.1 at a static pressure of 12 psf.

c. Blast Resistance:

1. Basis of Design: BMS-3000 Multi-Hazard (MH) extruded aluminum skylight system, as manufactured by Naturalite Skylight Systems, 803 Airport Road, Terrell, Texas 75160 (800-527-4018).

2. Design skylight to support insulating glass infill at its maximium capacity using WINGARD PE V5.5.

3. Response limits for skylight purlins and rafters shall be limited to 2 degrees of support rotation and/or ductility ratio of 3.

4. Design member end connections for ultimate capacity of member or two times calculated reaction load if two times reaction is less than the ulitimate reaction.

5. Design skylight system including structural silicone joints at purlins and secondary seal of insulating glass units to support a negative or rebound load equal to 50 percent of the positive blast load.

6. Glass is permitted to break under the positive blast load, but must remain in the openings.

7. Skylight system, including anchors to support structure, must be reviewed and approved by the project engineer and Owner's blast consutlant prior to fabrication.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Layout, Profiles and Product Components

Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.

Fabrication

Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, and details of framing members, glazing materials, sealants, fasteners, anchors and thicknesses and types of formed flashing and closures and relationship with adjacent materials. Indicate maximum horizontal and vertical forces at rafters.

Calculations; G

Submit calculations certified by a professional engineer for review prior to fabrication.

Submit stamped calculations and shop drawings for record approval.

SD-03 Product Data

Skylight System

Submit product literature for skylight system.

SD-04 Samples

Finish, Color, and Texture

Aluminum Finish: Samples of anodized aluminum finish for approval.

Glazing Materials: Submit a verification sample, 12 inches square, of the specified glass, including standard tint and low-e coating, as specified. Submit standard sealant colors for selection and approval.

SD-06 Test Reports

Certified Test Reports; G

Certified test reports showing compliance with specified performance characteristics and physical properties.

Performance Requirements

Submit product data, installation instructions, air and water resistance test reports. Test reports must show evidence that system experienced no uncontrolled water leakage when system is tested in accordance with ASTM E 331 and AAMA 501.1 at a minimum static pressure of 12 psf. Include both published data and specific data prepared for this project.

SD-10 Operation and Maintenance Data

Closeout Submittals

Operation and maintenance data for installed products in accordance with Section 01781 OPERATION AND MAINTENANCE DATA. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

Warranty

Warranty documents shall be submitted.

1.5 QUALITY ASSURANCE

Qualifications:

1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

Installer: Manufacturer of skylight system, or a pre-qualified subcontractor, shall erect and glaze the skylight(s).

2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

Manufacturer: Skylight systems shall be manufactured by a firm with a minimum of ten years experience in the fabrication and installation of custom extruded aluminum skylights. Manufacturers proposed for use, which are not named in these Specifications, shall submit evidence of ability to meet performance, fabrication and installation requirements specified; and include a list of projects of similar design and complexity completed within the past five years.

3. Materials: For each type of material required for the work of this Section, provide primary materials that are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturer of the primary materials.

4. Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of installation work to establish procedures to maintain optimum working conditions and schedules; and to coordinate this work with related and adjacent work. Agenda of the conference shall include review of roofing manufacturer's requirements for the protection of roof and base flashings during installation.

1.6 DELIVERY, STORAGE, AND HANDLING

a. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Sequence deliveries to avoid delays, but minimize onsite storage.

b. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Protect materials from damage from sunlight, weather, excessive temperatures and construction operations.

1.7 PROJECT CONDITIONS

Field Measurements: Time permitting, verify actual support dimensions by field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

Fabricate skylight based on "guaranteed dimensions" by the general contractor and allow for field trimming of perimeter flashing if taking field measurements before fabrication is not possible.

PART 2 PRODUCTS

2.1 SKYLIGHT MANUFACTURER

Manufacturer: Naturalite Skylight Systems, The Vistawall Group or approved equal.

Contact: 803 Airport Road, Terrell, TX 75160; Telephone: (800) 527-4018, (972) 551-6400; Fax (972) 551-6420, www.naturalite.com.

2.2 MANUFACTURED METAL-FRAMED SKYLIGHTS

a. Framing System:

1. Framing Members: Fabricate from 6063-T5, 6063-T6, or 6061-T6 extruded aluminum; temper and alloy as recommended by the manufacturer for design loading, cross-sectional configuration, fabrication requirements and required finish. Include an integral gutter system to control water infiltration and condensation.

2. Provide tubular rafter and purlin framing members with flush condensation gutters.

3. Formed Flashing and Closures: Minimum 0.063 inch thick aluminum.

4. Condensation and Water Infiltration Control: Provide framing system which will collect and channel condensation and water infiltration to the exterior through baffled weeps at sill members.

5. Fabricate work to be straight, plumb, level and square. Provide work to sizes, shapes and profiles indicated on approved shop drawings. Make work with uniform, tight joints.

6. Use factory-performed heliarc welding with all exposed welds finished to match adjacent material.

b. Finish: Aluminum used for framing shall have a clear anodized finish designation AA-A10-622-A31 meeting the requirements of AAMA 611.

c. Glazing Technique:

1. Two-sided Glazing: Provide rectangular rafter glazing caps (mechanically secured with stainless steel glazing fasteners and snap-on covers) and flush exterior silicone joints at purlin and sill members. Apply "wet seal" of silicone sealant from edge of rafter caps to face of glass.

2. Glazing system shall include a "positive stop" to control compression in the glazing rabbet so as to avoid excessive pressure at the insulating glass edges.

d. Sloped Glass:

Insulating Glass Units: Glass shall be as specified in Section 08800 GLAZING.

e. Glazing Requirements:

1. Glass shall conform to applicable requirements of ASTM C 1036 and ASTM C 1048.

2. Glaze in accordance with GANA Glazing Manual and glass fabricator's guidelines.

3. Provide glass products as fabricated by supplier with the appropriate code compliance approvals.

f. Glazing Gaskets and Blocking:

1. Continuous Cushion Below Glazing Materials: Provide extruded, dense EPDM black rubber gasket with 60 plus or minus 5 Shore A durometer complying with ASTM C 864.

2. Continuous Spacer Above Glazing Materials: Provide extruded, closed-cell, sponge EPDM black rubber gasket complying with ASTM C 509.

3. Ozone Resistance: Fabricate gaskets of material to withstand one part per million ozone for 100 hours at 20 percent elongation at 40 degrees C when tested in accordance with ASTM D 1149.

g. Anchors and Fasteners:

1. Provide cadmium plating for lag, sleeve and stud bolt anchors not exposed to the weather.

2. Provide anchors fabricated of stainless steel for anchors exposed to the weather.

3. Provide 300 Series stainless steel for bolted connections and fasteners exposed to the weather, and where bolted connections penetrate secondary gutter of sill member.

4. Reinforce butt, mitered and expansion joint framing member splices with internal aluminum splice plates where possible; mechanically fastened with stainless steel truss head fasteners in accordance with the skylight manufacturer's standard connection details.

h. Sealants:

1. Skylight manufacturer shall be responsible for the selection of sealants. Surfaces shall be cleaned and primed as required to assure proper adhesion. Sealants shall be applied in accordance with sealant manufacturer's guidelines and joint dimensions shown on approved shop drawings.

2. Exterior metal to glass wet seals shall be black in color. Exposed metal to metal joints shall be sealed with a standard color silicone sealant.

3. Sealants shall exhibit adequate adhesion to samples of metal and glass when tested in accordance with ASTM C 794.

2.3 SOURCE QUALITY

Obtain metal-framed skylight materials from a single manufacturer.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.2 EXAMINATION

Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product

installation in accordance with manufacturer's instructions.

3.3 PREPARATION

Preparation: Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed and notify Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.4 INSTALLATION

a. Skylight Installation:

1. Match profiles, sizes and spacings indicated on approved shop drawings. Ensure that weep and condensation control system operates properly.

2. Do not perform structural silicone sealant work when the metal temperature is below 32 degrees F without written approval from silicone manufacturer.

3. Coordinate installation with adjacent work such as roofing, sheet metal and other work to ensure a complete weatherproof assembly. Anchor work securely to supporting structure, but allow for differential and thermal movement.

4. Isolate between aluminum and dissimilar metals with a protective coating or plastic strip to prevent electrolytic corrosion.

b. Site Tolerances: All support and adjacent construction shall be held to within plus 1/2 inch of theoretical x-y-z dimensions.

3.5 FIELD QUALITY REQUIREMENTS

No site tests required.

3.6 ADJUSTING

During installation, remove labels, part number markings, sealant smears, handprints, and construction dirt from all components. Touch-up damaged coatings and finishes and repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

3.7 CLEANING

Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions during installation and prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

1. Clean exposed surfaces including metal and glass using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned.

2. Reclean as necessary to prevent damage. Protect completed work from damage and deterioration and inspect immediately before final

acceptance of project.

-- End of Section --

SECTION 08710

DOOR HARDWARE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 283	(1991; R 1999) Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM F 883	(1997) Standard Performance Specification for Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1	(2000) Butts and Hinges
BHMA A156.2	(2003) Bored and Preassembled Locks and Latches
BHMA A156.3	(2001) Exit Devices
BHMA A156.4	(2000) Door Controls - Closers
BHMA A156.5	(2001) Auxiliary Locks & Associated Products (BHMA 501)
BHMA A156.6	(2005) Architectural Door Trim
BHMA A156.7	(2003) Template Hinge Dimensions
BHMA A156.13	(2002) Locks & Latches - Mortise (BHMA 621)
BHMA A156.16	(2002) Auxiliary Hardware
BHMA A156.18	(2003) Materials and Finishes
BHMA A156.21	(2001) Thresholds
BHMA A156.22	(2003) Door Gasketing Systems
BHMA A156.26	(2006) Continous Hinges

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2001) Standard for Fire Doors and Fire Windows

NFPA 101 (2003) Life Safety Code

STEEL DOOR INSTITUTE (SDI)

ANSI A250.8 (1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir (2003) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-02 Shop Drawings

Hardware schedule; G

Keying system

SD-03 Product Data

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Hardware items; G

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1; G

Submit data package in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (If fire rated and listed)	BHMA Finish Designation
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1.4 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

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

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. Deliver permanent keys and removable cores to the Contractor, either directly or by certified mail. Deliver construction master keys with the locks.

PART 2 PRODUCTS

Give preference to products manufactured within 500 miles of the project site.

2.1 TEMPLATE HARDWARE

Provide hardware to be applied to metal or to prefinished doors manufactured to template. Promptly furnish template information or templates to door and frame manufacturers. Conform to BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Provide the label of Underwriters Laboratories, Inc. for such hardware listed in UL Bld Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

Clearly and permanently mark with the manufacturer's name or trademark, hinges, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

BHMA A156.1, 4-1/2 by 4-1/2 inch unless otherwise indicated. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges. Provide electric hinges, where scheduled or required.

BHMA A156.26 continous hinges shall be full mortise, heavy-duty Grade 1 continuous gear type. Hinges shall be clear anodized aluminum. Provide electric hinges, where scheduled or required.

2.3.2 Locks and Latches

2.3.2.1 Mortise Locks and Latches

BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Install knobs and roses of mortise locks with screwless shanks and no exposed screws.

2.3.3 Exit Devices

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms.

2.3.4 Cylinders and Cores

Provide locksets that accommodate Schlage Primus cylinders. Provide construction cylinders and cores, as required by the Contractor.

2.3.5 Keying System

Provide a master keying system as directed by the Owner. Provide a construction master keying system as directed by the Contractor. Provide key cabinet as specified.

2.3.6 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.6.1 Knobs and Roses

Conform to the minimum test requirements of BHMA A156.2 and BHMA A156.13 for knobs, roses, and escutcheons. For unreinforced knobs, roses, and escutcheons, provide 0.050 inch thickness. For reinforced knobs, roses, and escutcheons, provide outer shell of 0.035 inch thickness, and combined thickness of 0.070 inch, except for knob shanks, which are 0.060 inch thick.

2.3.6.2 Lever Handles

Provide lever handles in lieu of knobs. Conform to the minimum requirements of BHMA A156.13 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 1/2 inch of the door face.

2.3.7 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master and grand master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish six construction master keys, and six control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

2.3.8 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25.

2.3.9 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.9.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.10 Door Protection Plates

BHMA A156.6.

2.3.10.1 Sizes of Armor and Kick Plates

2 inch less than door width for single doors; one inch less than door width for pairs of doors. Provide 10 inch high kick plates. Provide a minimum 36 inch armor plates.

2.3.11 Door Stops and Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.12 Padlocks

ASTM F 883.

2.3.13 Thresholds

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise. See Paragraph Hardware Sets for threshold at interior doors.

2.3.14 Weather Stripping Gasketing

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". Provide a set to include head and jamb seals, sweep strips, and, for pairs of doors, astragals. Air leakage of weather stripped doors not to exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283. Provide weather stripping with one of the following:

2.3.14.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear

(natural) anodized aluminum.

2.3.15 Soundproofing Gasketing

BHMA A156.22. Provide suface applied compression bulb type permiter gaskets with adhesive backing. Gaskets shall be fire, smoke, and sound rated. Furnish door bottoms with adjustable operating rod and silicone rubber or closed-cell sponge neoprene gasket. Gaskets shall be mitered at corners. Provide the type and function designation where specified in paragraph entitled "Hardware Sets".

2.3.16 Special Tools

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

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel or nonferrous metal fasteners that are exposed to weather. Provide fasteners of type necessary to accomplish a permanent installation.

2.5 FINISHES

BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except aluminum paint finish for surface door closers, and except BHMA 652 finish (satin chromium plated) for interior steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish. Furnish exit devices in BHMA 630 finish. Match exposed parts of concealed closers to lock and door trim. Match hardware finish for aluminum doors to the doors.

2.6 KEY CABINET AND CONTROL SYSTEM

BHMA A156.5. Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping to prevent damage. Provide full contact, weather-tight seals. Operate doors without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 9 inch

on center after doors and frames have been finish painted.

3.1.2 Soundproofing Installation

Install as recommended by the manufacturer.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set exterior thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws.

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

3.3 HARDWARE LOCATIONS

ANSI A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

Provide hardware for aluminum doors under this section. Deliver Hardware templates and hardware, except field-applied hardware to the aluminum door and frame manufacturer for use in fabricating the doors and frames.

Hardware Set #01

Hinges	A8111 x 652
Privacy Lock	F22 x 626
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	

Hardware Set #02

Hinges	A8111 x 652
Office Lock	Lock F04 x 626
Wall Bumper	L02101 626

Hardware Set #03

Hinges	A8111 x 652
Office Lock	F04 x 626
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32334

Hardware Set #04

Hinges	A8111 x 652
Privacy Lock	F22 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626

Hardware Set #05

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Wall Bumper	L02101 x 626

Hardware Set #06

Hinges	A8111 x 652
Electric Hinge	
Elect. Exit Device	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 X626
Gasketing	R0E154
Monitor Switch	By Others

Hardware Set #07

Hinges	A8111 x 652
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Automatic Dr Bottom	R3C324
Threshold	J32130
Monitor Switch	By Others

Hardware Set #08

Hinges	A8111 x 652
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)

Access Control	Card Reader/Keypad by Others
X-09 Lock Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Monitor Switch	By Others

Hardware Set #09

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Monitor Switch	By Others

Hardware Set #10

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32130

Note: Automatic door bottom and threshold at Door LC22 only.

Hardware Set #11

Hinges	A8111 x 652
Passage Set	F01 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32130
Monitor Switch	By Others

Hardware Set #12

Hinges	A8111 x 652
Passage Set	F01 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32130

Hardware Set #12A

Hinges	A8111 x 652
Passage Set	F01 x 626
Electric Strike	E09321
ADA Operator w/ push pads	POWERSWING x 689

Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32130

Hardware Set #13

Hinges	A8111 x 652
Passage Set	F01 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154

Hardware Set #13A

Hinges	A8111 x 652
Passage Set	F01 x 626
Electric Strike	E09321
ADA Operator w/ push pads	POWERSWING x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154

Hardware Set #14

Hinges	A8111 x 652
Push Plate	J301 x 630
Push Pull Set	J406 With Pull x 630
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626

Note: Provide deadlock at Door LE40/2 only.

Hardware Set #14A

Hinges	A8111 x 652
Push Plate	J301 x 630
Push Pull Set	J406 With Pull x 630
ADA Operator w/ push pads	POWERSWING x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626

Hardware Set #15

Hinges	A8111 x 652
Office Lock	F04 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154

Hardware Set #16

Hinges	A8111 x 652
Exit Device	Type 3, Function 3 x 630
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Monitor Switch	By Others

Hardware Set #17

Hinges	K81151 x 652
Push Plate	J301 x 630
Armor Plates	J101 x 630
Wall Bumpers	L02101 x 626

Hardware Set #18

Hinges	A8111 x 652
Office Lock	F04 x 626
Closer w/ Hold Open	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Auto Door Bottom	R3C324
Threshold	J32130

Hardware Set #19

Hinges	A8111 x 652
Electric Hinge Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Monitor Switch	By Others

Hardware Set #19A

Hinges	A8111 x 652
Electric Hinge Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Electric Strike	E09321
ADA Operator w/ push pads	POWERSWING x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Gasketing	R0E154
Monitor Switch	By Others

Hardware Set #20

Hinges	A8111 x 652
Electric Hinge Electrified Exit Device	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.

Monitor Switch	By Others

Hardware Set #21

Hinges	A8111 x 652
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.
Auto. Dr Bottom	R3C324
Threshold	J32130
Monitor Switch	By Others

Hardware Set #21A

Hinges	A8111 x 652
Electric Hinges	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Electric Strike	E09391
Flush Bolts	L04251
Dust Proof Strike	L04021
ADA Operator w/ push pads	POWERSWING x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.
Auto. Door Bottom	R3C324
Threshold	J32130
Monitor Switch	By Others

Hardware Set #21B

Hinges	A8111 x 652
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Monitor Switch	By Others

Hardware Set #22

Hinges	A8111 x 652
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Auto. Flush Bolts	Type 25
Dust Proof Strike	L04021

Closers	Series C02000, Grade 1 x 689
Door Coordinator	Type 21
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.
Monitor Switch	By Others

Hardware Set #23

Hinges	A8111 x 652
Exit Device	Type 3, Function 3 x 630
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.
Monitor Switch	By Others

Hardware Set #24

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Astragal	By Door Mfr.

Hardware Set #24A

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Flush Bolts	L04251
Dust Proof Strike	L04021
Wall Bumpers	L02101 x 626

Hardware Set #25

Hinges	A8111 x 652
Storeroom Lock	Lock F07 x 626
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Auto. Door Bottom	R3C324
Astragal	By Door Mfr.
Monitor Switch	By Others

Hardware Set #26

Hinges	A8111 x 652
Push Plates	J301 x 630

Push Pull Sets	J406 with Pull x 630
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626

Hardware Set #27

Continuous Hinges	By Door Mfr.
Flush Bolts	By Door Mfr. x 628
Dust Proof Strike	L04021
Push Pull Bar Set	J504 x 630
Deadlock	E0211
Closers	Series C02000, Grade 1 x 689

Hardware Set #27A

Continuous Hinges	By Door Mfr.
Flush Bolts	By Door Mfr. x 628
Dust Proof Strike	L04021
Push Pull Bar Set	J504 x 630
Deadlock	E0211
ADA Operator w/ push pads	POWERSWING x 689

Hardware Set #28

Hinges	A8111 x 652
Exit Device	Type 2, Function 08
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Gasketing	R0E154
Auto. Door Bottom	R3C324

Hardware Set #28A

Hinges	A8111 x 652
Exit Device	Type 2, Function 08
Electric Strike	E09361
ADA Operator w/ push pads	POWERSWING x 689
Kick Plates	J102 x 630
Gasketing	R0E154
Auto. Door Bottom	R3C324

Hardware Set #29

Hinges	A8111 x 652
Electric Hinge Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Gasketing	R0E154
Astragal	By Door Mfr.
Monitor Switch	By Others

Hardware Set #30

Hinges	A8111 x 652
Office Lock	F04 x 626
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154

Hardware Set #31

Hinges	A8111 x 652
Classroom Lock	F05 x 626
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Gasketing	R0E154
Astragal	By Door Mfr.

Hardware Set #32

Electrified Continuous Hinge	Edge Mounted, Gear Type
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Removable Mullion	
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154
Auto. Door Bottom	R3C324
Monitor Switch	By Others

Hardware Set #33

Continous Hinge	Edge Mounted, Gear Type
Office Lock	
Removable Mullion	
Flush Bolts	L04251
Dust Proof Strike	L04021
Closer	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Wall Bumpers	L02101 x 626
Gasketing	R0E154

Hardware Set #34

Hinges	A8111 x 652
Passage Set	F01 x 262
Wall Bumper	L02101 x 626

Hardware Set #35

Hinges	A8111 x 652

Passage Set	F01 x 262
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626

Hardware Set #36

Hinges	A8111 x 652
Exit Device	Type 1, Function 01
Closer	Series C02000, Grade 1 x 689

Hardware Set #37

Hinges	A8111 x 652
Push Bar	J501
Electromagnetic Lock	E08531
Access Control	Push Button by Others
Closer	Series C02000, Grade 1 x 689

Hardware Set #38

Hinges	A8111 x 652
Passage Set	F01 x 262
Flush Bolts	L04251
Dust Proof Stike	L04021
Wall Bumpers	L02101 x 626

Hardware Set #40

Continuous Hinge	Edge Mounted, Gear Type
Exit Device	Type 1, Function 01, with local alarm
Closers	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #40A

Hinges	A5111 x 630
Exit Device	Type 1, Function 01, with local alarm
Closers	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #41

Electrified Continuous Hinge	Edge Mounted, Gear Type
Electrified Lock	(L221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #41A

Hinges	A5111 x 630
Electric Hinge electrified Lock	(L221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #42

Continuous Hinge	Edge Mounted, Gear Type
Entrance Lock	F21 x 626
Closer with Hold Open	Series C02000, Grade 1 x 689
Kick Plates	J102 10" X 2" LDW x 630
Weather Stripping	R3E164
Threshold	J32130
Monitor Switch	By Others

Hardware Set #43

Continuous Hinge	Edge Mounted, Gear Type
Exit Devices	Type 1, Function 01, with local alarm
Removable Mullion Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Gasketing	R3E164
Auto. Door Bottoms	R3C324
Threshold	J32334
Monitor Switch	By Others

Hardware Set #44

Continuous Hinge	Edge Mounted, Gear Type
Exit Device	Type 4, Function 02
Door Pull	J402
Closer	Series C02000, Grade 1 x 689
Weather Stripping	By Curtain Wall/Door Mfr.
Threshold	J32334
Monitor Switch	By Others

Hardware Set #44A

Continuous Hinge	Edge Mounted, Gear Type
Exit Device	Type 4, Function 02
Deadlock	E0211
Door Pull	J402
ADA Operator w/ push pads	POWERSWING x 689
Weather Stripping	By Curtain Wall/Door Mfr.
Threshold	J32334
Monitor Switch	By Others

Hardware Set #45

Continuous Hinges	Edge Mounted, Gear Type
Exit Devices	Type 4, Function 01, with local alarm
Mullion	By Curtain Wall/Door Mfr.
Closer	Series C02000, Grade 1 x 689
Weather Stripping	By Curtain Wall/Door Mfr.
Threshold	J32334
Monitor Switch	By Others

Hardware Set #46

Continuous Hinge Electrified	Edge Mounted, Gear Type
Continuous Hinge Electrified Exit Device	Edge Mounted, Gear Type (N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Surface bolts	L04161
Removable Mullion Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Auto. Door Bottoms	R3C324
Threshold	J32334
Monitor Switch	By Others

Hardware Set #47

Continuous Hinges	Edge Mounted, Gear Type
Exit Device	Type 1, Function 08
Removable Mullion Surface bolts	L04161
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Weather Stripping	R3E164
Auto. Door Bottom	R3C324
Threshold	J32334
Monitor Switch	By Others

Hardware Set #48

Continuous Hinges	Edge Mounted, Gear Type
Exit Device	Type 1, Function 01
Surface bolts	L04161
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Threshold	J32334
Monitor Switch	By Others

Hardware Set #49

Continuous Hinge Electrified	Edge Mounted, Gear Type
Continous Hinge Electrified Lock	Edge Mounted, Gear Type (L221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Surface bolts	L04161
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630

Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #49A

Hinges	A5111 x 630
Electric Hinge	
Electrified Lock	(L221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Surface bolts	L04161
Closers	Series C02000, Grade 1 x 689
Kick Plates	J102 x 630
Weather Stripping	R3E164
Threshold	J32334
Monitor Switch	By Others

Hardware Set #50

Hinges	A5111 x 630
Entrance Lock	Lock F04 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Weather Stripping	R3E164
Threshold	J32130
Monitor Switch	By Others

Hardware Set #51

Hinges	A5111 x 630
Storeroom Lock	Lock F07 x 626
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Wall Bumper	L02101 x 626
Weather Stripping	R3E164
Threshold	J32130
Monitor Switch	By Others

Hardware Set #52

Hinges	A5111 x 630
Electric Hinge	
Electrified Lock	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
X-09 Lock	
Closer	Series C02000, Grade 1 x 689
Kick Plate	J102 x 630
Weather Stripping	R3E164
Threshold	J32130
Monitor Switch	By Others

Hardware Set #53

Hinges	A5111 x 630
Exit Device	Type 4, Function 08
Closer	Series C02000, Grade 1 x 689
Weather Stripping	By Door Mfr.
Threshold	J32130

Monitor Switch	By Others

Hardware Set #54

Hinges	A5111 x 630
Electric Hinge	
Electrified Exit	
Device	(N221)(A156.13)(F07)
Access Control	Card Reader/Keypad by Others
Closer	Series C02000, Grade 1 x 689
Weather Stripping	By Door Mfr.
Threshold	J32334
Monitor Switch	By Others

Hardware Set #55

Continuous Hinges	Edge Mounted, Gear Type
Exit Devices	Type 4, Function 01, with local alarm
Closer	Series C02000, Grade 1 x 689
Weather Stripping	By Curtain Wall/Door Mfr.
Threshold	J32334
Monitor Switch	By Others

-- End of Section --

SECTION 08800

GLAZING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(1984; R 1994) Safety Glazing Materials Used in Buildings

ASTM INTERNATIONAL (ASTM)

ASTM C 1036	(2001) Flat Glass
ASTM C 1048	(2004) Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 1172	(2003) Standard Specification for Laminated Architectural Flat Glass
ASTM E 119	(2000a) Fire Tests of Building Construction and Materials
ASTM E 1300	(2004e1) Determining Load Resistance of Glass in Buildings
ASTM E 413	(1973; R 2004) Classification for Rating Sound Insulation
ASTM E 773	(2001) Accelerated Weathering of Sealed Insulating Glass Units
ASTM E 774	(1997) Classification of the Durability of Sealed Insulating Glass Units
ASTM E 90	(2004) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(2004) Glazing Manual
GANA Sealant Manual	(1990) Sealant Manual
GANA Standards Manual	(2001) Tempering Division's Engineering Standards Manual

INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)

SIGMA A1202	(1983) Commercial Insulating Glass Dimensional Tolerances
SIGMA TB-3001	(1990) Guidelines for Sloped Glazing
SIGMA TM-3000	(1997) Glazing Guidelines for Sealed Insulating Glass Units

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(1997; R 2004) Determining Fenestration Product U-factors
NFRC 200	(1997; R 2004) Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201	Safety Standard for Architectural Glazing Materials

UNDERWRITERS LABORATORIES (UL)

UL 752	(2005; Rev thru Dec 2006) Bullet-Resisting Equipment

U.S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	2002) Sustainable Project Rating Tool (SPiRiT) Version 1.4.1

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-03 Product Data

Insulating Glass

Documentation for Energy Star qualifications.

Glazing Accessories

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's product data or MSDS for all field applied adhesives used within the building interior highlighting VOC content, expressed in g/L, indicating that adhesives meet or exceed the VOC limits of SCAQMD Rule #1168.

Manufacturer's product data or MSDS for all field applied sealants used within the building interior highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

Local/Regional Materials; (SPiRiT)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

SD-04 Samples

Insulating Glass

Two 8 x 10 inch samples of each of the following: insulating glass units.

SD-07 Certificates

Insulating Glass

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

Glazing Accessories

SD-08 Manufacturer's Instructions

Setting and sealing materials

Glass setting

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing

material specified.

SD-11 Closeout Submittals

Local/Regional Materials; SPiRiT

SPiRiT (tm) documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above40 degrees F and rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total local material requirements. Glazing materials may be locally available.

1.7 WARRANTY

1.7.1 Warranty for Insulating Glass Units

Warranty insulating glass units against development of material obstruction to vision (such as dust, fogging, or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage, for a 10-year period following acceptance of the work. Provide new units for any units failing to comply with terms of this warranty within 45 working days after receipt of notice from the Government.

1.7.2 Monolithic Opacified Spandrel

Manufacturer shall warrant the opacifier film on the spandrel to be free of peeling for a period of five years after Date of Substantial Completion. Warranty shall be signed by manufacturer.

1.8 STRUCTURAL REQUIREMENT

Insulated glass units shall withstand the wind and blast loads specified in Section 08900 ALUMINUM CURTAIN WALL AND PUNCHED WINDOWS.

PART 2 PRODUCTS

2.1 GLASS

ASTM C 1036, unless specified otherwise. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

2.1.1 Annealed Glass

Annealed glass shall be Type I transparent flat type, Class 1 - clear, Quality q3 - glazing select, conforming to ASTM C 1036.

2.1.2 Laminated Glass

2.1.2.1 For Use in Insulating Glass Units

ASTM C 1172, Kind LA fabricated from two nominal 3/16 inch pieces of Type I, Class 1, Quality q3, Kind HS (heat-strengthened) float glass conforming to ASTM C 1048. Glass shall be laminated together with a minimum of 0.060 inch thick, clear polyvinyl butyral interlayer. The total thickness shall be nominally 3/8 inch.

2.1.2.2 For Use in STC-40 Glazed Openings

ASTM C 1172, Kind LA fabricated from two pieces of clear Type I, Class 1, Quality q3, flat annealed transparent glass conforming to ASTM C 1036. The laminated glass shall be composed of one piece of 1/4 inch thick glass and one piece of 3/8-inch thick glass laminated together with a minimum of 0.030-inch thick clear polyvinyl butyral interlayer for a total nominal glass thickness of 5/8-inch. The glass shall have a STC rating of at least 40.

2.1.3 Bullet-Resisting Glass

Provide bullet resisting glass composed of layers of architectural flat glass and polycarbonate with PVB interlayers sufficient in thickness and design to provide a UL 752 Level 3 level of protection. Bullet resisting glazing shall be type SP311 as manufactured by Global Security Glazing of Selma, Alabama or approved equal.

2.1.4 Tempered Glass

ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent), Quality q3, conforming to GANA Standards Manual. Color shall be clear.

2.1.5 Heat-Strengthened Glass

ASTM C 1048, Kind HS (heat strengthened), Condition A (uncoated), Type I, Class 1 (clear), Quality q3, 3/16 and 1/4 inch thick. Glass is used in fabrication of insulated glass units.

2.1.6 Fire/Safety Rated Glass

Fire/safety rated glass shall be clear, 1/4 inch polished wire glass with surface applied safety film. Glass shall have a 60 minute rating when tested in accordance with ASTM E 119. Glass shall be permanently labeled with appropriate markings.

2.2 INSULATING GLASS UNITS

Two panes of glass separated by a dehydrated 1/2 inch airspace and hermetically sealed. Glazed systems (including frames) shall be Energy Star labeled products as appropriate to climate zone and as applicable to window type, with a whole-window Solar Heat Gain Coefficient (SHGC) maximum of 0.39 determined according to NFRC 200 procedures. Glazed panels and curtain walls shall have a U-factor maximum of 0.30 Btu per square foot x hr x degree F in accordance with NFRC 100. Glazing shall meet or exceed a luminous efficacy of 1.0. Glazed panels shall be rated for not less than 40Sound Transmission Class (STC) when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413. Dimensional tolerances shall be as specified in SIGMA A1202. The units shall meet CBA Grade requirement when tested in accordance with ASTM E 773 and ASTM E 774, Class A. Spacer shall be roll-formed with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and the secondary seal shall be a specially formulated silicone.

Insulating glass units used in the Operations Building and Visitor Control Center shall have an outer light of 1/4 inch heat strengthened glass and an inner light of laminated glass as specified above. Units used in exterior aluminum and glass doors and in the glazed sidelights immediately adjacent to aluminum and glass doors shall have an outer light of 1/4 inch fully tempered glass instead of the heat strengthened glass.

Insulating glass units used in the Kennel, Vehicle Inspection Building, and Warehouse shall have two lights of 1/4 inch clear tempered glass separated by a 1/2 inch air space.

In all exterior insulating glass units, glass surface number 2 shall have the SunGuard Low-E coating SunGuard Neutral 61 (formerly NP 61) applied to it. In addition, glass panels with spandrel glass shall have a metallic opacifier applied to surface number 6. The opacifier shall be Viracon color V903, Subdued Gray or approved equal.

2.3 SETTING AND SEALING MATERIALS

Provide as specified in the Section 08900 ALUMINUM CURTAIN WALL AND PUNCHED WINDOWS.

2.4 WINDOW FILMS

2.4.1 RF Film

Provide SD2500 RF film, as manufactured by ASTIC Signals Defenses, LLC.

2.4.2 Privacy Matte Film

Provide Llumar glass treatment film NRMPS2 (frosted), as manufactured by CPFilms, Inc. or approved equal.

PART 3 EXECUTION

3.1 PREPARATION

Preparation, unless otherwise specified or approved, shall conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, SIGMA TB-3001, SIGMA TM-3000, and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on insulating glass units as soon as glass is installed. Coordinate installation with commissioning as specified in Section 01810 GENERAL COMMISSIONING REQUIREMENTS.

3.2 GLASS SETTING

Field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, shall conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, SIGMA TB-3001, SIGMA TM-3000, and manufacturer's recommendations. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place. Verify products are properly installed, connected, and adjusted.

3.2.1 Insulating Glass Units

Insulating glass units shall be installed in the skylight, all punched windows, and the curtain walls in the Operations Building including the exterior aluminum and glass doors. They shall also be installed in the punched windows and exterior storefront and aluminum and glass doors of the Visitor Control Center except where bullet resistant glass is specified. Insulating glass units shall also be installed in all exterior windows in the Vehicle Inspection Building, Warehouse, and Kennel.

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation shall conform to applicable recommendations of SIGMA TB-3001 and SIGMA TM-3000.

3.2.2 Installation of STC-40 Rated Laminated Glass

Install STC-40 rated laminated glass in all hollow metal sidelights and other windows located in the walls of the small conference rooms and caves and in the windows in the half-glass wall in Room 2W62.

3.2.3 Installation of Tempered Glass

Install 1/4 inch thick tempered glass in all interior aluminum and glass doors and sidelights in both the Operations Building and the Visitor Control Center. It shall also be installed in all non fire-rated exterior and interior hollow metal doors where glazing is shown. Install 1/2 inch thick tempered glass with butt joints in the sloped glass windows on the Second Level of the Operations Building that overlook the SOC. Install 1/2 inch thick tempered glass at the glass handrails in the Operations Building.

3.2.4 Installation of Fire/Safety Rated Glass

Install fire/safety rated glass in the interior stairwell doors in the Operations Buildings. Install in accordance with manufacturer's instructions as required to meet the specified fire rating.

3.2.5 Installation of Bullet Resistant Glass

Install bullet resistant glass in the exterior windows in Room 109 of the Visitor Control Center. The glass shall be installed with the glass face to the exterior in accordance with the manufacturer's instructions.

3.3 APPLICATION OF WINDOW FILMS

3.3.1 Application of RF Film

Apply RF film to the underside of the insulating glass units in the skylight in the Operations Building, and the inner surface of all transparent insulating glass units in the exterior windows and glazed exterior doors in the Operations Building, Module B of the Visitor Control Center, and the Warehouse. Install the film in accordance with the manufacturer's instructions.

3.3.2 Application of Privacy Matte Film

Apply privacy matte film to the inner surface of all sidelights and other windows located in the walls of the small conference rooms and caves in the Operations Building. Do not install the film on the glass in Room 2W62 of the Operations Building. Install the film in accordance with the manufacturer's instructions.

3.4 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass shall be clean at the time the work is accepted. Clean plastic sheet in accordance with manufacturer's instructions.

3.5 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Upon removal, separate protective materials for reuse or recycling. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

3.6 WASTE MANAGEMENT

Disposal and recycling of waste materials, including corrugated cardboard recycling, shall be in accordance with the Waste Management Plan. Upon removal, separate protective materials and reuse or recycle. Separate tempered glass for use as aggregate or nonstructural fill. Close and seal tightly all partly used sealant containers and store protected in well-ventilated, fire-safe area at moderate temperature.

-- End of Section --

SECTION 08900

ALUMINUM CURTAIN WALL AND PUNCHED WINDOWS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA ASD1	(2003) Aluminum Standards and Data

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501	(2005) Methods of Test for Exterior Walls
AAMA 609/610	(2002) Cleaning and Maintenance Guide for Architecturally Finished Aluminum
AAMA 611	(1998) Voluntary Specification for Anodized Architectural Aluminum
AAMA 800	(2005) Voluntary Specifications and Test Methods for Sealants
AAMA CW-10	(2004) Care and Handling of Architectural Aluminum from Shop to Site
AAMA MCWM-1	(1989) Metal Curtain Wall Manual

AMERICAN WELDING SOCIETY (AWS)

AWS A5.10/A5.10M	(1999) Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods
AWS D1.1/D1.1M	(2006) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2005) Carbon Structural Steel
ASTM A 572/A 572M	(2004) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM B 108	(2003a) Aluminum-Alloy Permanent Mold Castings
ASTM B 136	(2003) Measurement of Stain Resistance of Anodic Coatings on Aluminum
ASTM B 137	(1995; R 2004) Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum

ASTM B 209	(2004) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2005) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 244	(1997; R 2002) Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
ASTM B 26/B 26M	(2005) Aluminum-Alloy Sand Castings
ASTM B 85	(2003) Aluminum-Alloy Die Castings
ASTM C 1048	(2004) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 542	(1994; R 1999) Lock-Strip Gaskets
ASTM C 612	(2004) Mineral Fiber Block and Board Thermal Insulation
ASTM C 665	(2001e1) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 864	(1999) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 920	(2005) Elastomeric Joint Sealants
ASTM E 119	(2000a) Fire Tests of Building Construction and Materials
ASTM E 136	(2004) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 330	(2002) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E 331	(2000) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E 34	(1994; R 2002) Chemical Analysis of Aluminum and Aluminum-Base Alloys
ASTM E 84	(2005) Surface Burning Characteristics of Building Materials

ASTM E 90 (2004) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Aluminum curtain wall and punched window system

Submit for curtain wall system and accessories. Drawings shall indicate in detail all system parts including elevations, full-size sections, framing, jointing, panels, types and thickness of metal, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.

SD-03 Product Data

Aluminum curtain wall and punched window system

Include descriptive literature, detailed specifications, and available performance test data.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's product data or MSDS for all field applied sealants used within the building interior highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

SD-05 Design Data

Calculations; G

SD-08 Manufacturer's Instructions

Aluminum curtain wall and punched window system

Insulating glass

1.3 REQUIREMENT FOR DESIGN DATA

Submit structural and thermal calculations for complete wall assembly.

1.4 QUALITY ASSURANCE

1.4.1 Testing Requirements

The components listed below shall have been tested in accordance with the

requirements below, and shall meet performance requirements specified.

a. Joint and Glazing Sealants: Perform tests as required by applicable publications referenced.

b. Preformed Compression Gaskets and Seals: ASTM C 864.

c. Preformed Lock-strip Gaskets: ASTM C 542, modified as follows: Heat age specimens seven days at 158 degrees F, in zipped or locked position under full design compression. Unzip, cool for one hour, re-zip, and test lip seal pressure, which shall be minimum 2.5 pounds per linear inch on any extruded or corner specimen.

d. Spandrel Glass: Fallout resistance test, ASTM C 1048.

e. Anodized Finishes: Stain resistance, coating weight, and coating thickness tests, ASTM B 136, ASTM B 137, and ASTM B 244, respectively.

1.4.2 Factory Tests

Perform the following tests except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested, under the conditions specified herein.

1.4.2.1 Deflection and Structural Tests

No curtain wall framing member shall deflect, in a direction normal to the plane of the wall, more than 1/175 of its clear span or 3/4 inch, whichever is less, when tested in accordance with ASTM E 330, except that when a plastered surface will be affected the deflection shall not exceed 1/360 of the span. No framing member shall have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E 330 for a minimum test period of 10 seconds at 1.5 times the design wind pressures specified.

1.4.2.2 Water Penetration Test

No water penetration shall occur when the wall is tested in accordance with ASTM E 331 at a differential static test pressure of 20 percent of the inward acting design wind pressure as specified, but not less than 4 psf. Make provision in the wall construction for adequate drainage to the outside of water leakage or condensation that occurs within the outer face of the wall. Leave drainage and weep openings in members and wall open during test.

1.4.2.3 Air Infiltration Test

Air infiltration through the wall, when tested in accordance with ASTM E 283, shall not exceed 0.06 cfm per square foot of fixed wall area, plus the permissible allowance specified for operable windows within the test area.

1.4.2.4 Fire Resistance Tests

Insulation field applied in conjunction with the curtain wall system shall have a flame spread rating not exceeding 75 and a smoke developed rating not exceeding 150 when tested in accordance with ASTM E 84, except as specified otherwise herein.

a. Curtain Wall Systems: Material for firestopping the opening between the edge of the floor slab and back of the curtain wall system, shall have not less than the flame spread and smoke developed ratings specified for insulation which is neither isolated from the building interior nor encased in masonry cores.

b. Firestopping Materials and Devices: Firestopping material and attachment devices shall be an effective barrier against the spread of fire, smoke, and gases for a period of 1 hour when exposed to the conditions of the standard ASTM E 119 time-temperature curve for a period equivalent to the fire rating of the floor system and shall also be rated noncombustible when tested in accordance with ASTM E 136.

1.4.2.5 Sound Transmission Loss Test

Sound transmission loss (TL) of the wall shall be less than 45 db, when tested in accordance with ASTM E 90 for the frequency range from 125 to 400 Hz.

1.5 ALUMINUM CURTAIN WALL AND PUNCHED WINDOW SYSTEM REQUIREMENTS

Provide system complete with framing, mullions, trim, windows, glass, glazing, sealants, insulation, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing the wall to the structure as specified or indicated.

1.5.1 Source

Curtain wall system components shall be furnished by one manufacturer or fabricator; however, all components need not be products of the same manufacturer.

1.5.2 Design

Stick system with mullions and horizontal rails. Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.

1.5.3 Thermal Movement

Fabricate, assemble, and erect system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from 20 degrees F to 100 degrees F.

1.5.4 Tolerances

Design and erect wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified. Provide with the following tolerances:

a. Maximum variation from plane or location shown on approved shop drawings: 1/8 inch per 12 feet of length up to not more than 1/2 inch in any total length.

b. Maximum offset from true alignment between two identical members abutting end to end in line: 1/16 inch.

1.5.5 Structural Requirements

No member shall deflect in a direction parallel to the plane of the wall, when carrying its full design load, more than an amount which will reduce the edge cover or glass bite below 75 percent of the design dimension. No member after deflection under full design load, shall have a clearance between itself and the top of the panel, glass, sash, or other part immediately below it less than 1/8 inch; the clearance between the member and an operable door shall be minimum 1/16 inch. Design entire system to withstand the indicated wind and blast loads.

a. Wind load oOn the first two stories above grade shall be 33 psf acting inward, and the same load acting outward.

b. Wind load on corner areas, extending 23 feet from the building corners on the two stories, on all facades, the outward-acting (negative) design load shall be increased to 40 pounds per square foot.

c. Blast load reflective pressure of 2.43 psi and a reflected impulse of 40.68 psi-msec.

1.6 QUALIFICATION OF WELDERS

Welding shall be performed by certified welders qualified in accordance with AWS D1.1/D1.1M using procedures, materials, and equipment of the type required for the work.

1.7 DELIVERY AND STORAGE

Inspect materials delivered to the site for damage; unload and store with a minimum of handling in accordance with recommendations contained in AAMA CW-10. Storage spaces shall be dry locations with adequate ventilation, free from heavy dust, not subject to combustion products or sources of water, and shall permit easy access for inspection and handling. Deliver calking and sealing compounds to the job site in sealed containers labeled to show the designated name, formula or specifications number; lot number; color; date of manufacturer; shelf life; and curing time when applicable.

1.7.1 Protective Covering

Prior to shipment from the factory, place knocked-down lineal members in cardboard containers and cover finished surfaces of aluminum with protective covering of adhesive paper, waterproof tape, or strippable plastic. Covering shall not chip, peel, or flake due to temperature or weather, shall protect against discoloration and surface damage from transportation, and storage, and shall be resistant to alkaline mortar and plaster. Do not cover aluminum surfaces that will be in contact with sealants after installation.

1.7.2 Identification

Prior to delivery, mark wall components to correspond with shop and erection drawings placement location and erection.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aluminum

Shall be free from defects impairing strength or durability of surface finish. Standard alloys shall conform to standards and designations of AA ASD1. Special alloys, not covered by the following ASTM specifications, shall conform to standards and designations recommended by the manufacturer for the purpose intended.

2.1.1.1 Wrought Aluminum Alloys

Shall be those which include aluminum alloying elements not exceeding the following maximum limits when tested and additional in accordance with ASTM E 34. These limits apply to both bare products and the core of clad products. The cladding of clad products shall be within the same limits except that the maximum zinc limit may be 2.5 percent in order to assure that the cladding is anodic to the core. Special wrought alloys with a silicon content not more than 7.0 percent will be acceptable for limited structural uses where special appearance is required:

ALLOY	PERCENT
Silicon	1.5
Magnesium, Manganese, and Chromium combined	6.0
Iron	1.0
Copper	0.4
Zinc	1.0

Within the chemical composition limits set forth above, wrought aluminum alloys shall conform to the following:

a. Extruded bars, rods, shapes and tubes: ASTM B 221.

b. Sheet and Plate: ASTM B 209.

2.1.1.2 Cast Aluminum Alloys

Provide those in which the alloying elements are silicon, magnesium, manganese, or a combination of these. Other elements shall not exceed the following limits:

ELEMENT	PERCENT
Iron	1.2
Copper	0.4
Nickel	0.4
Titanium	0.2

ELEMENT	PERCENT
Others (total)	0.5

Within the chemical composition limits set forth above, cast aluminum alloys shall conform to the following:

a. Sand castings: ASTM B 26/B 26M.

b. Die casting: ASTM B 85.

c. Permanent mold castings: ASTM B 108.

2.1.1.3 Welding Rods and Electrodes

Welding rods and bare electrodes shall conform to AWS A5.10/A5.10M as recommended by the manufacturer of the aluminum base metal alloy being used.

2.1.1.4 Finish

Aluminum used for framing shall have a clear anodized finish designation AA-M1O-C22-A31, meeting the requirements of AAMA 611.

2.1.1.5 Strength

Aluminum extrusions for framing members used in curtain walls and main frame shall have a minimum ultimate tensile strength of 22,000 psi and a minimum yield strength of 16,000 psi.

2.1.2 Carbon Steel

Conform to the following specifications:

a. Rolled shapes, plates, and bars: ASTM A 36/A 36M.

2.1.3 High-Strength, Low-Alloy Steel

Conform to ASTM A 572/A 572M for structural shapes, plates, and bars.

2.1.4 Metal Fasteners

Provide fasteners as specified in paragraph entitled "Fastener Metals for Joining Various Metal Combinations" in "Part 2 - Products" of the AAMA MCWM-1. Metals used for fasteners shall be chemically and galvanically compatible with contiguous materials.

2.1.5 Joint Sealants and Accessories

Provide manufacturer's standard colors as closely matching the adjacent surfaces as possible.

2.1.5.1 Elastomeric, Single or Multiple Component

ASTM C 920, Type S, single component. Use Grade NS, nonsag type in joints on vertical surfaces and use Grade P, self-leveling or flow type, in joints on horizontal surfaces.

2.1.5.2 Single Component Silicone Rubber Base

ASTM C 920, Type S, Grade NS (Silicone).

2.1.5.3 Solvents and Primers

Provide material which is quick drying, colorless, nonstaining, compatible with compound used, as recommended by sealant manufacturer. Where primer is specified or recommended by sealant manufacturer, tests related to that material shall include primer.

2.1.5.4 Backing Material

Provide material which is nonstaining, nonabsorbent, and compatible with sealing compound. Closed cell resilient urethane, polyvinylchloride or polyethylene foam; closed-cell sponge of vinyl or rubber; closed cell neoprene or butyl rod; or polychloroprene tubes or beads.

2.1.5.5 Bond Preventive Materials

Provide polyethylene tape with pressure-sensitive adhesive; aluminum foil or waxed paper.

2.1.5.6 Preformed Sealing Compound

Provide nonskinning type conforming to AAMA 800. Tapes, beads, ribbons or other shapes as required.

2.1.6 Glass and Glazing

Materials are specified under Section 08800 GLAZING.

2.1.7 Aluminum and Glass Doors

Aluminum and glass doors to be installed in the aluminum curtain walls are specified in Section 08390 BLAST RESISTANT DOORS.

2.1.8 Firestopping Material

Mineral fiber manufactured from asbestos-free materials, and conforming to ASTM C 612 or ASTM C 665, meeting fire resistance requirements specified.

2.1.9 Metal Accessories

Fabricate accessories of sizes and shapes indicated from similar materials and finish as specified for wall system.

PART 3 EXECUTION

3.1 FABRICATION

The curtain wall components shall be of the materials and thickness indicated or specified. The details indicated are representative of the required design and profiles. Acceptable designs may differ from that shown if the proposed system components conform to the limiting dimensions indicated and the requirements specified herein. Unless specifically indicated or specified otherwise, the methods of fabrication and assembly shall be at the discretion of the curtain wall manufacturer. Perform fitting and assembling of components in the shop to the maximum extent

practicable. Anchorage devices shall permit adjustment in three directions. Exposed fastenings used on finished surfaces shall be truss head, flat head, or oval head screws or bolts.

3.1.1 Joints

Provide welded or mechanical fasteners as indicated or specified. Match joints in exposed work to produce continuity of line and design. Bed-joints or rabbets receiving calking or sealing material shall be minimum 3/4 inch deep and 3/8 inch wide at mid ambient temperature range.

3.1.2 Welding

Conform to AWS D1.1/D1.1M. Use methods and electrodes recommended by manufacturers of base metal alloys. Welding rods shall be of an alloy that matches the color of the metal being welded. Protect glass and other finish from exposure to welding spatter. Ground and finish weld beads on exposed metal surfaces to minimize mismatch and to blend with finish on adjacent parent metal. If flux is used in welding aluminum, completely remove it immediately upon completion of welding operations. Do not use exposed welds on aluminum surfaces.

3.1.3 Soldering and Brazing

Provide as recommended by suppliers. Solder only for filling or sealing joints.

3.1.4 Ventilation and Drainage

Provide internal ventilation drainage system of weeps or based on principles of pressure equalization to ventilate the wall internally and to discharge condensation and water leakage to exterior as inconspicuously as possible. Flashings and other materials used internally shall be nonstaining, noncorrosive, and nonbleeding.

3.1.5 Protection and Treatment of Metals

3.1.5.1 General

Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving the shop.

3.1.5.2 Galvanic Action

Provide protection against galvanic action wherever dissimilar metals are in contact, except in the case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint or apply appropriate calking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.

3.1.5.3 Protection for Aluminum

Protect aluminum which is placed in contact with, built into, or which will receive drainage from masonry, lime mortar, concrete, or plaster with one coat of alkali-resistant bituminous paint. Where aluminum is contacted by absorptive materials subject to repeated wetting or treated with preservative noncompatible with aluminum, apply two coats of aluminum paint, to such materials and seal joints with approved calking compound.

3.2 INSTALLATION

Installation and erection of glazed wall system and all components shall be performed under direct supervision of and in accordance with approved recommendations and instructions of wall system manufacturer or fabricator.

3.2.1 Bench Marks and Reference Points

Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of the marks, stop erection work in that area until discrepancies have been corrected.

3.2.2 Verifying Conditions and Adjacent Surfaces

After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in the building frame.

3.2.3 Joint Sealants

3.2.3.1 Surface Preparation

Surfaces to be primed and sealed shall be clean, dry to the touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions shall conform to approved detail drawings with a tolerance of plus 1/8 inch. Do not apply compound unless ambient temperature is between 40 and 90 degrees F. Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings shall be of type that leave no residue on metals.

3.2.3.2 Applications

Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound shall be uniformly smooth and free of wrinkles and, unless indicated otherwise, shall be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four hours, but at no time shall this amount exceed 5 gallons.

3.2.3.3 Primer

Apply to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after calking is completed.

3.2.3.4 Backing

Tightly pack in bottom of joints which are over 1/2 inch in depth with specified backing material to depth indicated or specified. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.

3.2.3.5 Bond Prevention

Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.

3.2.3.6 Protection and Cleaning

Remove compound smears from surfaces of materials adjacent to sealed joints as the work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with approved solvent. Upon completion of calking and sealing, remove remaining smears, stains, and other soiling, and leave the work in clean neat condition.

3.2.4 Glass

Install in accordance with manufacturer's recommendations as modified herein.

3.2.4.1 Inspection of Sash and Frames

Before installing glass, inspect frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.

3.2.4.2 Preparation of Glass and Rabbets

Clean sealing surfaces at perimeter of glass and sealing surfaces of rabbets and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer.

3.2.4.3 Positioning Glass

Maintain specified edge clearances and glass bite at perimeter. Maintain position of glass in rabbet and provide required sealant thickness on both sides of glass. Provide setting blocks at sill and spacer shims on all four sides; locate setting blocks one quarter way in from each jamb edge of glass. Where setting blocks and spacer shims are set into glazing compound or sealant, butter with compound or sealant, place in position, and allow to firmly set prior to installation of glass.

3.2.4.4 Setting Methods

Apply glazing compound, glazing sealant, glazing tape, and gaskets uniformly with accurately formed corners and bevels. Remove excess compound from glass and sash. Use only recommended thinners, cleaners, and solvents. Strip surplus compound from both sides of glass and tool at slight angle to shed water and provide clean sight lines. Secure stop beads in place with suitable fastenings. Do not apply compound or sealant at temperatures lower than 40 degrees F, or on damp, dirty, or dusty surfaces. After glazing, fix ventilators in sash so they cannot be operated until compound or sealant has set.

3.2.4.5 Void Space

Provide void space at head and jamb to allow glass to expand or move without exuding the sealant.

3.2.4.6 Insulating Glass

Provide adequate means to weep incidental water and condensation away from the sealed edges of insulated glass units and out of the wall system. The weeping of lock-strip gaskets should be in accordance with the recommendation of the glass manufacturer.

3.2.4.7 Insulating Glass With Edge Bands

Insulating glass with flared metal edge bands set in lock-strip type gaskets: Follow glass manufacturer's recommendations and add supplementary wet seal as required; when used with glazing tape, use tapered tape.

3.2.5 Firestopping

Provide firestopping, where indicated, in openings between wall system and floor at each story to prevent passage of flame and hot gases from floor to floor under extended fire exposure. Installed fire stopping shall remain in place under extended fire exposure despite distortions that may occur in wall system components. Securely attach anchoring or containment devices to building structure and not to wall system. Place mineral fiber on steel plates attached to bottom of floor slab.

3.3 FIELD TESTS

Conduct field check test for water leakage on designated wall areas after erection. Conduct test on one wall area, two bays wide by two stories high where directed, and on two punched window installations. Conduct test and take necessary remedial action as described in AAMA 501.

3.4 CLEANING AND PROTECTION

3.4.1 Glass

Upon completion of wall system installation, thoroughly wash glass surfaces on both sides and remove labels, paint spots, putty, compounds, and other defacements. Replace cracked, broken, and defective glass with new glass at no additional cost to the Contractor.

3.4.2 Aluminum Surfaces

Protection methods, cleaning, and maintenance shall be in accordance with AAMA 609/610 and AAMA 609/610.

3.4.3 Other Metal Surfaces

After installation, protect exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods shall be in accordance with recommendations of product manufacturers or of the respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent

fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or the respective trade association.

-- End of Section --

SECTION 09100

METAL SUPPORT ASSEMBLIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 463/A 463M	(2005) Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 645	(2004a) Nonstructural Steel Framing Members
ASTM C 754	(2004) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Metal support systems; G

Submit for the erection of metal framing, furring, and ceiling suspension systems. Indicate materials, sizes, thicknesses, and fastenings.

SD-03 Product Data

Certification

Submit manufacturer's product data for steel framing, including percentages of post-consumer and post-industrial recycled content. Provide manufacturer's letter certifying that steel framing specified as regionally manufactured materials containing locally recovered recycled content and were manufactured in a facility within 500 miles of the project site. Provide written statement of the cost of steel framing.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site and store in ventilated dry locations.

Storage area shall permit easy access for inspection and handling. If materials are stored outdoors, stack materials off the ground, supported on a level platform, and fully protected from the weather. Handle materials carefully to prevent damage. Remove damaged items and provide new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide steel materials for metal support systems with galvanized coating ASTM A 653/A 653M, G-40; aluminum coating ASTM A 463/A 463M, T1-25; or a 55-percent aluminum-zinc coating. Provide steel materials having a minimum 30 percent recycled content. Give preferance to products having locally recovered recycled content.

2.1.1 Materials for Attachment of Gypsum Wallboard

2.1.1.1 Suspended and Furred Ceiling Systems

ASTM C 645.

2.1.1.2 Nonload-Bearing Wall Framing and Furring

ASTM C 645. Thickness, size, and spacing of studs shall be as indicated on the drawings.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Systems for Attachment of Gypsum Wallboard

3.1.1.1 Suspended and Furred Ceiling Systems

ASTM C 754, except that framing members shall be 16 inches o.c. unless indicated otherwise.

3.1.1.2 Nonload-Bearing Wall Framing and Furring

ASTM C 754, except as indicated otherwise.

3.2 ERECTION TOLERANCES

Framing members which will be covered by finish materials such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/4 inch in 8 feet from a straight line;

c. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/4 inch in 8 feet from a true plane.

Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive shall be within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/8 inch in 8 feet from a straight line;

c. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/8 inch in 8 feet from a true plane.

3.3 WASTE MANAGEMENT

Recycle or otherwise divert from a landfill, all steel framing waste, as required by Construction Waste Management Plan.

-- End of Section --

SECTION 09235

GLASS FIBER REINFORCED GYPSUM FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

This section includes the glass fiber reinforced gypsum column covers located in the SOC and Cafeteria.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 473	(2007) Physical Testing of Gypsum Panel Products
ASTM D 2240	(2005) Standard Test Method for Rubber Property - Durometer Hardness
ASTM D 256	(2006a) Determining the Izod Pendulum Impact Resistance of Plastics
ASTM C 109/C 109M	(2007) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C 947	Standard Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete (Using Simple Beam with Third-Point Loading)
ASTM D 696	(2003) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM E 136	(2004) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E 84	(2008a) Standard Test Method for Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Column Covers

For custom items, provide drawings showing locations, dimensions, layout, joints, details, and interface with adjacent work; include field measured dimensions of the spaces where items are to be installed, if critical to proper installation.

SD-03 Product Data

Column Covers

Manufacturer's data sheets on each product to be used, including dimensions, finishes, storage and handling requirements and recommendations, and installation recommendations.

Material Safety Data Sheets for raw materials used.

SD-04 Samples

Finish samples

Six inch by 6 inch flat samples depicting material thickness and surface finish to be supplied.

SD-06 Test Reports

Material tests

Test data from an approved independent testing laboratory employed by the manufacturer of the finished product establishing compliance with specification requirements. Tests are to include flexural strength, impact resistance, hardness, coefficient of linear thermal expansion, humidified defection, flammability, compressive strength, and density.

SD-07 Certificates

Percent of reinforcement

Manufacturer's certification that all pieces contain at least 5% by weight of glass fiber reinforcement.

1.4 DELIVERY, STORAGE, AND HANDLING

Transport, lift, and handle units with care, avoiding excessive stress and preventing damage; use appropriate equipment.

Store products in manufacturer's unopened packaging until ready for installation, in a clean dry area protected from weather, moisture and damage; store units upright and not stacked unless permitted by manufacturer.

1.5 QUALITY ASSURANCE

1.5.1 Manufacturer's Qualifications

Manufacturer shall have five years verifiable and successful experience

producing material for projects of similar size and scope.

1.5.2 Installer's Qualifications

Firm must provide evidence of three years verifiable experience installing the specified work. Installer must be acceptable to the manufacturer.

1.6 SEQUENCING AND SCHEDULING

Coordinate the delivery and installation of column covers with work specified in other sections. Do not proceed with the installation of column covers until conditions are acceptable.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

Acceptable Manufacturer: Plaster Concepts, Inc., 425 E. Crossville Road, Suite 207, Roswell, GA 30075, (770) 552-0215 or approved equal.

2.2 COLUMN COVERS

a. Glass Fiber Reinforced Gypsum Fabrications: High density gypsum reinforced with continuous filament glass fiber mat and structural reinforcing as required.

(1) Glass Content: 5 to 6 percent by weight.

(2) Density: 95 pcf neat, minimum.

(3) Flame Spread Index: 0, when tested in accordance with ASTM E 84.

(4) Smoke Developed Value: 0, when tested in accordance with ASTM E 84.

(5) Flammability: passes, when tested in accordance with ASTM E 136.

(6) Flexural Strength: flexural yield - 1532 psi, minimum; flexural ultimate - 5716 psi, minimum, when tested in accordance with ASTM C 947.

(7) Impact Resistance: 4.52 in-lbs/in, minimum, when tested in accordance with ASTM D 256, Method E (Izod reverse notch method).

(8) Hardness: Shore "D" 84, minimum, when tested in accordance with ASTM D 2240.

(9) Coefficient of Linear Thermal Expansion: .0000108 in/in degrees F, maximum, when tested in accordance with ASTM D 696.

(10) Humidified Deflection: 1/4 inch maximum, when tested in accordance with ASTM C 473.

(11) Compressive Strength: 5620 psi, minimum, when tested in accordance with ASTM C 109/C 109M.

2.3 ACCESSORIES

Non-corrosive and non-bleeding fasteners, embeds, and framing, as detailed in the approved shop drawings. Adhesive to be silicone based.

PART 3 EXECUTION

3.1 FABRICATION

Fabricate 24 inch diameter glass fiber reinforced gypsum column covers. Covers shall have 3/4 inch by 3/4 inch reveals on opposite sides of the column 180 degrees apart as shown on the drawings. Column cover sections shall be one piece for the full height from floor to ceiling.

Fabricate column covers to profiles, shapes, and configurations detailed on approved shop drawings using manufacturer's standard processes. Tolerances as stated on manufacturer's approved shop drawings. Finished surfaces to have a smooth finish suitable for priming.

3.2 EXAMINATION

Do not begin installation until substrates have been properly constructed; verify that substrates are plumb and true. If substrate preparation is unsatisfactory notify Contractor before proceeding.

Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contractor and wait for instructions before beginning installation.

3.3 PREPARATION

Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Install supplementary temporary and permanent supports as required for proper installation.

3.4 INSTALLATION

Install in accordance with manufacturer's shop drawings, plumb and true to line; shim where necessary. Coordinate work with related gypsum wallboard work.

Finish the joints at piece intersections such that joints are neither visible nor perceptible. If the column covers are to be installed in an area subject to "critical lighting," the entire surface of the material may need to be skim coated. If the column covers are to receive a semi-gloss of gloss paint, the entire surface of the material may need to be skim coated.

Prime all column covers with a primer recommended for gypsum board or gypsum plaster. More than one coat of primer may be required. Sanding after each coat of primer may be required.

3.5 PROTECTION

Protect installed products until completion of project. Touch-up, repair or replace damaged products before Substantial Completion.

-- End of Section --

SECTION 09250

GYPSUM BOARD

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 36/C 36M	(2003) Gypsum Wallboard
ASTM C 79/C 79M	(2003) Treated Core and Nontreated Core Gypsum Sheathing Board
ASTM C 442/C 442M	(2004) Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board
ASTM C 475	(2002) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 630/C 630M	(2003) Water-Resistant Gypsum Backing Board
ASTM C 840	(2003) Application and Finishing of Gypsum Board
ASTM C 954	(2000) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C 1002	(2001) Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C 1047	(1999) Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C 1177/C 1177M	(2004) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1396/C 1396M	(2003a) Standard Specification for Gypsum Board
ASTM D 226	(1997a) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

GYPSUM ASSOCIATION (GA)

GA 214	(1996) Recommended Levels of Gypsum Board Finish
GA 216	(2000) Application and Finishing of Gypsum Board
GA 253	(1999) Application of Gypsum Sheathing
GA 600	(2003) Fire Resistance and Sound Control Design Manual

U.S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	(2002) Sustainable Project Rating Tool (SPiRiT), Version 1.4.1

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(2004) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

RFI Shielding Foil; G

Shop drawings indicating RFI shielding foil installation details.

SD-03 Product Data

Water-Resistant Gypsum Backing Board

Glass Mat Covered or Reinforced Gypsum Sheathing

Accessories

Submit for each type of gypsum board.

Gypsum Board (SPiRiT)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate dollar value of recycled content products included in project.

Joint Treatment Materials (SPiRiT)

Submit manufacturer's product data, indicating volatile organic compounds (VOC) content expressed in grams/liter.

Local/Regional Materials (SPiRiT)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin

from the project site. Indicate dollar value of local/regional materials included in the project.

SD-07 Certificates

Asbestos Free Materials; G

Certify that gypsum board types, gypsum backing board types, and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-10 Operation and Maintenance Data

Manufacturer maintenance instructions

Waste Management

SD-11 Closeout Submittals

Local/Regional Materials (SPiRiT)

SPiRiT documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Gypsum Board (SPiRiT)

SPiRiT documentation relative to recycled content credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

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

1.3.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of VOCs or other contaminants. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.3.3 Handling

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

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, and joint treatment materials, or the bonding of adhesives.

1.4.2 Exposure to Weather

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

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Local/Regional Materials (SPiRiT)

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total local material requirements. Gypsum board materials may be locally available.

1.6 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

1.7 SCHEDULING

The gypsum wallboard shall be taped, spackled, and primed before the installation of any highly-emitting materials or the gypsum wallboard shall be installed after the installation and ventilation period of any highly-emitting materials.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, and joint treating materials manufactured from asbestos free materials only.

2.1.1 Gypsum Board

ASTM C 36/C 36M and ASTM C 1396/C 1396M. Gypsum board shall be low VOC with no urea formaldehyde. Gypsum board shall contain a minimum of 80 percent post-consumer recycled content, or a minimum of 80 percent post-industrial recycled content. Paper facings shall contain 100 percent post-consumer recycled paper content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements.

2.1.1.1 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.1.2 Sag Resistant Ceiling Board

48 inch wide, 1/2 inch thick, tapered edges, with additives to enhance sag resistance of the core.

2.1.2 Water-Resistant Gypsum Backing Board

ASTM C 630/C 630M.

2.1.2.1 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.3 Glass Mat Covered or Reinforced Gypsum Sheathing

Exceeds physical properties of ASTM C 79/C 79M and ASTM C 1177/C 1177M. Provide 5/8 inch, gypsum sheathing. Provide gypsum board with a noncombustible water-resistant core, with glass mat surfaces embedded to the gypsum core or reinforcing embedded throughout the gypsum core. Warrant gypsum sheathing board for at least six months against delamination due to direct weather expsosure. Provide continuous, asphalt impregnated, building felt to cover exterior face of sheathing.

2.1.4 Joint Treatment Materials

ASTM C 475. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.4.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.4.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.4.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.4.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.4.5 Joint Tape

Use cross-laminated or tapered edge tape recommended by the manufacturer.

2.1.5 Fasteners

2.1.5.1 Screws

ASTM C 1002, Type "S" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C 954 steel drill screws for fastening gypsum board

to steel framing members 0.033 to 0.112 inch thick.

2.1.6 Shaftwall Liner Panel

ASTM C 442/C 442M. Conform to the UL Fire Resist Dir for the Design Numbers(s) indicated for shaftwall liner panels. Manufacture liner panel for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, 1 inch thick, by 24 wide.

2.1.7 Accessories

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

2.1.8 Asphalt Impregnated Building Felt

Provide a 15 lb asphalt moisture barrier over gypsum sheating. Conforming to ASTM D 226 Type 1 (No. 15) for asphalt impregnated building felt.

2.1.9 Water

Provide clean, fresh, and potable water.

2.1.10 RFI Shielding Foil

a. Perforated 5 mil (0.005 inch) minimum thickness aluminum foil film.

b. Natural finish material for use in concealed locations.

2.1.11 Sound Attenuation Blankets

Provide unfaced fiberglass or mineral wool sound attenuation blankets 16 inches wide by thickness sufficient to achieve the desired through-the-wall STC rating.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C 840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels

in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may not be bonded together with an adhesive. Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Provide type of gypsum board for use in each system specified herein as indicated.

For the double layer installation at the interior of the exterior walls, screw the first layer of gypsum board to the steel studs. No finishing of this layer is required. Then adhere the RFI shielding foil to the face of the first layer, as specified in Paragraph RFI Shielding Foil. Install the second layer of gypsum board over the foil by screwing through the foil and first layer of board into the studs. Stagger the vertical joints between the two layers of board. Finish the second layer of board, as specified in Paragraph FINISHING OF GYPSUM BOARD.

3.2.1 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C 840, System VIII or GA 216.

3.2.2 Arches and Bending Radii

Apply gypsum board in accordance with ASTM C 840, System IX or GA 216.

3.2.3 Gypsum Board for Wall Tile or Tile Base and Other Areas as Indicated

In restrooms, toilets, the area within locker rooms with plumbing fixtures, the cafeteria servery, and all areas of the kitchen where water is present, install water-resistant gypsum backing board on all walls in accordance with ASTM C 840, System X or GA 216.

3.2.4 Glass Mat covered or Fiber Reinforced Gypsum Sheathing

Apply gypsum sheathing in accordance with GA 253. Follow gypsum sheathing manufacturer's requirements of design details for joints and fasteners and be properly installed to protect the substrate from moisture intrusion. Do not leave exposed surfaces of the gypsum sheathing beyond the manufacturer's recommendation without a weather barrier cladding. Provide continuous asphalt impregnated building felt over sheathing surface in single fashion with edges and ends lapped a minimum of 6 inches. Properly flash the openings.

3.2.5 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C 840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to match the fire-rating of construction.

3.2.6 RFI Shielding Foil

Apply continuous sheet of foil to wall types indicated. Extend onto adjacent floor and roof structures. Wrap material behind recessed wall-mounted items. Wrap material into window, door, and other wall openings. Overlap and splice joints in foil using only materials approved by the foil material manufacturer. Coordinate installation with electrical trades to ensure proper grounding of material and to ensure safeguards against electric shock hazards are in place during the construction period

and in the completed work.

3.2.7 Sound Attenuation Blankets

Friction fit blankets snugly within stud spaces in STC rated walls. Tightly abut adjacent blankets. Fill all voids in wall cavity. Wrap behind electrical and communications boxes. Fill hollow metal door frames located in STC rated walls.

3.3 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish water resistant gypsum backing board, ASTM C 630/C 630M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering to Level 3 in accordance with GA 214. Finish all remaining walls and ceilings to Level 4 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.

3.4 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board as specified in Section 07920 JOINT SEALANTS Apply material with exposed surface flush with gypsum board.

3.5 FIRE-RESISTANT ASSEMBLIES

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, wall and ceiling framing in accordance with the specifications contained in UL Fire Resist Dir for the Design Number(s) indicated, or GA 600 for the File Number(s) indicated. Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

3.6 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

3.7 SHAFTWALL FRAMING

Install the shaftwall system in accordance with the system manufacturer's published instructions. Coordinate bucks, anchors, blocking and other items placed in or behind shaftwall framing with electrical and mechanical work. Patch or replace fireproofing materials which are damaged or removed during shaftwall construction.

3.8 WASTE MANAGEMENT

As specified in Waste Management Plan.

Identify manufacturer's policy for collection or return of remaining construction scrap, unused material, and packaging material. Institute demolition and construction recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 09310

CERAMIC TILE, QUARRY TILE, AND PAVER TILE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.1	(2005) General Requirements: Subsurffaces and Preparations by Other Trades
ANSI A108.5	(1999; Reaffirmed 2005) Installation of Ceramic Tile with Dry-Set Portland Cement Mortar of Latex-Portland Cement Mortar
ANSI A108.6	(1999; Reaffirmed 2005) Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy
ANSI A108.10	(1999; Reaffirmed 2005) Installation of Grout in Tilework
ANSI A118.1	(1999; Reaffirmed 2005) Standard Specification for Dry-Set Portland Cement Motrar
ANSI A118.3	(1999; Reaffirmed 2005) Standard Specification for Chemical Resistant, Waster cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-wetting Epoxy Adhesive
ANSI A118.4	(1999; Reaffirmed 2005) Standard Specification for Latex-Portland Cement
ANSI A118.7	(1999; Reaffirmed 2005) Standard Specification for Polymer Modified Cement Grouts for Tile Installation
ANSI A118.9	(1999; Reaffirmed 2005) Standard Specification for Test Mothods and Specifications for Cementitious Backer Units
ANSI A118.10	(1999; Reaffirmed 2005)) Specification for Load Bearing-Bonded Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation

ANSI A137.1 (1988) Ceramic Tile

ASTM INTERNATIONAL (ASTM)

ASTM C 1027 (1999) Determining Visible Abrasion Resistance of Glazed Ceramic Tile

ASTM C 1028 (1996) Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

ASTM C 241 (1990; R 1997e1) Abrasion Resistance of Stone Subjected to Foot Traffic

ASTM C 373 (1988; R 1999) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products

ASTM C 482 (2002) Bond Strength of Ceramic Tile to Portland Cement

ASTM C 501 (1984; R 2002) Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser

ASTM C 648 (2004) Breaking Strength of Ceramic Tile

Bay Area Air Quality Management District (Bay Area AQMD)

Bay Area AQMD Rule 8-51 (1992; R 2001) Adhesive and Sealant Products

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual (2003) Dimension Stone Design Manual

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule #1168 (1989; R 2005) Adhesive and Sealant Applications

TILE COUNCIL OF AMERICA (TCA)

TCA Hdbk (2003; R 2005) Handbook for Ceramic Tile Installation

U. S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT (2002) Sustainable Project Rating Tool (SPiRiT) Version 1.4.1

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings

Drawings showing ceramic tile pattern.

SD-03 Product Data

Local/Regional Materials; (SPiRiT)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Provide products manufactured within a 500 mile radius of the project site. Provide products with a minimum 17% post-consumer recycled content and a minimum 4% post-industrial recycled content.

Tile

Mortar, Grout, and Adhesive (SPiRiT)

Manufacturer's catalog data and preprinted installation and cleaning instructions. Indicate VOC content.

Tile; (SPiRiT)

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Membrane

Provide manufacturer's data for waterproof membrane and sound reduction membrane.

SD-04 Samples

Tile
Marble Thresholds
Grout

Samples of sufficient size to show color range, pattern, type and joints.

SD-07 Certificates

Tile
Mortar, Grout, and Adhesive

Certificates indicating conformance with specified requirements. Furnish a master grade certificate for tile.

SD-11 Closeout Submittals

Local/Regional Materials; (SPiRiT)

SPiRiT documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Tile; (SPiRiT)

SPiRiT documentation relative to recycled content credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Adhesives; (LEED)

SPiRiT documentation relative to low-emitting materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.3 DELIVERY AND STORAGE

Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather, and stored under cover in accordance with manufacturer's printed instructions.

1.4 ENVIRONMENTAL REQUIREMENTS

a. Close space in which tile is being set to traffic and other work. Keep closed until tile is firmly set. Do not walk or work on newly tiled floors without using kneeling boards or equivalent protection of the tiled surface. Keep traffic off horizontal portland cement mortar installations for at least 72 hours.

b. Do not perform ceramic tile work unless the substrate and ambient temperature in the area is at least 50 degrees F and rising. Maintain temperature above50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used, ventilate the area to the outside to avoid carbon dioxide damage to new tilework.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available

from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total local material requirements. Tile materials may be locally available.

1.6 EXTRA STOCK

Supply an extra two percent of each type tile used in clean and marked cartons.

1.7 DETAIL DRAWINGS

Dimension and draw detail drawings at a minimum scale of 1/4 inch = 1 foot. Include drawings of pattern at inside corners, outside corners, termination points and location of all equipment items such as thermostats, switch plates, mirrors and toilet accessories mounted on surface.

PART 2 PRODUCTS

2.1 TILE

Conform to ANSI A137.1 for standard grade tile. Provide grade sealed containers. Mark seals with the marks on the signed master grade certificate. Provide an impact resistant tile with a minimum floor breaking strength for wall tile of 90 pound and for floor tile of 250 pound in accordance with ASTM C 648. Provide a 0.50 maximum percent water absorption in accordance with ASTM C 373. Provide a minimum coefficient of friction of 0.60 wet and dry in accordance with ASTM C 1028. Identify floor tile as Class IV Plus-Extra Heavy Traffic, durability classification as rated by the manufacturer when tested in accordance with ASTM C 1027 for abrasion resistance as related to foot traffic. Coordinate the color with the MATERIAL LEGEND in the drawings.

2.1.1 Quarry Tile

Furnish an unglazed porcelain stone and trim with abrasive surface. Quarry tile shall contain a minimum of 40 percent post-industrial recycled content. Use 8 by 8 by 5/16 inch. Coordinate the color with the MATERIAL LEGEND in the drawings.

2.1.2 Porcelain Tile

Furnish an unglazed porcelain tile and trim with the color extending uniformly through the body of the tile. Provide a nominal size of 12 by 12 by 5/16 inch thick. Criteria for tile to meet or exceed is as follows: Abrasive wear in accordance with ASTM C 501 and bonding strength in accordance with ASTM C 482. Comply with 36 CFR 1191 for coefficient of friction for interior tiled floors. Coordinate the color with the MATERIAL LEGEND in the drawings.

2.1.3 Glazed Wall Tile

Provide glazed wall tile with cushioned edges and trim edged with lead-free matte finish. Provide tile 12 by 12 and 9 by 18 inch. Coordinate the color with the MATERIAL LEGEND in the drawings.

2.2 WATER

Provide potable water.

2.3 MORTAR, GROUT, AND ADHESIVE

Interior adhesives, sealants, primers and sealants used as filler must meet the requirements of SPiRiT low emitting materials credit. Conform to SCAQMD Rule #1168 and Bay Area AQMD Rule 8-51, and to the following for mortar, grout, adhesive, and sealant:

2.3.1 Dry-Set Portland Cement Mortar

ANSI A118.1. Zero-volatile organic compound (VOC) content.

2.3.2 Latex-Portland Cement Mortar

ANSI A118.4. Zero-VOC content.

2.3.3 Ceramic Tile Grout

ANSI A118.6 or ANSI A118.7; petroleum-free and plastic-free standard cement grout or polymer modified cement grout. Maximum VOC content of 150 grams/liter.

2.3.4 Epoxy Resin Grout

ANSI A118.3. For use in kitchen and servery areas.

2.3.5 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Single-component polyurethane sealant shall have a zero-VOC content.

2.3.6 Cementitious Backer Board

Provide cementitious backer units for use as tile substrate over access floor panels. Units shall conform with ANSI A118.9. Furnish 1/2 inch thick cementitious backer units.

2.4 MARBLE THRESHOLDS

Provide marble thresholds of size required by drawings or conditions. Categorize marble Group A as classified by MIA Design Manual. Provide a honed marble with white in color as approved by the Architect as shown on Finish Schedule. Provide minimum 12.0 marble abrasion when tested in accordance with ASTM C 241.

2.5 WATERPROOF MEMBRANE

ANSI A118.10.

2.6 SOUND REDUCTION MEMBRANE

Provide sound reduction membrane compatible for use with specified floor tile installation. Membrane shall be 1.4 mm thick LATICRETE 150 Sound N' Crack Isolation Mat, as manufactured by LATICRETE International, Inc. or approved equal.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of ANSI A108.1 for surface conditions for the type setting bed specified and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	1/8 inch in 8 ft.	1/4 inch in 10 ft.
Latex Portland Cement Mortar	1/8 inch in 8 ft.	1/4 inch in 10 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Do not start floor tile installation in spaces requiring wall tile until after wall tile has been installed. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar.

3.3 INSTALLATION OF WALL TILE

Install wall tile in accordance with the TCA Hdbk, Method W243-05.

3.3.1 Dry-Set Mortar and Latex-Portland Cement Mortar

Use Dry-set or Latex-Portland Cement to install tile in accordance with ANSI A108.5. Use Latex Portland Cement when installing porcelain ceramic tile.

3.3.2 Ceramic Tile Grout

Prepare and install standard cement grout or polymer modified cement grout in accordance with ANSI A108.10.

3.4 INSTALLATION OF FLOOR TILE

Install floor tile in accordance with TCA Hdbk Method F122-05. Install waterproof membrane in accordance with the manufacturer's instructions. Prior to installing the floor tile in the kitchen and servery, install the sound reduction membrane over the waterproofing membrane. Install in accordance with the manufacturer's instructions.

3.4.1 Dry-Set and Latex-Portland Cement

Use dry-set or Latex-Portland cement mortar to install tile directly over cementitious backer board or properly cured, plane, clean concrete slabs in accordance with ANSI A108.5. Use Latex Portland cement when installing porcelain ceramic tile.

3.4.2 Ceramic Tile Grout

Prepare and install standard cement grout or polymer modified cement grout in accordance with ANSI A108.10.

3.4.3 Epoxy Resin Grout

Prepare and install epoxy resin grout in kitchen and servery areas in accordance with ANSI A108.6.

3.5 INSTALLATION OF MARBLE THRESHOLDS

Install thresholds where indicated, in a manner similar to that of the ceramic tile floor. Provide thresholds full width of the opening. Install head joints at ends not exceeding 1/4 inch in width and grouted full.

3.6 EXPANSION JOINTS

Form and seal joints as specified in Section 07920JOINT SEALANTS.

3.6.1 Walls

Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

3.6.2 Floors

Provide expansion joints over construction joints, control joints, and expansion joints in concrete slabs. Provide expansion joints where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 24 to 36 feet each way in large interior floor areas and 12 to 16 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

3.7 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. Clean floor tile with factory mixed grout in accordance with printed instructions of the grout manufacturer. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection for tile wall surfaces. Cover tiled floor areas with building paper before foot traffic is permitted over the finished tile floors. Provide board walkways on tiled floors that are to be continuously used as passageways by workmen. Replace damaged or defective tiles.

3.8 WASTE MANAGEMENT

Separate waste, including metal and cardboard, in accordance with the Waste Management Plan and recycle or reuse. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in designated containers and areas. Close and seal tightly partly used sealant and adhesive containers and store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in designated containers and areas and dispose of properly.

Set aside and protect half-tile and larger offcuts and remainders for reuse. Identify manufacturer's policy for collection or return of construction scrap, unused material, and packaging material. Institute recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 09445

RESINOUS TERRAZZO FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 56 (2002a)Flash Point by Tag Closed Cup Tester

NATIONAL TERRAZZO & MOSAIC ASSOCIATION (NTMA)

NTMA Info Guide (2000) Terrazzo Information Guide

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings
Strips
Control Joint Strips

Drawings indicating the type, size, and layout of divider strips and control joint strips.

SD-03 Product Data

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturers' product data or MSDS for each product, including printed statement of VOC content.

Resin
Mixing, Proportioning, and Installation
Cleaning and Sealing

Resin manufacturer's descriptive data, mixing, proportioning, and installation instructions. Maintenance literature for terrazzo cleaning and sealing shall be included.

SD-04 Samples

Resinous Terrazzo Flooring

Two 6 x 6 inches, (minimum) samples of each color of resinous terrazzo and two 6 inches lengths, of each type of strip.

SD-07 Certificates

Conductive Resinous Terrazzo Flooring

Certificates indicating conformance with specified requirements. Certificates shall be accompanied by certified test reports showing that the conductive resinous terrazzo floor has been tested and meets the requirements specified.

1.3 GENERAL REQUIREMENTS

Resinous terrazzo flooring, in the colors indicated, shall be applied in the areas shown on the approved detail drawings. Flooring shall be an epoxy terrazzo system that conforms to the requirements specified in paragraphs 2.01A and B of NTMA Info Guide.

1.4 QUALIFICATION OF APPLICATOR

Applicator shall be approved by the resin manufacturer and shall have a minimum of 3 years experience in the application of the materials to be used and shall have completed 8 successful installations within the past 2 years.

1.5 DELIVERY AND STORAGE

Materials shall be delivered to the project site in manufacturer's original unopened containers. Materials shall be kept in a clean, dry, area with temperatures controlled between 50 and 90 degrees F.

1.6 ENVIRONMENTAL REQUIREMENTS

Areas to receive terrazzo shall be maintained at a temperature above 50 degrees F for 2 days prior to installation and for 7 days following installation.

PART 2 PRODUCTS

2.1 PRIMER

Primer shall be a material recommended by the resin manufacturer which will penetrate the pores of the substrate and bond with the topping to form a permanent monolithic bond between the substrate and the topping.

2.2 RESIN

Resin for the specified terrazzo flooring shall conform to the requirements shown in NTMA Info Guide.

2.3 FILLERS

Fillers, if required, shall be inert mineral or cellulosic material as

recommended by the manufacturer and best suited for the resin binder used. Fillers shall be furnished in the quantity necessary to impart the required color and physical characteristics.

2.4 GLASS CHIPS

Glass chips shall be of domestic origin of sizes and colors to match NTMA Info Guide color plate indicated on MATERIAL LEGEND in drawings. Chips shall be a range of sizes up to and including the NTMA Standard No. 0 through Standard No. 2 for 3/8 inch thick floors. Glass Chips shall have minimum 98 percent recycled content.

2.5 STRIPS

2.5.1 Divider Strips

Strips shall be as deep as required, 16 gauge and of stainless steel.

2.5.2 Control Joint Strips

Control joint strips shall be as deep as required, 16 gauge and of stainless steel.

2.6 GROUT

Grout shall be as recommended by the manufacturer of the resin.

2.7 SEALER

Sealer shall have a pH factor between 7 and 10 and shall be a penetrating type specially prepared for use on terrazzo. The sealer shall not discolor or amber the terrazzo and shall produce a slip resistant surface. Flash point of sealer shall be a minimum of 80 degrees F when tested in accordance with ASTM D 56.

PART 3 EXECUTION

3.1 PREPARATION OF CONCRETE SUBFLOOR

Installation of the floor topping shall not commence until the concrete substrate is at least 28 days old. The concrete surfaces shall be prepared in accordance with the instructions of the resin manufacturer.

3.2 MIXING, PROPORTIONING, AND INSTALLATION

Mixing, proportioning, and installing shall be in accordance with the approved instructions of the manufacturer. Strips shall be installed in locations indicated. The topping shall be applied to give a finish thickness of 3/8 inch. Bases shall be precast type and shall be 2.5 or 6 inches high, as indicated on the drawings

3.3 CLEANING AND SEALING

The terrazzo shall be washed with a neutral cleaner and where required shall be cleaned with a fine abrasive to remove any stains or cement smears. The cleaned surfaces shall be rinsed. When dry, a terrazzo sealer shall be applied in accordance with the manufacturer's directions.

3.4 PROTECTION

The terrazzo work shall be covered and protected from damage until completion of the work of all other trades.

-- End of Section --

SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 489	(2004) Carbon Steel Lifting Eyes
ASTM A 641/A 641M	(2003) Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM C 423	(2002a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM C 635	(2004) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636	(2004) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C 834	(2000e1; R 2005) Latex Sealants
ASTM E 1264	(1998; R 2005) Acoustical Ceiling Products
ASTM E 1414	(2000a) Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
ASTM E 1477	(1998a; R 2003) Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
ASTM E 580	(2002e1) Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Moderate Seismic Restraint
ASTM E 795	(2000) Mounting Test Specimens During Sound Absorption Tests
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-03A (2005) Seismic Design for Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

SD-03 Product Data

Acoustical Ceiling Systems

a. Manufacturer's data indicating percentage of post-industrial and post-consumer recycled content in acoustic ceiling tiles and suspension system.

b. Total product value of acoustic ceiling tiles and suspension system with recycled content.

c. Documentation indicating distance between manufacturing facility and the project site.

d. Documentation indicating manufacturer's product data for sealants and adhesives including printed statement of VOC content in g/l.

SD-04 Samples

Acoustical Units

Two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color.

SD-06 Test Reports

Fire Resistive Ceilings
Ceiling Attenuation Class and Test

Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified sound transmission requirements.

SD-07 Certificates

Acoustical Units
Aluminum Panels

Certificate attesting that the mineral based acoustical units and aluminum panels furnished for the project contain recycled content and showing a percentage of post-consumer and

post-industrial content.

1.3 GENERAL REQUIREMENTS

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. The location and extent of acoustical treatment must be as shown on the approved detail drawings. Coordinate with paragraph RECLAMATION PROCEDURES for reclamation of mineral fiber acoustical ceiling panels to be removed from the job site.

1.3.1 Fire Resistive Ceilings

Provide acoustical units with a flame spread of 25 or less and smoke development of 50 or less when tested in accordance with ASTM E 84.

1.3.2 Ceiling Attenuation Class and Test

Provide ceiling systems with an attenuation class (CAC) of 35 when determined in accordance with ASTM E 1414.

1.3.3 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with ASTM C 423 Test Method.

1.3.4 Light Reflectance

Determine light reflectance factor in accordance with ASTM E 1477 Test Method.

1.4 DELIVERY AND STORAGE

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

1.6 SCHEDULING

Complete and dry interior finish work such as concrete before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Include an agreement to repair or replace acoustical panels that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of

panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Furnish spare tiles and panels, from the same lot as those installed, of each color at the rate of one tile for each 1000 tiles installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

Provide acoustical ceiling panels and suspension systems with a minimum recycled content, as indicated in the MATERIAL LEGEND included on the drawings.

Comply with EPA requirements in accordance with Section 01670 RECYCLED/RECOVERED MATERIALS. Conform acoustical units to ASTM E 1264, Class A, and the following requirements:

2.1.1 Affirmative Procurement

Mineral Wool, Cellulose, and Laminated Paperboard used in acoustic ceiling tiles are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (http://www.epa.gov/cpg/). EPA's recommended Recovered Materials Content Levels for Mineral Wool, Cellulose, Structural Fiberboard and Laminated Paperboard are:

Product	Material	Percent of Post Consumer Materials	Percent of Total Recovered Materials
Laminate Paperboard	Post Consumer Paper	100	100
Rock Wool	Slag	75	
Cellulose	Post Consumer Paper	75	75

a. The recommended recovered materials content levels are based on the weight (not volume) of materials in the insulating core only.

b. For informational purposes, a list of known sources for acoustical ceiling tiles using recycled material is provided in the EPA/CPG Supplier database at http://www.ergweb2.com/cpg4review/user/cpg_search.cfm.

c. Note that the Contractor is not limited to these sources. A product meeting CPG recycle requirements from other sources may be submitted for the Government's approval.

d. Submit recycled material content data for acoustic ceiling tiles indicating compliance with affirmative procurement.

e. Submit total weight and volume quantities of acoustic ceiling tiles with recycle material.

2.1.2 Units for Exposed-Grid System (APC 1)

a. Type: Mars ClimaPlus, as manufactured by USG Interiors, Inc. or approved equal.

b. Flame Spread: Class A, 25 or less

d. Minimum NRC: .70.

e. Minimum Light Reflectance Coefficient: .89.

f. Nominal size: 24 by 24 inch (24 by 48 inch in Antenna Farm Building).

g. Edge detail: Square.

h. Finish: Factory-applied standard white finish.

i. Minimum CAC: 35.

2.1.3 Metal Panels (MLP 1)

a. Type: Hunter Douglas Contract, Luxalon Wide Panel 300C, Natural Finish with #124 perforation with acoustical backing or approved equal.

b. Flame Spread: Class: A, 25 or less.

c. Pattern: C.

d. Minimum NRC: 0.70.

e. Minimum Light Reflectance coefficient: LR-1, 0.75 or greater.

f. Nominal size: 12 inches wide by 19 foot 6 inch long panels.

g. Edge detail: 4 inch tall EdgeLine Trim System in natural finish.

h. Joint detail: V-joint.

i. Finish: Factory-applied standard natural finish #7163.

2.1.4 Humidity Resistant Composition Units for Exposed-Grid System (APC 2)

a. Type: Clean Room Mylar, as manufactured by Armstrong or approved equal.

b. Flame Spread: Class: A, 25 or less.

d. Minimum NRC: Minimum .55 when tested on Mounting Type E-400 of ASTM E 795.

e. Minimum Light Reflectance Coefficient: LR-1, 0.75 or greater.

f. Nominal Size: 24 by 24 inch.

g. Edge Detail: Square.

2.1.5 Composite Core Acoustical Ceiling Panels in the SOC (APC 3)

a. Type: Techstyle Classic (clipped) fabric faced composite core ceiling panels, as manufactured by Hunter Douglas or approved equal.

b. Flame Spread: Class: A, 25 or less.

c. Minimum NRC: 0.85.

d. Nominal Size: 1.125 inches thick. Size of field panels shall be 48 inches by 60 inches, perimeter panels shall be cut to meet reflected ceiling plan configuration.

e. Edge Detail: Hunter Douglas Edgeline trim system, 6 inches tall, in white.

f. Color: White.

2.2 SUSPENSION SYSTEM

Provide A 9/16 inch wide Centricitee Suspension System by USG Interiors, Inc. or approval equal with Mars ClimaPlus Ceiling Panels. Provide 15/16 inch wide Prelude Suspension System by Armstrong or approved equal with Clean Room Mylar Ceiling Panels and Techstyle panels. Provide Concealed Carrier System by Hunter Douglas or approved equal with Luxalon Panel 300C system.

Suspension systems for APC 1, APC 2, and APC 3 shall conform to ASTM C 635 for intermediate-duty systems. Provide surfaces exposed to view of aluminum or steel with a factory-applied white baked-enamel finish. Provide wall molding having a flange of not less than 9/16 inch for the Centricitee system and 15/16 inch for the Prelude system. Provide standard corners. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the guidance in UFC 3-310-03A and ASTM E 580.

2.3 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.3.1 Wires

Conform wires to ASTM A 641/A 641M, Class 1, 0.11 inch in diameter.

2.3.2 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A 489. Eyebolt size must be a minimum 1/4 inch, zinc coated.

2.4 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.5 ACOUSTICAL SEALANT

Conform acoustical sealant to ASTM C 834, nonstaining.

PART 3 EXECUTION

3.1 INSTALLATION

Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with ASTM C 636 and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.

3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 6 inch from each corner of each fixture.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, offset the resulting horizontal force by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 3 inch from ends of each length and not more than 16 inch on centers between end fastenings.

3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized.

3.1.4 Caulking

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

3.2 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.3 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling, on 4 by 4 foot pallets not higher than 4 foot. Panels must be completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over. Disposal shall be in accordance with Section 01572 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.

-- End of Section --

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4078	(2002) Water Emulsion Floor Polish
ASTM E 648	(2004) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F 1066	(2004) Vinyl Composition Floor Tile
ASTM F 1303	(2004) Sheet Vinyl Floor Covering with Backing
ASTM F 1344	(2004) Rubber Floor Tile
ASTM F 1482	(2004) Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
ASTM F 1861	(2002) Resilient Wall Base
ASTM F 1869	(2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
ASTM F 2169	(2002) Resilient Stair Treads
ASTM F 2170	(2002) Determining Relative Humidity in Concrete Floor Slabs in situ Probes
ASTM F 2195	(2003) Linoleum Floor Tile
ASTM F 710	(2003) Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(1989; R 2005) Adhesive and Sealant Applications

U.S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	(2002 Sustainable Project Rating Tool

1.2 FIRE RESISTANCE REQUIREMENTS

Provide a minimum average critical radiant flux of 0.45 watts per square centimeter for flooring in corridors and exits when tested in accordance with ASTM E 648.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Resilient Flooring and Accessories

Manufacturer's descriptive data.

Adhesives; (SPiRiT)

Manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics. Provide Material Safety Data Sheets (MSDS) for all primers and adhesives to the Contracting Officer. Highlight VOC, expressed in content g/l.

Rubber Tile; (SPiRiT)

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Local/Regional Materials; (SPiRiT)

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Provide products manufactured within a 500 mile radius of the project site. Provide products with a minimum 17 percent post-consumer recycled content and a minimum 4 percent post-industrial recycled content.

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Linoleum Tile

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Documentation indicating distance between manufacturing facility and the project site.

Documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

SD-04 Samples

Resilient Flooring and Accessories

Three samples of each indicated color and type of flooring, base, mouldings, and accessories. Provide a minimum 2-1/2 by 4 inch sample.

SD-06 Test Reports

Moisture, Alkalinity and Bond Tests

Copy of test reports for moisture and alkalinity content of concrete slab, and bond test stating date of test, person conducting the test, and the area tested.

SD-08 Manufacturer's Instructions

Surface Preparation
Installation

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

SD-10 Operation and Maintenance Data

Resilient Flooring and Accessories

Data Package 1 in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Local/Regional Materials; (SPiRiT)

SPiRiT documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Resilient Flooring and Accessories; (SPiRiT)

SPiRiT documentation relative to recycled content credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Adhesives; (SPiRiT)

SPiRiT documentation relative to low-emitting materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Linoleum Tile; (SPiRiT)

SPiRiT documentation relative to rapidly renewable materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.4 DELIVERY AND STORAGE

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, production run, project identification, and handling instructions. Store materials in a clean, dry, secure, and well-ventilated area free from strong contaminant sources and residues with ambient air temperature maintained above 68 degrees F and below 85 degrees F, stacked according to manufacturer's recommendations. Remove resilient flooring products from packaging to allow ventilation prior to installation. Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Observe ventilation and safety procedures specified in the MSDS. Do not store rubber surface products with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store exposed rubber surface materials in occupied spaces. Do not store near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas to receive resilient flooring at a temperature above 68 degrees F and below 85 degrees F for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 55 degrees F thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT DOCUMENTATION for cumulative total local material requirements. Flooring materials may be locally available.

1.7 SCHEDULING

Schedule resilient flooring application after the completion of other work which would damage the finished surface of the flooring.

1.8 EXTRA MATERIALS

Furnish extra flooring material of each color and pattern at the rate of 5 tiles for each 1000 tiles and 5 square feet for each 1000 square feet of sheet flooring installed. Furnish extra wall base material composed of 20

linear feet of each type, color and pattern. Package all extra materials in original properly marked containers bearing the manufacturer's name, brand name, pattern color name and number, production run, and handling instructions. Provide extra materials from the same lot as those installed. Leave extra stock at the site in location assigned by Contracting Officer.

PART 2 PRODUCTS

2.1 VINYL COMPOSITION TILE

Conform to ASTM F 1066 for vinyl-composition tile, Class 2, (through pattern tile), Composition 1, asbestos-free, 12 inch square and 1/8 inch thick. Provide color and pattern uniformly distributed throughout the thickness of the tile.

2.2 SHEET VINYL FLOORING

Conform to ASTM F 1303 for sheet vinyl flooring, Type I, Grade 1, Class B-nonfoamed plastic backing (minimum wear layer thickness 0.020 inch and minimum overall thickness 0.080 inch) and a minimum 6 feet wide. Flooring shall contain 50 percent post-industrial recycled material. As required, provide welding rods as recommended by the manufacturer for heat welding of joints.

2.3 RUBBER TILE

Conform to ASTM F 1344 for rubber tile Class 1 homogeneous, Type A (solid color), 19-11/16 inch square. Provide raised round surface studs with chamfered edges. Provide low stud profile. Provide 0.125 inch overall thickness. Rubber tile shall be Roppe Raised Circular Vantage Design or approved equal.

2.4 LINOLEUM TILE

Conform to ASTM F 2195 for linoleum tile consisting of a homogeneous layer of a mixture of linoleum cement (binder in linoleum consisting of a mixture of linseed oil, pine rosin, fossil, or other resins or rosins, or an equivalent oxidized oleoresinous binder), cork and/or wood flour, mineral fillers, and pigments bonded to a jute backing. Provide square tiles a minimum 24 inches square with overall minimum thickness of 0.100 inch.

2.5 WALL BASE

Conform to ASTM F 1861 for wall base, Type TS (vulcanized thermoset rubber). Provide 2-1/2 inch high and a minimum 1/8 inch thick wall base. Furnish job formed corners in matching height, shape, and color.

2.6 STAIR TREADS

Conform to ASTM F 2169 Type TS (vulcanized thermoset rubber). Conform to ASTM F 2169 for surface of treads Class 2 raised round pattern. Provide square nosing. Stair treads shall be Roppe Raised Circular Vantage Design without Riser, Square Nose, #98 or approved equal.

2.7 SPORT FLOORING

The sport flooring identified on the drawings as SP 1 shall be Plynyl w2w, as manufactured by Chilewich LLC.

2.8 MOULDING

Provide tapered mouldings of clear anodized aluminum and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

2.9 ADHESIVES

Provide adhesives for flooring, base and accessories as recommended by the manufacturer and comply with local indoor air quality standards. Interior adhesives must meet the requirements of SPiRiT low emitting materials credit. VOC content must be less than the current VOC content limits of SCAQMD Rule 1168.

2.10 SURFACE PREPARATION MATERIALS

Provide surface preparation materials, such as floor crack fillers as recommended by the flooring manufacturer for the subfloor conditions. Comply with ASTM F 1482 for panel type underlayment products.

2.11 POLISH/FINISH

Furnish polish as recommended by the manufacturer and conform to ASTM D 4078.

2.12 CAULKING AND SEALANTS

Furnish caulking and sealants in accordance with Section 07920 JOINT SEALANTS.

2.13 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture for resilient flooring and accessories as indicated on the MATERIAL LEGEND in the drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers. Provide floor patterns as specified on the drawings. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern.

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

Examine and verify that site conditions are in agreement with the design package. Report all conditions that will prevent a proper installation. Do not take any corrective action without written permission from the Government. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Provide a smooth, true, level plane for surface preparation of the flooring, except where indicated as sloped. Flatten floor to within 1/4 inch in 10 feet. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Prepare the surfaces of lightweight concrete slabs (as defined by the flooring manufacturer) as recommended by the flooring manufacturer. Comply with ASTM F 710 for

concrete subfloor preparation. Floor fills or toppings may be required as recommended by the flooring manufacturer. Before any work under this section is begun, correct all defects such as rough or scaling concrete, chalk and dust, cracks, low spots, high spots, and uneven surfaces. Repair all damaged portions of concrete slabs as recommended by the flooring manufacturer. Remove from the slabs concrete curing and sealer compounds, other than the type that does not adversely affect adhesion. Remove paint, varnish, oils, release agents, sealers, waxers, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions.

3.3 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests and comply with manufacturer's recommendations. Conduct moisture testing in accordance with ASTM F 1869 or ASTM F 2170, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations.

3.4 PLACING VINYL-COMPOSITION, LINOLEUM TILES

Install vinyl composition and linoleum tile flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size tiles in the field, but no edge tile with less than one-half the field tile size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

Linoleum tile to be installed on the access floor panels shall be factory-bonded to the access floor panels in accordance with the manufacturer's instructions. See Section 10270 RIGID GRID ACCESS FLOORING.

3.5 PLACING SHEET VINYL FLOORING

Install sheet vinyl flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Provide square, symmetrical, tight, and even flooring lines and joints. Keep each floor in true, level plane, except where slope is indicated. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Lay out sheets to minimize waste. Cut, fit, and scribe flooring to walls and partitions after field flooring has been applied. Provide seams and edges of sheet vinyl flooring in accordance with the manufacturer's written installation instructions. Finish joints flush, free from voids, recesses, and raised areas.

3.6 PLACING RUBBER TILE

Install rubber tile and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in

accordance with manufacturer's printed directions. Provide square, symmetrical, tight, and even flooring lines and joints. Keep each floor in true, level plane, except where slope is indicated. Vary width of edge tiles as necessary to maintain full-size tiles, except where irregular-shaped rooms makes it impossible. Cut flooring to fit around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe flooring to walls and partitions after field flooring has been applied.

3.7 PLACING SPORT FLOORING

Plynyl sport flooring shall be installed by direct glue down to concrete floor using the adhesive and seam sealer, as recommended by the manufacturer.

3.8 PLACING MOULDING

Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Secure moulding with adhesive as recommended by the manufacturer. Prepare and apply adhesives in accordance with manufacturer's printed directions. Anchor aluminum moulding to floor surfaces as recommended by the manufacturer.

3.9 PLACING WALL BASE

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.10 PLACING STAIR TREADS

Secure and install stair treads in accordance with manufacturer's printed installation instructions. Cover treads to the full width of the stairs. Provide stairs wider than manufacturer's standard lengths with equal length pieces butted together to cover the treads.

3.11 CLEANING

Immediately upon completion of installation of flooring in a room or an area, dry/clean the flooring and adjacent surfaces to remove all surplus adhesive. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions. No sooner than 5 days after installation, wash flooring with a nonalkaline cleaning solution, rinsed thoroughly with clear cold water, and, except for rubber flooring and stair treads, vinyl and other flooring not requiring polish by manufacturer, given the number of coats of polish in accordance with manufacturer's written instructions. Clean and maintain all other flooring as recommended by the manufacturer. Cover flooring with building paper following installation.

3.12 WASTE MANAGEMENT

Separate offcuts and waste materials and reuse or recycle in accordance

with the Waste Management Plan, keeping sheet materials larger than 2 square feet and tiles larger than 1/2 tiles separate for reuse. Identify manufacturer's policy for collection or return of construction scrap, unused material, demolition scrap, and/or packaging material. Place materials defined as hazardous or toxic waste in designated containers and dispose of properly. Close and seal tightly partly used sealant and adhesive containers and store protected in a well ventilated fire-safe area at moderate temperature.

3.13 PROTECTION

From the time of laying until acceptance, protect flooring from damage as recommended by the flooring manufacturer. Remove and replace flooring which becomes damaged, loose, broken, or curled and wall base which is not tight to wall or securely adhered.

-- End of Section --

SECTION 09670

FLUID-APPLIED FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM F 1869	(2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
ASTM F 2170	(2002) Determining Relative Humidity in Concrete Floor Slabs in situ Probes

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Floor Surfacing

Flooring manufacturer's descriptive data, mixing, proportioning, and installation instructions. Maintenance literature for resinous flooring shall be included.

SD-04 Samples

Flooring Systems

Cured samples of each floor finish or color combination.

SD-07 Certificates

Qualifications of Installer

A written statement from the floor manufacturer that the installer is acceptable.

SD-08 Manufacturer's Instructions

Application

Complete instructions for application of flooring system including any precautions or special handling instructions required to comply with OSHA 29 CFR 1910-Subpart Z.

1.3 DELIVERY AND STORAGE

Deliver the materials to the project site in unopened bags and containers clearly labeled with the name of the manufacturer, type of material, batch number, and date of manufacture. Store materials, other than aggregates, away from fire, sparks, or smoking areas. Maintain the storage area between 50 and 90 degrees F.

1.4 ENVIRONMENTAL CONDITIONS

Maintain the ambient room and floor temperatures at 65 degrees F, or above, for a period extending from 48 hours before installation until one week after installation. Concrete to receive surfacing shall have cured for at least 28 days and shall have been free of water for at least 7 days.

1.5 PROTECTION

Protect adjacent surfaces not scheduled to receive the flooring by masking, or by other means, to maintain these surfaces free of the flooring material.

1.6 QUALIFICATIONS OF INSTALLER

Installation shall be performed by an applicator approved by the manufacturer of the floor surfacing materials. The Contractor shall furnish a written statement from the manufacturer that the installer is acceptable.

PART 2 PRODUCTS

2.1 MATERIALS

Materials (except aggregate) used in the flooring shall be the products of a single manufacturer. Industrial resin-based flooring shall be Desco Granite Series, as manufactured by Desco Coatings, Inc. or approved equal.

2.2 COLOR

Color shall be Desco GS 106, semi-gloss.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Remove all dirt, dust, debris, and other loose particles by sweeping or vacuum cleaning.

3.1.1 Concrete Surfaces

3.1.1.1 Mechanical Cleaning

Completely remove dirt, wax, paint, and laitance. Acid etching is not acceptable.

3.1.1.2 Moisture Test

Test concrete for moisture content by one of the following. Moisture content must be within an acceptable level before floor surfacing is applied.

a. Using a Tramax concrete moisture detection device, firmly apply the test apparatus to concrete that has had sealers or other subsequent coatings removed. The readings shall be 4.2 percent or less. If readings are higher, use ASTM F 2170 for non-conditioned spaces and/or ASTM F 1869 for conditioned spaces.

b. ASTM F 2170 in-situ Relative Humidity Test. Follow test procedures of manufacturer of testing equipment. Reading should be below 80 percent. If above 80 percent, use the next test method below.

c. ASTM F 1869 Calcium Chloride Moisture Vapor Transmission Test. Follow test procedures of manufacturer of testing equipment. Results should be below 3 to 4 pounds/1000 square feet/24 hours (This test is valid only for conditioned spaces).

3.2 MIXING

Proportion and mix the floor surfacing components in accordance with the manufacturer's instructions.

3.3 APPLICATION

Apply primer, floor surfacing, and seal coat in accordance with the manufacturer's recommendations and the following requirements.

3.3.1 Floor Surfacing

Apply mixed surfacing material to provide a finish floor surfacing not less than 1/8 inch thick. The entire surfacing in any one room or area shall be one continuous operation except for placement of divider strips at structural floor control joints or as indicated. All surfaces shall be flush, true to plane and line, and level within 1/4 inch in 10 feet.

3.3.2 Seal Coat

Apply seal coat uniformly covering all surfaces after floor surfacing has cured and as recommended by the supplier.

3.4 PROTECTION

Surfacing shall set for a minimum period of 48 hours before traffic is allowed on the floor. Finished flooring shall be protected from traffic by covering with 30 pound building paper or other equally effective means until final acceptance of the project.

-- End of Section --

SECTION 09680

CARPET

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 107	(2002) Colorfastness to Water
AATCC 134	(2001) Electrostatic Propensity of Carpets
AATCC 16	(2004) Colorfastness to Light
AATCC 165	(1999) Colorfastness to Crocking: Textile Floor Coverings - AATCC Crockmeter Method
AATCC 174	(1998) Antimicrobial Activity Assessment of Carpets

ASTM INTERNATIONAL (ASTM)

ASTM D 1423	(2002) Twist in Yarns by Direct-Counting
ASTM D 3278	(1996e1; R 2004) Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D 5252	(1998a; R 2003) Operation of the Hexapod Drum Tester
ASTM D 5417	(1999; R 2003) Operation of the Vettermann Drum Tester
ASTM D 5793	(2003) Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
ASTM D 5794	(1995; R 2002) Determination of Anions in Cathodic Electrocoat Permeates by Ion Chromatography
ASTM D 5848	(1998) Mass Per Unit Area of Pile Yarn Floor Coverings
ASTM E 648	(2004) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(2002) Standard for Installation

Specification of Commercial Carpet

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-W-40	(Rev A; Int Am 1, Notice 1) Wall Base: Rubber, and Vinyl Plastic

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 2551	(1981) Machine-made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions

U.S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	(2002) Sustainable Project Rating Tool (SPiRiT) Version 1.4.1

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630	Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)
40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation
Molding

Three copies of drawings indicating areas receiving carpet, carpet types, textures and patterns, direction of pile, location of seams, and locations of edge molding. Installation drawings for the following items diagramming the location of seams, edge moldings, and carpet direction for approval prior to installation.

1) Carpet Moldings
2) Base

SD-03 Product Data

Manufacturer's product data or MSDS for each product, including printed statement of VOC content.

Carpet
Carpet Moldings
Base

Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading, and flame resistance characteristics for each type of carpet material

and installation accessory. Submit manufacturer's catalog data for the following items:

1) Carpet Moldings
2) Base

Surface Preparation
Installation

Three copies of the manufacturer's printed installation instructions for the carpet, including preparation of substrate, seaming techniques, and recommended adhesives and tapes.

Regulatory Requirements

Three copies of report stating that carpet and carpet components contain recycled materials and/or involvement in a recycling or reuse program. Include in the report percentage of post-industrial and post-consumer recycled material and relative dollar value of recycled content products to total dollar value of products included in project. Include manufacturer's independent, third party certification of compliance with Carpet and Rug Institute's Green Label Indoor Air Quality program

Physical Characteristics; (SPiRiT)

Documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project. Documentation indicating relative dollar value of rapidly renewable materials to total dollar value of products included in project.

Local/Regional Materials; (SPiRiT)

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a faciliy within 500 miles fom the project site. Provide a written statement of the cost of each product.

Environmental Data

Documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

SD-04 Samples

Carpet
Molding

a. Carpet: Two "Production Quality" samples, a minimum of 18 by 18 inches of each carpet proposed for use, showing quality, pattern, and color specified.

b. Vinyl or Aluminum Moldings: Two pieces of each type at least 12 inches long.

SD-06 Test Reports

Moisture and Alkalinity Tests

Three copies of test reports of moisture and alkalinity content of concrete slab stating date of test, person conducting the test, and the area tested.

SD-07 Certificates

Carpet

Certificates of compliance from a laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards and Technology attesting that each type of carpet and carpet with cushion material conforms to the standards specified.

Regulatory Requirements

Report stating that the carpet contains recycled materials and indicating the actual percentage of post-consumer and post-industrial recycled material. Certificates, showing conformance with the referenced standards contained in this section, for the following:

1) Carpet Moldings
2) Base

SD-10 Operation and Maintenance Data

Carpet
Cleaning and Protection

Three copies of carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

Operational Service

Documentation of manufacturer's take-back program for carpet. Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

SD-11 Closeout Submittals

Local/Regional Materials; (SPiRiT)

SPiRiT documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Carpet; (SPiRiT)

SPiRiT documentation relative to recycled content credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Adhesives and Concrete Primer; (SPiRiT)

SPiRiT documentation relative to low-emitting materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.3 REGULATORY REQUIREMENTS

Provide the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) label for carpet, carpet cushion, and adhesives or demonstrate compliance with testing criteria and frequencies through independent laboratory test results. Carpet, carpet cushion, and adhesives bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI IAQ Carpet Testing Program, and minimizes the impact on indoor air quality. Procure carpet in accordance with 40 CFR 247, and where possible, purchased locally to reduce emissions of fossil fuels from transporting. Conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS for carpet.

1.4 DELIVERY AND STORAGE

Deliver materials to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Remove materials from packaging and store them in a clean, dry, well ventilated area (100 percent outside air supply, minimum of 1.5 air changes per hour, and no recirculation), protected from damage, soiling, and moisture, and strong contaminant sources and residues,and maintain at a temperature above 60 degrees F for 2 days prior to installation. Carpet or carpet tiles shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants. Do not store carpet near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas in which carpeting is to be installed at a temperature above 60 degrees F and below 90 degrees F for 2 days before installation, during installation, and for 2 days after installation. Provide temporary ventilation during work of this section. Maintain a minimum temperature of 55 degrees F thereafter for the duration of the contract. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation. Complete other work which would damage the carpet prior to installation of carpet.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total local material requirements. Carpet materials may be locally available.

1.7 SCHEDULING

Install carpet systems after the installation and ventilation period of

materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds which may be adsorbed by or settle on the carpet tiles.

1.8 OPERATIONAL SERVICE

Collect information from the manufacturer about maintenance agreement and take-back program options, and submit to Contractor. Service shall reclaim materials for recycling and/or reuse. Service shall not landfill or burn reclaimed materials. When such a service is not available, local recyclers shall be sought after to reclaim the materials.

1.9 EXTRA MATERIAL

Provide extra material from same dye lot consisting of uncut carpet tiles for future maintenance. Provide a minimum of 5 percent of total square yards of each carpet type, pattern, and color.

PART 2 PRODUCTS

2.1 CARPET

Furnish first quality carpet; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Provide carpet materials and treatments as reasonably nonallergenic and free of other recognized health hazards. Provide a static control construction on all grade carpets which gives adequate durability and performance. Provide the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) Label. Carpet type bearing the label will indicate that carpet has been tested and meets the criteria of the CRI Green Label Requirements for Indoor Air Quality Test Criteria. Carpet tiles shall have Carpet Component Identification Codes as established by the CRI for future recycling. The labels shall be permanently printed or attached to the carpet backing. The codes shall identify, at minimum, the carpet's face fiber, primary backing, and secondary backing.

2.1.1 Polyester Carpet Face Fibers

For informational purposes, a list of sources known to recycle polyester carpet face fibers is provided below. An approved product from other sources may be submitted for the Contractor's approval during construction. Acceptable manufacturer's include, but are not limited to:

Bretlin, Inc.
LaFayette, Georgia

Central Vermont Carpet
Barre, Vermont

Environmental Building Supplies
Portland, Oregon

Image Industries
Amuchee, Georgia

Martin Color-FI
Edgefield, South Carolina

Talisman Mills, Inc.

Mequon, Wisconsin

2.1.2 Physical Characteristics

2.1.2.1 Modular Tile Carpet 1

Carpet shall comply with the following:

a. Carpet Construction: Tufted.

b. Type: Modular tile 24 by 24 inches square with 0.15 percent growth/shrink rate in accordance with ISO 2551.

c. Pile Type: Level-loop.

d. Pile Fiber: Commercial 100 percent branded (federally registered trademark) nylon continuous filament 25 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. Carpet pile fiber may contain post-consumer or post-industrial recycled content.

e. Yarn Ply: Minimum 2.

f. Gauge or Pitch: Minimum 1/12 inch in accordance with ASTM D 5793.

g. Stitches or Rows/Wires: Minimum 11.33 per square inch.

h. Finished Pile Yarn Weight: Minimum 30 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D 5848.

i. Pile Density: Minimum 8000 ozs/yd^3.

j. Dye Method: Yarn dyed.

k. Backing Materials: Provide primary backing materials like synthetic material. Provide secondary backing to suit project requirements of 100 percent PVC-free backing made of thermoplastic. Backing system shall contain a minimum 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total recycled content requirements. Carpet backing may contain post-consumer or post-industrial recycled content.

l. Recycle Efforts: Use of nylon carpet with backing containing recovered carpet. Use of nylon fiber with 25 per cent minimum recycled content.

2.1.2.2 Modular Tile Carpet 2 and 3

Comply with the following carpet requirements:

a. Carpet Construction: Tufted.

b. Type: 24 by 24 inches square with 0.15 percent growth/shrink rate in accordance with ISO 2551.

c. Pile Type: Level-loop.

d. Pile Fiber: Commercial 100 percent branded (federally registered trademark) nylon continuous filament25 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. Carpet pile fiber may contain post-consumer or post-industrial recycled content.

e. Yarn Ply: Minimum 2 in accordance with ASTM D 1423.

f. Gauge or Pitch: Minimum 1/12 inch in accordance with ASTM D 5793.

g. Stitches or Rows/Wires: Minimum 11.33 per square inch.

h. Finished Pile Yarn Weight: Minimum 30 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D 5848.

i. Pile Density: Minimum 6,626 ozs/yd^3.

j. Dye Method: Solution dyed and Yarn dyed.

k. Backing Materials: Provide primary backing materials like synthetic material. Provide secondary backing to suit project requirements of 100 percent PVC-free backing made of thermoplastic. Backing system shall contain a minimum of 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total recycled content requirements. Carpet backing may contain post-consumer or post-industrial recycled content.

l+. Recycle Efforts: Use of nylon carpet with backing containing recovered carpet. Use of nylon fiber with 25 per cent minimum recycled content.

2.1.2.3 Modular Tile Carpet 4

Comply with the following carpet requirements:

a. Carpet Construction: Tufted.

b. Type: Modular tile 24 by 24 inches square with 0.15 percent growth/shrink rate in accordance with ISO 2551.

c. Pile Type: Level-loop.

d. Pile Fiber: Commercial 100 percent branded (federally registered trademark) nylon continuous filament25 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. Carpet pile fiber may contain post-consumer or post-industrial recycled content.

e. Yarn Ply: Minimum 2 in accordance with ASTM D 1423.

f. Gauge or Pitch: Minimum 1/10 inch in accordance with ASTM D 5793.

g. Stitches or Rows/Wires: Minimum 10.7 per square inch.

h. Finished Pile Yarn Weight: Minimum 20 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D 5848.

i. Pile Density: Minimum 6,626 ozs/yd^3.

j. Dye Method: Solution dyed.

k. Backing Materials: Provide primary backing materials of synthetic material. Provide secondary backing to suit project requirements of 100 percent PVC-free backing made of thermoplastic. Back system shall contain a minimum 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total recycled content requirements. Carpet backing may contain post-consumer or post-industrial recycled content.

l. Recycle Efforts: Use of nylon carpet with backing containing recovered carpet. Use of nylon fiber with 25 per cent minimum recycled content.

2.1.2.4 Modular Tile Carpet 5

Carpet shall comply with the following:

a. Carpet Construction: Tufted

b. Type: Modular tile 24 by 24 inches square with 0.15 percent growth/shrink rate in accordance with ISO 2551.

c. Pile Type: Multilevel loop, cut and loop.

d. Pile Fiber: commercial 100 percent branded (federally registered trademark) nylon continuous filament. See Section 01335 Sustainable Design and Development.

e. Yarn Ply: Minimum 2

f. Gauge or Pitch: Minimum 1/10 inch in accordance with ASTM D 5793.

g. Stitches or Rows/Wires: Minimum 10.66 per square inch.

h. Finished Pile Yarn Weight: Minimum 42 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D 5848.

i. Pile Density: Minimum 7,376 ozs/yard 3.

j. Dye Method: Yarn Dyed.

k. Backing Materials: Provide primary backing materials like synthetic material. Provide secondary backing to suit project requirements 100 percent PVC-free backing made of thermoplastic. Backing system shall contain a minimum 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total recycled content requirments. Carpet backing may contain post-consumer or post-industrial recycled content.

l. Recycled Efforts: use of nylon carpet with backing containing recovered carpet. Use of nylon carpet with backing containing recovered carpet. Use of nylon fiber with 25 percent minimum recycled content.

2.1.2.5 Modular Tile Carpet 6

Carpet shall comply with the following:

Modular Tile Carpet 6

a. Carpet Construction: Tufted

b. Type: Modular tile 24 by 24 inches square with 0.15 percent growth/shrink rate in accordance with ISO 2551

c. Pile Type: Multilevel loop, cut and loop.

d. Pile Fiber: Commercial 100 percent branded (fedrally registered trademark) nylon continuous filament. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT

e. Yarn Ply: Minimum 2

f. Gauge or Pitch: Minimum 1/12 inch in accordance with ASTM D 5794.

g. Stitches or Rows/Wires: Minimum 09.33 per square inch.

h. Finished Pile Yarn Weight: Minimum 40 ounces per square yard. this does not include weight of backings. Determine weight in accordance with ASTM D 5848.

i. Pile Density: Minimum 8,324 ozs/yard ^{3}.

j. Dye Method: Yarn Dyed.

k. Backing Materials: Provide primary backing materials like synthetic material. Provide secondary backing to suit project requirements 100 percent PVC-free backing made of thermoplastic. Backing system shall contain a minimum 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DOCUMENTATION for cumulative total recycled content requirements. Carpet backing may contain post-consumer or post-industrial recycled content.

l. Recycle Efforts: Use of nylon carpet with backing containing recovered carpet. Use of nylon carpet with backing containing recovered carpet. Use of nylon fiber with 25 percent minimum recycled content.

2.2 PERFORMANCE REQUIREMENTS

a. ARR (Appearance Retention Rating): Test carpet with the minimum 3.5-4.0 (Severe) ARR in accordance with either the ASTM D 5252(Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.

b. Static Control: Provide static control to permanently regulate static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 70 degrees F in accordance with AATCC 134.

c. Flammability and Critical Radiant Flux Requirements: Comply carpet with 16 CFR 1630. Provide carpet in corridors and exits with a minimum average critical radiant flux of 0.22 watts per square centimeter when tested in accordance with ASTM E 648.

d. Tuft Bind: Provide tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 10 pound average force.

e. Colorfastness to Crocking: Comply dry and wet crocking with AATCC 165 and with a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

f. Colorfastness to Light: Comply colorfastness to light with AATCC 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and with a minimum 4 grey scale rating after 40 hours.

g. Colorfastness to Water: Comply colorfastness to water with AATCC 107 and with a minimum 4.0 gray scale rating and a minimum 4.0 transfer scale rating.

h. Delamination Strength: Provide delamination strength for tufted carpet with a secondary back of minimum 2.5 lbs/inch.

i. Antimicrobial: Nontoxic antimicrobial treatment in accordance with AATCC 174 Part I (qualitatiave), guaranteed by the carpet manufacturer to last the life of the carpet.

2.3 CARPET MOLDINGS

Install carpet moldings, either vinyl or aluminum, where floor covering material changes or carpet edge does not abut a vertical surface.

2.4 BASE

Conform to FS SS-W-40 for vinyl or rubber base. Provide minimum overall thickness of base not less than 0.125 inch, color as selected from manufacturer's full line. Straight style, 4 inch high. Furnish base in rolls not less than 96 feet long. Premold corners with wings not less than 2 inch long.

2.5 ADHESIVES AND CONCRETE PRIMER

Adhesives and concrete primers shall comply with applicable regulations regarding toxic and hazardous materials. Provide waterproof, nonflammable, and nonstaining adhesives and concrete primers for carpet installation to meet local air-quality standards, and as required by the carpet manufacturer. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 140 degrees F in accordance with ASTM D 3278.

2.6 MOLDING

Provide a hammered surface aluminum molding, pinless clamp-down type, designed for the type of carpet being installed. Provide natural color anodized finish. Provide a floor flange of a minimum 1-1/2 inch wide and face a minimum 5/8 inch wide.

2.7 TAPE

Provide tape for seams as recommended by the carpet manufacturer for the type of seam used in installation. Any seam sealant shall have a maximum VOC content of 50 grams/liter. Do not use sealants that contain 1,1,1-trichloroethane or toluene.

2.8 COLOR, TEXTURE, AND PATTERN

Provide color, texture, and pattern in accordance with MATERIAL LEGEND in the drawings.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Do not install carpet on surfaces that are unsuitable and will prevent a proper installation. Repair holes, cracks, depressions, or rough areas using material recommended by the carpet or adhesive manufacturer. Free floor of any foreign materials and sweep clean. Before beginning work, test subfloor with glue and carpet to determine "open time" and bond.

3.2 MOISTURE AND ALKALINITY TESTS

Test concrete slab shall for moisture content and excessive alkalinity in accordance with CRI 104.

3.3 PREPARATION OF CONCRETE SUBFLOOR

Do not commence installation of the carpeting shall until concrete substrate is at least 90 days old. Prepare the concrete surfaces in accordance with instructions of the carpet manufacturer. Match carpet, when required, and adhesives to prevent off-gassing to a type of curing compounds, leveling agents, and concrete sealer.

3.4 INSTALLATION

Isolate area of installation from rest of building. Perform all work by installers who are CFI certified (International Certified Floorcovering Installer Association), or manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI 104. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least 72 hours following installation.

3.4.1 Modular Tile Installation

Install modular tiles with release adhesive and snugly jointed together. Lay tiles in the same direction with accessibility to the subfloor where required. See Section 10270 ACCESS FLOORING for installation of carpet on

access floor panels.

3.5 CLEANING AND PROTECTION

3.5.1 Cleaning

As specified in Section 01780 CLOSEOUT SUBMITTALS. After installation of the carpet, remove debris, scraps, and other foreign matter. Remove soiled spots and adhesive from the face of the carpet with appropriate spot remover. Cut off and remove protruding face yarn. Vacuum carpet clean with a high-efficiency particulate air (HEPA) filtration vacuum.

3.5.2 Protection

Protect the installed carpet from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Lap and secure edges of kraft paper protection to provide a continuous cover. Restrict traffic for at least 48 hours.

3.6 REMNANTS

Collect information from manufacturer about maintenance agreement and take-back program options, and provide to Contractor. Manage waste as specified in the Waste Management Plan. Non-retained scraps shall be set aside and returned to manufacturer for recycling into new product or removed from site and recycled appropriately.

-- End of Section --

SECTION 09720

WALL COVERINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 1308	(2002e1) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 751	(2000) Coated Fabrics
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials

CHEMICAL FABRICS & FILM ASSOCIATION (CFFA)

CFFA-W-101-D	(2002) Vinyl Coated Fabric Wallcovering

GYPSUM ASSOCIATION (GA)

GA 214	(1996) Recommended Levels of Gypsum Board Finish

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 286	(2000) Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(1989; R 2005) Adhesive and Sealant Applications

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD 191	(Rev A; Notice 7) Textile Test Methods
FS CCC-W-408	(Rev C) Wallcovering, Vinyl Coated

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wall Coverings and Accessories

Wall covering manufacturer's descriptive data, documentation stating physical characteristics, flame resistance, mildew and germicidal characteristics. Corner guard and wainscot cap manufacturer's descriptive data.

Primer and Adhesive

Manufacturer's descriptive data, documentation stating physical characteristics, mildew and germicidal characteristics. Submit Material Safety Data Sheets (MSDS) for all primers and adhesives to the Contracting Officer. Highlight VOC expressed in g/l.

Vinyl Wall Covering

Manufacturer's catalog data.

SD-04 Samples

Wall Coverings and Accessories
Wall Coverings

Three samples of each indicated type, pattern, and color of wall covering. Provide minimum 5 by 7 inch samples of wall covering to show pattern repeat of sufficient size.

Three samples of each indicated type of frame for presentation dry erase wall covering. Provide samples a minimum of3 inches long.

Vinyl Wall Covering Mockup Panels. After vinyl wall covering samples are approved, and prior to starting installation, provide a minimum 8 by 8 foot vinyl wall covering mock-up for each color and type of vinyl wall covering, using the proposed primers and adhesives and actual substrate materials. Once approved, use the mock-up samples as a standard of workmanship for installation within the facility. Submit written notification to the Contracting Officer at least 48 hours prior to mock-up installation.

Wall Covering: Three samples, 3 yards long by the width specified, of each color and grain to be installed in the work, as required to illustrate material weight, color, shade, decorative design, and embossing when required.

SD-07 Certificates

Wall Coverings and Accessories

Manufacturer's statement attesting that the product furnished meets or exceeds specification requirements. The statement must; be dated after the award of the contract, state Contractor's name and address, name the project and location, and list the requirements being certified. Certificates for Vinyl Wall Covering including the following:

a. Certified laboratory test reports of the physical properties

for vinyl wall covering, as specified.

b. Certificates of Compliance for UL fire hazard classification listing, as specified.

c. Certificates of Compliance for contact adhesive.

SD-08 Manufacturer's Instructions

Wall Coverings and Accessories

Preprinted installation instructions for wall covering and accessories, adhesives and primers. Include preparation of the substrate within the instructions.

SD-10 Operation and Maintenance Data

Vinyl Wall Covering

Preventative maintenance and inspection for Vinyl Wall Covering showing the manufacturer's recommended cleaning materials and application methods, including precautions in the use of cleaning materials that may be detrimental to the wall covering surface when improperly applied.

1.3 DELIVERY AND STORAGE

Deliver the material to the site in manufacturer's original wrappings and packages and clearly label with the manufacturer's name, brand name, pattern and color name and number, dye lot number, size, and other related information. Store in a safe, dry, clean, and well-ventilated area at temperatures not less than 50 degrees F and within a relative humidity range of 30 to 60 percent. Store wall covering material in a flat position and protect from damage, soiling, and moisture. Do not open containers until needed for installation, unless verification inspection is required.

1.4 ENVIRONMENTAL REQUIREMENTS

Comply with wall covering manufacturer's printed installation instructions for minimum temperature of area to receive requirements for conditioning adhesive and wall covering. Provide a minimum 50 degrees F area temperature, 72 hours prior to installation, during installation, and until the adhesive dries. Observe ventilation and safety procedures.

1.5 EXTRA MATERIALS

Provide one linear foot of full-width wall covering of each pattern and color for each 100 linear feet of wall covering installed. Provide the same manufacturer, type, pattern, color, and lot number of extra stock as the installed wall covering. Provide full rolls, packed for storage and marked with content, manufacturer's name, pattern and color name and number and dye lot number. Leave extra stock at the site at a location as directed by the Contracting Officer.

PART 2 PRODUCTS

2.1 WALL COVERINGS

Provide Wall coverings and accessories material designed specifically for

the specified use. Furnish wall covering with a mercury, cadmium, lead, and chromium free base. Protect wall coverings with bactericides and mildew inhibitors against microbiological and mildew growth.

2.1.1 Vinyl Wall Covering

Provide vinyl wall covering with an integrally pigmented, opaque vinyl film, laminated to, or combined with, a fabric backing.

Provide a stain-resistant wall covering of medium duty type, finish as specified, with a polyvinylfluoride film top coating, conforming to FS CCC-W-408, Type II, and the following modifications:

Supporting material for wall covering may be mildew-resistant treated at the option of the wall covering manufacturer.

Use a clear polyvinylfluoride film, not less than 0.005-inch thick as a top coating.

Provide the following physical properties:

REQUIREMENT	TEST METHOD	VALUE
Coating weight, exclusive of fabric backing	FED-STD 191, Test 5041	Not less than 7 ounces per square yard
Adhesion of coating to fabric backing	ASTM D 751	Not less than 3 pounds pull per inch of width
Stain-resistance, covered spot test, 24-hour exposure, using the household chemical reagents and staining agents specified in ASTM D 1308 and the following: ballpoint pen ink lipstick nicotine shoe polish stamp-pad ink rubber scuff marks crayon merthiolate	ASTM D 1308	No perceptible staining or bleaching of coating; stains readily removed with solvent or cleaning agent

Match color and grain of wall covering of the sample approved. Provide a 53 to 54 inch width wall covering.

2.1.2 Vinyl Wall Covering Type I

Provide a nonwoven wall covering fabric. Conform to CFFA-W-101-D for vinyl wall covering, Type II (Medium Duty) with a minimum total weight of 13 ounces/square yard and 20 ounces/linear yard. Provide width of 54 inch.

Test vinyl wall covering in accordance with NFPA 286 or have a Class A flame spread rating of 0-25 and smoke development rating of 0-450 when tested in accordance with ASTM E 84.

2.1.3 Presentation Dry Erase Wall covering

Furnish presentation dry erase wall covering that accepts dry erase markings and is designed to be used as a projection screen. Provide wall covering with a minimum total weight of 18 ounces/square yard, a width of 60 inches and backing of a nonwoven polyester. Test wall covering in accordance with NFPA 286 or have a Class A flame spread rating of 0-25 and smoke development rating of 0-450 when tested in accordance with ASTM E 84. Provide wall covering color selected from manufacturers standard colors. When frame is required provide aluminum and have a full length tray of the same material. Markings shall be removable with a felt eraser or cloth without ghosting. Provide each unit complete with an eraser, four different color compatible dry erase markers, and an 8 oz. bottle of liquid surface cleaner recommended by the manufacturer.

2.2 PRIMER AND ADHESIVE

Provide a type primer and adhesive recommended by the wall covering manufacturer, containing a non-mercury based mildewcide, and complying with local indoor air quality standards. VOC content must be less than the current VOC content limits of SCAQMD Rule 1168. Primer must permit removal of the wall covering and protect the wall surface during removal. Do not damage gypsum wallboard facing paper during removal of wall covering. Provide a strippable type adhesive. When substrate color variations show through vinyl wall covering, provide a white pigmented primer as recommended by the wall covering manufacturer used to conceal the variations. Provide a recommended type adhesive to install corner guards and wainscot cap by the manufacturer of the corner guards and wainscot cap.

2.3 COLOR, TEXTURE, AND PATTERN

Provide color as indicated on the MATERIAL LEGEND in the drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers.

PART 3 EXECUTION

3.1 EXAMINATION

Inspect all areas and conditions under which wall coverings are to be installed. Notify the Contracting Officer, in writing, of any conditions detrimental to the proper and timely completion of the installation. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Do not apply wall covering to surfaces that are rough, that contain stains which will bleed through the wall covering, or that are otherwise unsuitable for proper installation. Fill cracks and holes; sand rough spots smooth. Finish walls to receive presentation dry erase wall covering to a Level 4 gypsum wallboard finish in accordance with GA 214 unless Level 5 is recommended by the wall covering manufacturer. Thoroughly dry surfaces at least 30 days prior to installation of vinyl wall covering. Provide interior surfaces of new and existing gypsum wallboard with a wall

covering primer in accordance with the manufacturer's printed instructions. As required, use white primer when substrate color variations are visible through thin or light color wall covering. Seal interior surfaces of exterior masonry walls to prevent moisture penetration, then prime with a wall covering primer in accordance with the manufacturer's printed instructions. Provide masonry walls with flush joints. Test moisture content of plaster, concrete, and masonry with an electric moisture meter of a maximum five percent reading. Apply a thin coat of joint compound or cement plaster, as recommended by the wall covering manufacturer, to the concrete and masonry walls as a substrate preparation. To promote adequate adhesion of wall lining over masonry walls, prime the walls as recommended by the wall lining manufacturer. Prime the surfaces of walls as required by the manufacturer's printed instructions to permit ultimate removal of wall covering from the wall surfaces. Allow primer to completely dry before adhesive application.

3.3 INSTALLATION

3.3.1 Wall Covering

Install wall covering in accordance with the manufacturer's printed installation instructions. Remove glue and adhesive spillage from wall covering face and seams with a remover recommended by the manufacturer. After the installation is complete, vacuum the fabric with a ceiling to floor motion. Upon completion of presentation dry erase wall covering installation, clean the wall covering surface as recommended by the manufacturer prior to first use. When frame and tray are required for presenation dry erase wall covering, install them in accordance with manufacturer's installation instructions. Refer to interior elevations for locations of wall coverings.

3.3.1.1 Presenation Dry Erase Wall Covering Placement

Install presentation dry erase wall covering, as indicated on the interior elevations. Unless otherwise indicated on the elevations, make the first seam at 30 inch above finished floor for rooms with 9 foot ceilings. Do not make seams at writing height to provide a continual, seamless writing surface. Wall covering locations are as indicated on drawings.

3.4 CLEAN-UP

Upon completion of the work, clean wall covering free of dirt, soiling, stain, or residual film. Remove and clean surplus materials, rubbish, and debris resulting from the wall covering installation.

-- End of Section --

SECTION 09840

ACOUSTICAL WALL TREATMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16	(2004) Colorfastness to Light

ASTM INTERNATIONAL (ASTM)

ASTM C 423	(2002a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM D 5034	(1995; R 2001) Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM E 84	(2006a) Standard Test Method for Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings

Drawings showing plan locations, elevations and details. Drawings shall include details of method of anchorage, location of doors and other openings, base detail and shape and thickness of materials.

SD-03 Product Data

Installation

Manufacturer's installation instructions and recommended cleaning instructions.

Acoustical Wall Panels

Manufacturer's descriptive data and catalog cuts.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Provide products manufactured with in a 500 mile radius of the project site. Provide products with a minimum 17 percent post-consumer recycled content and a minimum 4 prcent post-industrial recycled content.

Documentation indicating distance between manufacturing facility and the project site.

Give preference to products manufactured and harversted/extracted/recovered within 500 miles of the project site.

Manufacturer's product data or MSDS for each product including printed statement of VOC content.

SD-04 Samples

Acoustical Wall Panels

Fabric swatches, minimum 24 inches wide by 24 inches long 3 samples of each color range specified.

SD-07 Certificates

Acoustical Wall Panels

Certificates of compliance from an independent laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards. A label or listing from the testing laboratory will be acceptable evidence of compliance.

1.3 DELIVERY AND STORAGE

Materials delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt, dust, or other contaminants.

PART 2 PRODUCTS

2.1 FABRIC COVERED ACOUSTICAL WALL PANELS

Acoustical wall panels shall consist of a fabric covered 6-7 PCF glass fiber core with chemically-hardened edge protection. Wall panels shall be manufactured to the dimensions and configurations shown on the approved detail drawings. Perimeter edges shall be full-fabric wrapped. Panels shall be Conwed Designscape Respond custom acoustic wall panels style Act or approved equal.

a. Recycled Contect: Minimum recycled content indicated in MATERIAL LEGEND in drawings.

b. Panel Width: Panel width shall be as shown on the drawings and verified in the field.

c. Panel Height: Panels shall be field measured for custom fit to ceiling. Tolerance at floor to be as detailed. Panel height shall be as shown on the drawings and verified in the field.

d. Thickness: 1 inch.

e. Fabric Covering: Seamless fabric as indicated in the MATERIAL LEGEND in the drawings. Tear strength shall be minimum 29 pounds. Tensile strength shall be 150 pounds minimum in accordance with ASTM D 5034. Fabric covering shall be stretched free of wrinkles and then bonded to the edges and back or bonded directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. Light fastness (fadeometer) shall be approximately 40 hours in accordance with AATCC 16.

f. Fire rating for the complete composite system: Class A, 200 or less smoke density and flame spread less than 25, when tested in accordance with ASTM E 84.

g. Noise Reduction Coefficient (NRC) Range: 0.80-0.90 ASTM C 423.

h. Edge Detail: Fabric wrapped, square edge.

i. Core Type: Acoustical/tackable 1 inch thick fiber glass core.

j. Mounting: Acoustical panels shall be mounted by manufacturer's standard z-clips.

k. Color: Fabric shall be as indicated on the MATERIAL LEGEND on the drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Walls shall be clean, smooth, oil free and prepared in accordance with panel manufacturer's instructions. Installation shall not begin until all wet work, such as, plastering, painting, and concrete are completely dry.

3.2 INSTALLATION

Panel installation shall be by personnel familiar with and normally engaged in installation of acoustical wall panels. Panels shall be applied in accordance with the manufacturer's installation instructions.

3.3 CLEANING

Following installation, dirty or stained panel surfaces shall be cleaned in accordance with manufacturer's instructions and left free from defects. Panels that are damaged, discolored, or improperly installed shall be removed and new panels provided as directed.

-- End of Section --

SECTION 09850

INTERIOR METAL WALL PANELS

PART 1 GENERAL

1.1 GENERAL

This section includes the interior metal wall panels shown on the drawings that are located in the SOC, on the elevator entrance walls in the Atrium, and on the rectangular column covers in the Atrium.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611	(1998) Voluntary Specification for Anodized Architectural Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM B 209/B 209M	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM D 1002	(2005) Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)
ASTM C 297/C 297M	(2004) Flatwise Tensile Strength of Sandwich Constructions
ASTM E 84	(2008a) Standard Test Method for Surface Burning Characteristics of Building Materials

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 9001	(2000) Quality management systems-Requirements

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Metal Wall Panels

Shop drawings shall show dimensions, sizes, thickness, methods of joining, attachments, and relationship to adjoining work.

SD-03 Product Data

Metal Wall Panels

Submit manufacturer's technical data and brochures for each type of wall panel required indicating alloys, tempers, and finishes.

SD-04 Samples

Metal Wall Panels

Submit at least five 3 inches X 5 inches samples of each type of metal and finish as specified.

SD-07 Certificates

Metal Wall Panels

Submit certification from manufacturer of wall panels attesting that products comply with specified requirements including finish as specified.

1.4 QUALITY ASSURANCE

a. Manufacturer: Firm with manufacturing and delivery capacity required for the project, shall have successfully completed at least ten projects within the past five years, utilizing systems, materials and techniques as herein specified.

b. Fabricator: Fabricator must own and operate its own manufacturing facilities for all metal components. "Stick Built" or "Kit of Parts Systems" consisting of components from a variety of manufacturers will not be considered or accepted.

c. Quality Control: Manufacturer must have in place a quality system equivalent to the ISO 9001 and must be able to demonstrate compliance.

1.5 DELIVERY, STORAGE, AND HANDLING

All materials shall be protected during fabrication, shipment, site storage and erection to prevent damage to the finished work from other trades. Store wall panels inside a well-ventilated area, away from uncured concrete and masonry, and protected from the weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

The wall panel system shall be manufactured by LAM-CEL division of Railtech Composites, Inc., 80 Montana Drive, Plattsburgh, NY 12903, (514) 457-4760 or approved equal.

2.2 MATERIALS

a. LAM-CEL Metal Panel

1. Panel Composition: All structural panels shall consist of a metal

face, core, and metal backer. Panels shall be fabricated with structural adhesives in a platen press under controlled conditions of temperature, time, and pressure. No contact adhesives or pinch rollers shall be employed in the panel fabrication.

2. Panel Sizes: Panels shall be fabricated to the sizes shown on the drawings. All special size and shaped panels shall be fabricated in the factory and be fully formed on all edges. Details as shown on drawings.

3. Core Materials: Shall be 3/8 inch hexagonal aluminum honeycomb, thickness to be 1/2 inch (1/4 inch to 1 inch). Optional Cores - Grade 1 Particle Board (1/2 inch to 1 inch) or insulating Isocyanuarate foam (1 inch thick).

4. Surface Quality: Provide metals free from surface blemishes where exposed to view in finished unit. Surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable. All metals shall be of the highest-grade commercial type.

5. Metal Face: Metal face thickness shall be adequate to resist design loads. Metal face shall be aluminum sheet of Type 3003-H14 alloy (3004-H14 or 50005 H34) minimum .025 inch (ASTM B 209/B 209M.

6. Panel Bond Strength: Panel bond strength, as tested according to ASTM C 297/C 297M shall be a minimum of 400 psi.

7. Adhesive Shear Strength: The adhesive, when tested according to ASTM D 1002 shall have a minimum shear strength of 3,200 psi.

8. Testing: Manufacturer must have an internal testing program integrated into their QA system to test for these bond and adhesive strengths on a constant basis to test production panels.

9. Flammability:

ASTM E 84 Flame Spread: 0
ASTM E 84 Smoke Developed: 15

b. Panel Suspension System: The wall panel suspension system shall be a Z-Clip System. All secondary framing, anchors, clips and fasteners are to be provided as a complete package of this work. No exposed fasteners are allowed.

2.3 FINISHES

Aluminum shall have a clear anodized finish designation AA M1O-C22-A31 meeting the requirements of AAMA 611.

PART 3 EXECUTION

3.1 INSTALLATION

a. Install wall panels in accordance with manufacturer's written installation instructions and shop drawings.

b. Wall Panels shall be erected plumb except where sloped panels are required in the SOC, level, square, true to line, securely anchored, and in

proper alignment and relationship to work of other trades.

c. Wall Panels when installed shall have vertical and horizontal reveal joints, as shown on the architectural drawings. All other details, including base and ceiling details, shall be in accordance with the architectural drawings.

d. Wall Panels shall be inspected before installation to be free from dents, scratches, and other defects.

3.2 CLEANING

a. Removal of protective covering shall occur immediately after installation to prevent adhesive transfer.

b. Clean all surfaces following installation.

3.3 PROTECTION

Protection of wall panels from damage by other trades after installation to be provided by general contractor.

-- End of Section --

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100Doc	(2005) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D 2092	(1995; R 2001e1) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM D 4263	(1983; R 2005) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D 4444	(1992; R 2003) Use and Calibration of Hand-Held Moisture Meters
ASTM D 523	(1989; R 1999) Specular Gloss
ASTM F 1869	(2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

MASTER PAINTERS INSTITUTE (MPI)

MPI 10	(Jan 2004) Exterior Latex, Flat, MPI Gloss Level 1
MPI 107	(Jan 2004) Rust Inhibitive Primer (Water-Based)
MPI 11	(Jan 2004) Exterior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 119	(Jan 2004) Exterior Latex, Gloss
MPI 134	(Jan 2004) Galvanized Primer (Waterbased)
MPI 138	(Jan 2004) Interior High Performance Latex, MPI Gloss Level 2
MPI 141	(Jan 2004) Interior High Performance Latex MPI Gloss Level 5

MPI 23	(Jan 2004) Surface Tolerant Metal Primer
MPI 26	(Jan 2004) Cementitious Galvanized Metal Primer
MPI 39	(Jan 2004) Interior Latex-Based Wood Primer
MPI 4	(Jan 2004) Interior/Exterior Latex Block Filler
MPI 44	(Jan 2004) Interior Latex, MPI Gloss Level 2
MPI 45	(Jan 2004) Interior Alkyd Primer Sealer
MPI 47	(Jan 2004) Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 49	(Jan 2004) Interior Alkyd, Flat, MPI Gloss Level 1
MPI 50	(Jan 2004) Interior Latex Primer Sealer
MPI 54	(Jan 2004) Interior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 79	(Jan 2004) Alkyd Anti-Corrosive Metal Primer
MPI 8	(Jan 2004) Exterior Alkyd, Flat, MPI Gloss Level I
MPI 9	(Jan 2004) Exterior Alkyd, Gloss, MPI Gloss Level 6
MPI 95	(Jan 2004) Quick Drying Primer for Aluminum

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP-01	(2000) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting
SSPC PA Guide 3	(1982; E 1995) A Guide to Safety in Paint Application
SSPC SP 1	(1982; E 2004) Solvent Cleaning
SSPC SP 10	(2000; E 2004) Near-White Blast Cleaning
SSPC SP 12	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 2	(1982; E 2004) Hand Tool Cleaning

SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6	(2000; E 2004) Commercial Blast Cleaning
SSPC SP 7	(2000; E 2004) Brush-Off Blast Cleaning
SSPC VIS 1	(2002) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(2004) Visual Standard for Power-and Hand-Tool Cleaned Steel
SSPC VIS 4	(1998; e2000) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24	(2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(Rev D; Am 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved

Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-03 Product Data

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Materials; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Coating

Manufacturer's Technical Data Sheets; (LEED)

Indicate VOC content.

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-07 Certificates

Qualification Testing laboratory for coatings

SD-08 Manufacturer's Instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings:

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Materials; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

LEED documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 QUALITY ASSURANCE

1.3.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that confrom to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.3.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.3.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing

lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.4 REGULATORY REQUIREMENTS

1.4.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.4.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.4 Asbestos Content

Materials shall not contain asbestos.

1.4.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.6 Silica

Abrasive blast media shall not contain free crystilline silica.

1.4.7 Human Carcinogens

Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented

paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.6 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

1.6.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100Doc, threshold limit values.

1.7 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as

manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total local material requirements. Paint and coating materials may be locally available.

1.9 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs.

1.10 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color of wall coating systems shall be as indicated in the FINISH SCHEDULE on the drawings.

1.11 LOCATION AND SURFACE TYPE TO BE PAINTED

1.11.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.11.1.1 Exterior Painting

Includes new surfaces of the buildings and appurtenances.

1.11.1.2 Interior Painting

Includes new surfaces of the buildings and appurtenances as indicated. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

1.11.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.11.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.11.4 Definitions and Abbreviations

1.11.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.11.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.11.4.3 Coating

A film or thin layer applied to a base material called a substrate. A

coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.11.4.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.11.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.11.4.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.11.4.7 EXT

MPI short term designation for an exterior coating system.

1.11.4.8 INT

MPI short term designation for an interior coating system.

1.11.4.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.11.4.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.11.4.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.11.4.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees

G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.11.4.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.11.4.14 Paint

See Coating definition.

1.11.4.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.11.4.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents. Comply with applicable regulations regarding toxic and hazardous materials.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 PREPARATION OF METAL SURFACES

3.2.1 Existing and New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6, or SSPC SP 10. Brush-off blast remaining surface in accordance with SSPC SP 7. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/SSPC SP 12 WJ-3.

3.2.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

3.2.3 Galvanized Surfaces

a. New Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.3 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.3.1 Concrete and Masonry

a. Curing: Concrete and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cuphousehold detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water.

(2) Fungus and Mold: Wash new surfaces with a solution composed

of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.3.2 Gypsum Board

a. Surface Cleaning: Gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when measured in accordance with ASTM D 4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

3.4 PREPARATION OF WOOD SURFACES

3.4.1 New Wood Surfaces:

a. Wood surfaces shall be cleaned of foreign matter.

Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood.

b. Moisture content of the wood shall not exceed 12 percent as

measured by a moisture meter in accordance with ASTM D 4444, Method A, unless otherwise authorized.

c. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.

de. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

3.4.2 Interior Wood Surfaces, Stain Finish

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

3.5 APPLICATION

3.5.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or

intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

3.5.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.5.3 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.5.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table
Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 6. Interior Wood Paint Table
Division 9: Interior Gypsum Board, Textured Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces

which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

3.6 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.7 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.8 COATING SYSTEMS FOR WOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

3.9 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate

mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.10 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, local recyclers shall be sought after to reclaim the materials. Set aside extra paint for future color matches or reuse by the Government. Where local options exist for leftover paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility for reuse by local organizations.

3.11 PAINT TABLES

All DFT's are minimum values. Use only materials with a GPS green check mark having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels. Use only interior paints and coatings that meet VOC requirements of LEED low emitting materials credit. Acceptable products are listed in the MPI Green Approved Products List, available at http://www.specifygreen.com/APL/ProductIdxByMPInum.asp.

3.11.1 EXTERIOR PAINT TABLES

DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

A. New concrete
vertical surfacesas shown on the drawings:

1. Latex
   New; MPI EXT 3.1A-G2 (Flat) / Existing; MPI REX 3.1A-G2 (Flat)
   Primer: Intermediate: Topcoat:
   MPI 10 MPI 10 MPI 10
   System DFT: 3.5 mils

   New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI EXT 3.1A-G5 (Semigloss)
   Primer: Intermediate: Topcoat:
   MPI 11 MPI 11 MPI 11
   System DFT: 3.5 mils

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd
   New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6

STEEL / FERROUS SURFACES

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 9	MPI 9

System DFT: 5.25 mils

B. New Steel that has been blast-cleaned to SSPC SP 6:

1. Alkyd

New; MPI EXT 5.1D-G6 (Gloss) / Existing; MPI REX 5.1D-G6

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 9	MPI 9

System DFT: 5.25 mils

EXTERIOR GALVANIZED SURFACES

C. New Galvanized surfaces:

1. Cementitious primer / Latex

MPI EXT 5.3A-G1 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 26	MPI 10	MPI 10

System DFT: 4.5 mils

2. Waterborne Primer / Latex

MPI EXT 5.3H-G1 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 10	MPI 10

System DFT: 4.5 mils

MPI EXT 5.3H-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 119	MPI 119

System DFT: 4.5 mils

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

D. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd

MPI EXT 5.4F-G1 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 8	MPI 8

System DFT: 5 mils

MPI EXT 5.4F-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 9	MPI 9

System DFT: 5 mils.

E. Surfaces adjacent to painted surfaces; Mechanical, Electrical, and miscellaneous metal items not otherwise specified except new prefinished equipment. Match surrounding finish.

3.11.2 INTERIOR PAINT TABLES

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New Concrete, vertical surfaces, not specified otherwise:

1. Latex
New; MPI INT 3.1A-G2 (Flat) / Existing; MPI RIN 3.1A-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 44	MPI 44

System DFT: 4 mils

New; MPI INT 3.1A-G5 (Semigloss) / Existing; MPI RIN 3.1A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 54	MPI 54

System DFT: 4 mils

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New and uncoated Existing Concrete masonry:

1. MPI INT 4.2D-G5 (Semigloss)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 141	MPI 141

System DFT: 11 mils

Fill all holes in masonry surface

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Steel Doors and Frames, Surfaces adjacent to painted surfaces and miscellaneous metal items not otherwise specified except surfaces and new prefinished equipment:

1. Alkyd
MPI INT 5.1E-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 49	MPI 49

System DFT: 5.25 mils

MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT: 5.25 mils

B. Miscellaneous non-ferrous metal items not otherwise specified:

1. High Performance Architectural Latex
PI INT 5.4F-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 138	MPI 138

System DFT: 5 mils

MPI INT 5.4F-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:

INTERIOR STEEL / FERROUS SURFACES
MPI 95 MPI 141 MPI 141
System DFT: 5 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New uncoated Wood not otherwise specified:

1. MPI INT 6.4S-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 39 MPI 141 MPI 141
System DFT: 4.5 mils

B. New uncoated Wood Doors; Pigmented finish:

1. Alkyd
New; MPI INT 6.3B-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 45 MPI 47 MPI 47
System DFT: 4.5 mils

DIVISION 9: INTERIOR GYPSUM BOARD PAINT TABLE

A. New Wallboard not otherwise specified:

1. Latex
New; MPI INT 9.2A-G2 (Flat) / Existing; RIN 9.2A-G2 (Flat)
Primer: Intermediate: Topcoat:
MPI 50 MPI 44 MPI 44
System DFT: 4 mils

2. High Performance Architectural Latex - High Traffic Areas
New; MPI INT 9.2B-G2 (Flat) / Existing; MPI RIN 9.2B-G2 (Flat)
Primer: Intermediate: Topcoat:
MPI 50 MPI 138 MPI 138
System DFT: 4 mils

B. New Wallboard in toilets, food-preparation, food-serving, restrooms, shower areas, and other high humidity areas not otherwise specified:

1. Alkyd
New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 50 MPI 47 MPI 47
System DFT: 4 mils

-- End of Section --

SECTION 10160

TOILET COMPARTMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 167	(2004) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 385	(2005) Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
ASTM D 1972	(1997; R 2005) Standard Practice for Generic Marking of Plastic Products

INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1	(2003; R 2004) Standard for Accessible and Usable Buildings and Facilities

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-60003	(Basic) Partitions, Toilet, Complete

U.S. ARMY CORPS OF ENGINEERS (USACE)

SPiRiT	(2002) Sustainable Project Rating Tool (SPiRiT) Version 1.4.1

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings
Fabrication Drawings

Drawings showing plans, elevations, details of construction, hardware, reinforcing, fittings, mountings, and anchorings for metal partitions and urinal screens. Installation drawings as specified.

SD-03 Product Data

Toilet Partition System
Cleaning and Maintenance Instructions
Colors And Finishes
Partition Panels and Doors
Anchoring Devices and Fasteners
Hardware and Fittings
Brackets
Door Hardware
Overhead-Braced Partitions

Manufacturer's technical data and catalog cuts including installation and cleaning instructions.

Local/Regional Materials; (SPiRiT)

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Provide products manufactured within a 500 mile radius of the project site. Provide products with a minimum 17 percent post-consumer recycled content and a minimum 4 percent post-industrial recycled content.

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Toilet Enclosures; (SPiRiT)
Urinal Screens; (SPiRiT)

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

SD-04 Samples

Colors and Finishes

Manufacturer's standard color charts and color samples.

Partition Panels

Three samples showing a finished edge, each not less than 12-inch square

Hardware and Fittings
Anchoring Devices and Fasteners

Three samples of each item. Approved hardware samples may be installed in the work if properly identified.

SD-10 Operation and Maintenance Data

Plastic Identification

When not labeled, identify types in Operation and Maintenance Manual.

Waste Management

SD-11 Closeout Submittals

Local/Regional Materials; (SPiRiT)

SPiRiT documentation relative to local/regional materials credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

Toilet Enclosures; (SPiRiT)

Urinal Screens; (SPiRiT)

SPiRiT documentation relative to recycled content credit in accordance with SPiRiT Reference Guide. Include in SPiRiT Documentation Notebook.

1.3 SYSTEM DESCRIPTION

Provide a complete and usable toilet partition system, including toilet enclosures and urinal screens, hardware, and support components. Comply with EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS and Affirmative Procurement guidelines. Furnish the partition system from a single manufacturer, with a standard product as shown in the most recent catalog data. Submit manufacturer's Cleaning and Maintenance Instructions with Fabrication Drawings for review.

1.4 REGULATORY REQUIREMENTS

Conform to ICC A117.1 code for access for the handicapped operation of toilet compartment door and hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the manufacturer's original unopened packages with the brand, item identification, and project reference clearly marked. Store Components in a dry location that is adequately ventilated; free from dust, water, other contaminants, and damage during delivery, storage, and construction.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total local material requirements. Toilet partition materials may be locally available.

1.6.2 Plastic Identification

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D 1972. Where products are not labeled, provide product data indicating polymeric information in the Operation and Maintenance Manual.

a. Type 1: Polyethylene Terephthalate (PET, PETE).
b. Type 2: High Density Polyethylene (HDPE).
c. Type 3: Vinyl (Polyvinyl Chloride or PVC).
d. Type 4: Low Density Polyethylene (LDPE).
e. Type 5: Polypropylene (PP).
f. Type 6: Polystyrene (PS).
g. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Manufacturer

Material and products provided shall be Bobrick Sierra Series Solid Color Reinforced Composite (SCRC) products or approved equal.

2.1.2 Anchoring Devices and Fasteners

Provide steel anchoring devices and fasteners hot-dipped galvanized after fabrication, in conformance with ASTM A 385 and ASTM A 123/A 123M. Conceal all galvanized anchoring devices.

2.1.3 Brackets

Wall brackets must be two-ear panel brackets, T-style, 1-inch stock. Provide stirrup style panel-to-pilaster brackets.

2.1.4 Hardware and Fittings

2.1.4.1 General Requirements

Hardware for the toilet partition system must conform to CID A-A-60003 for the specified type and style of partitions. Provide hardware finish highly resistant to alkalies, urine, and other common toilet room acids. Comply latching devices and hinges for handicap compartments with 36 CFR 1191; devices and hinges must be stainless steel door latches that operate without either tight grasping or twisting of the wrist of the operator.

a. Corrosion-resistant steel must conform to ASTM A 167, Type 304.

2.1.4.2 Finishes

a. Corrosion-resistant steel must have a satin finish.

b. Exposed fasteners must match the hardware and fittings.

2.1.5 Door Hardware

2.1.5.1 Hinges

Hinges must be self-lubricating with the indicated swing. Hinges must be the surface-mounted type, have the following type of return movement:

Gravity return movement

Hinge must be adjustable to hold in-swinging doors open at any angle up to 90 degrees and outswinging doors to 10 degrees.

2.1.5.2 Latch and Pull

Latch and pull must be a combination rubber-faced door strike and keeper equipped with emergency access.

2.1.5.3 Coat Hooks

Coat hooks shall be manufacturer's standard.

2.2 PARTITION PANELS AND DOORS

Partition Panels must be not less than 1/2 inch thick. Doors and pilasters must be not less than 3/4 inch thick.

2.2.1 Toilet Enclosures

Conform toilet enclosures to CID A-A-60003, Type I, Style, overhead braced. Furnish width, length, and height of toilet enclosures as shown. Finish surface of panels must be solid color reinforced composite. Enclosures shall contain a minimum of 15 percent post-consumer recycled content, with a minimum of 15 percent post-consumer recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. This item may contain post-consumer or post-industrial recycled content. Panels indicated to receive toilet paper holders or grab bars must be reinforced for mounting of the items required.

2.2.2 Urinal Screens

Provide 42 inch high wall hung urinal screens. Provide finish for surface of screens as solid color reinforced composite. Screens shall contain a minimum of 15 percent post-consumer recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. This item may contain post-consumer or post-industrial recycled content. Furnish width and height of urinal screens as shown. Secure wall hung urinal screens with a minimum of three wall stirrup brackets. Screens must be fabricated from the same types of panels as the toilet partitions. Fittings and fasteners must be corrosion-resistant steel.

2.3 OVERHEAD-BRACED PARTITIONS

Provide manufacturer's standard anchoring device at the bottom of the pilaster. Overhead brace must be fabricated from a continuous extruded aluminum tube with 0.125-inch wall thickness and satin finish. Set and secure brace into the top of each pilaster. Trim piece at the floor must be at least 3 inches high and fabricated from not less than 0.030 inch thick corrosion-resistant steel.

2.4 PILASTER SHOES

Provide shoes at pilasters to conceal floor-mounted anchorage. Pilaster shoes shall be stainless steel. Shoes shall contain a minimum of 10 percent post-consumer recycled content, or a minimum of 40 percent post-industrial recycled content. See Section 01335 SUSTAINABLE DESIGN AND DEVELOPMENT for cumulative total recycled content requirements. Pilaster shoes may contain post-consumer or post-industrial recycled content. Height shall be at least 3 inches.

2.5 HARDWARE

Hardware shall be pre-drilled by manufacturer. Hardware finish shall be stainless steel. Hardware shall include: pivot hinges, gravity type, adjustable for door close positioning; nylon bearings; door latch; door strike and keeper with rubber bumper; and coat hook. Latching devices and hinges for handicap compartments shall comply with 36 CFR 1191 and shall operate without either tight grasping or twisting of the wrist of the operator. Screws and bolts shall be stainless steel, tamper proof type. Wall mounting brackets shall be stainless steel, in accordance with toilet compartment manufacturer's instructions. Floor-mounted anchorage shall consist of corrosion-resistant anchoring assemblies with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor.

2.6 COLORS AND FINISHES

2.6.1 Colors

Provide manufacturer's standard color charts for color of finishes for toilet partition system components. Color shall be Bobrick SCRC color SC02, Desert Beige or approved equal.

2.6.2 Finishes No.4 and No. 5

Provide solid color reinforced composite surface thermoset and integrally fused into one homogeneous piece formed under high pressure rendering a single component section not less than 1/2 inch thick. Colors must extend throughout the panel thickness. Provide exposed finish surfaces: smooth, waterproof, non-absorbant, and resistant to staining and marking with pens, pencils, or other writing devices.

PART 3 EXECUTION

3.1 PREPARATION

Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive work. Verify correct spacing of plumbing fixtures. Verify correct location of built in framing, anchorage, and bracing. Report in writing to Contracting Officer prevailing conditions

that will adversely affect satisfactory execution of the work of this section. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

Install partitions rigid, straight, plumb, and level, with the panels centered between the fixtures. Provide a panel clearance of not more than 1/2 inch and secure the panels to walls and pilasters with not less than two wall brackets attached near the top and bottom of the panel. Locate wall brackets so that holes for wall bolts occur in masonry or tile joints. Secure Panels to pilasters with brackets matching the wall brackets. Provide for adjustment due to minor floor variations. Locate head rail joints at pilaster center lines. Install adjacent components for consistency of line and plane. Equip each door with hinges, one door latch, and one coat hook. Align hardware to uniform clearance at vertical edges of doors.

a. Secure panels to ceramic tile on gypsum board walls with screws of sufficient length to pass through the tile and gypsum board and firmly anchor to sheet metal backing attached to metal studs beyond. Screws must have a load-carrying strength of not less than 600 pounds each anchor.

b. Submit Installation Drawings for toilet partitions and urinal screens showing plans, elevations, details of construction, hardware, reinforcing and blocking, fittings, mountings and escutcheons. Indicate on drawings the type of partition, location, mounting height, cutouts, and reinforcement required for toilet-room accessories.

3.3 OVERHEAD-BRACED PARTITIONS

Secure pilasters to the floor with the anchorage device specified. Make all leveling devices readily accessible for leveling, plumbing, and tightening the installation. Overhead brace must be secured to the pilaster face with not less than two fasteners per face. Expansion shields must have a minimum 2-inch penetration into the concrete slab. Tops of doors must be parallel with the overhead brace when doors are in a closed position.

3.4 FINAL ADJUSTMENT

After completion of the installation, make final adjustments to the pilaster-leveling devices, door hardware, and other working parts of the partition assembly. Doors shall have a uniform vertical edge clearance of approximately 3/16 inch and shall rest open at approximately 30 degrees when unlatched.

3.5 CLEANING

Clean all surfaces of the work, and adjacent surfaces soiled as a result of the work, in an approved manner compliant with the manufacturer's recommended cleaning and protection from damage procedures until accepted. Remove all equipment, tools, surplus materials, and work debris from the site.

3.6 WASTE MANAGEMENT

Identify manufacturer's policy for collection or return of construction

scrap, unused material, demolition scrap, packaging material. Institute demolition and construction waste separation and recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 10201

METAL LOUVERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

AMCA 500-D	(1998) Laboratory Methods of Testing Dampers for Rating
AMCA 511	(1999; R 2004) Certified Ratings Program for Air Control Devices

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(2003) Designation System for Aluminum Finishes

ASTM INTERNATIONAL (ASTM)

ASTM B 221	(2006) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wall louvers

SD-03 Product Data

Metal Wall Louvers

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.4 DETAIL DRAWINGS

Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Extruded Aluminum

ASTM B 221, alloy 6063-T5 or -T52.

2.2 METAL WALL LOUVERS

Weather resistant type, with replaceable insect screens and made to withstand a wind load of not less than 40 pounds per square foot. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 1000 feet per minute.

The louvers shall have a minimum of 50 percent free area and pressure drop of no more than 0.20 inches w.g. at a velocity of 1000 FPM across the free area and through the insect screen.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.

2.2.2 Mullions and Mullion Covers

Same material and finish as louvers. Provide mullions for all louvers more than 5 feet in width at not more than 5 feet on centers. Provide mullions covers on both faces of joints between louvers.

2.2.3 Screens and Frames

For aluminum louvers, provide square or rectangular mesh aluminum bird or insect screening. Mount screens in removable, rewirable frames of same material and finish as the louvers. See LOUVER SCHEDULE on the drawings for screen type to be provided.

2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers. Provide other accessories as required for complete and proper installation.

2.4 FINISHES

2.4.1 Aluminum

Provide factory-applied anodic coating.

2.4.1.1 Anodic Coating

Clean exposed aluminum surfaces and apply an anodized finish conforming to AA DAF-45 Designation System for Aluminum Finishes, clear (natural), M10C22A31, Architectural Class II.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.1.2 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Copper or Copper-Bearing Alloys

Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

3.2.2 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

3.2.3 Metal

Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.2.4 Wood

Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

-- End of Section --

SECTION 10221

WIRE MESH PARTITIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3 (2002) Cold-Formed Steel Design Manual Set

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M (2005) Standard Specification for Carbon Structural Steel

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are or information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wire mesh partitions

Show layout, details, materials, dimensions, finishes, and all information necessary for fabrication and installation.

SD-03 Product Data

Wire mesh partitions

Submit for each type of partition, door, and window.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials in manufacturer's original, unopened containers or packaging with labels intact and legible. Deliver, store, and handle materials so as to prevent damage. Replace damaged or defective materials with new.

1.4 DESCRIPTION OF WORK

Wire mesh partitions shall be all wire type, normal duty for normal industrial use, and shall be provided complete with fasteners, capping bars, adjustable floor sockets, bracing, doors, hardware, and other items necessary for a complete, useable, and rigid installation.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Shapes, Plates, and Bars

ASTM A 36/A 36M.

2.1.2 Cold-Formed Steel

AISI SG03-3.

2.1.3 Wire Mesh

Carbon steel wire, woven diamond mesh, intermediate crimped.

2.1.4 Floor Sockets

Cast or forged steel or ductile iron, adjustable, approximately 2 1/2 inches high.

2.2 NORMAL DUTY PARTITIONS

2.2.1 Wire Mesh

10 gage wire, 1 1/2 inch mesh.

2.2.2 Vertical Frames

1 1/4 by 5/8 inch cold-rolled C section channels or 1 1/4 by 5/8 by 1/8 inch channels.

2.2.3 Horizontal Frames

One by 5/8 inch channels.

2.2.4 Center Reinforcing Bar

One one by 1/2 by 1/8 inch channel with all wires woven through, or two one by 3/8 by 1/8 inch channels bolted together with mesh in between.

2.2.5 Capping Bar

2 1/4 by one by 1/8 inch channel or 2 by 1/4 inch flat bar.

2.2.6 Corner Posts

Structural steel angles, 1 1/4 by 1 1/4 by 1/8 inch.

2.2.7 Line Posts

Unless otherwise indicated, provide partitions more than 12 feet high with flat bar line posts bolted between vertical frame channels. Sizes of posts shall be as follows:

Partition Height	Size of Posts
12 feet to 14 feet 8 inches	1 3/4 by 5/16 inch or 2 by 1/4 inch

Partition Height	Size of Posts
14 feet 8 inches to 19 feet 8 inches	2 1/2 by 5/16 inch
19 feet 8 inches to 23 feet 8 inches	3 by 5/16 inch

2.3 SLIDING DOORS

Frames shall be 1 1/2 by 3/4 by 1/8 inch channels with 1 1/2 by 1/8 inch flat bar cover all around. Provide two four-wheel, roller bearing hangers and steel box track for each door leaf.

2.4 DOOR OPENING FRAMES

Provide frames the same size and shape as the vertical frames for the mesh panels.

2.5 LOCKS

Provide bi-parting sliding doors with hasp for installation of padlock by others.

2.6 FABRICATION

2.6.1 Standard Panels

Wire shall be woven into diamond mesh, intermediate crimped, and securely clinched to frames. Joints shall be mortised and tenoned. Wire shall be continuous at center reinforcing bars. Panel vertical frames shall have 1/4 inch bolt holes 12 inches o.c. for normal duty partitions.

2.6.2 Doors

Construction shall be similar to that specified for panels. Wire mesh shall be the same as that used in the adjacent partition panels. Clear height of door openings shall be at least 7 feet-0 inches.

2.6.3 Finish

Thoroughly clean ferrous metal, treat with phosphate, and paint with dark gray enamel in the shop.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wire Mesh Partitions

Install plumb, level, and true to line, within a tolerance of 1/8 inch in 10 feet or the height or run of the partition, if less than 10 feet. Anchor floor sockets to the floor with expansion bolts. Vertical frames and posts shall be bolted together with 1/4 inch bolts 12 inches o.c. for normal duty partitions. Secure top frames to a continuous capping bar with 1/4 inch diameter U bolts not more than 28 inches o.c.

3.1.2 Doors

Install in accordance with the manufacturers' recommendations. Adjust as

required so that doors and hardware operate freely and properly.

3.1.3 Bracing

Brace free standing partitions more than 20 feet in length, at intervals not greater than 20 feet with a steel channel brace connected to the capping bar and anchored to the building wall or framing member.

3.1.4 Touch-Up

Clean and paint scratches, abrasions, and other damage to shop painted surfaces to match the shop-applied finish.

-- End of Section --

SECTION 10270

RIGID GRID ACCESS FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 780	(2001; R 2006) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings

CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)

CISCA Access Floors	(2004) Test Procedures for Access Floors

ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC300	(2005) Acceptance Criteria for Access Floors

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(2005) High-Pressure Decorative Laminates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99	(2005; Errata 2005) Health Care Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detailed Installation Drawings; G

Drawings showing location, details at floor perimeter, method of anchorage to structural subfloor, grounding, description of factory coating, installation height above structural floor, stairs, ramps, accessories and other details as specified.

SD-03 Product Data

Access Flooring System

Manufacturer's descriptive data, catalog cuts, and installation instructions. The data must include information about any design

and production techniques, total system including all accessories and finish coatings of under-floor components, procedures and policies used to conserve energy, reduce material, improve waste management or incorporate green building/recycled products into the manufacturer of their components or products. Cleaning and maintenance instructions must be included.

Systems which contain zinc electroplated anti-corrosion coatings are prohibited.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's product data or MSDS for all field applied adhesives used within the building interior highlighting VOC content, expressed in g/L, indicating that adhesives meet or exceed the VOC limits of SCAQMD Rule # 1168.

Manufacturer's product data or MSDS for all field applied sealants used within the building interior highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

SD-04 Samples

Three complete Floor Panels for each floor finish type
Three separate samples of the specified Finish Flooring
Panel Support System
Accessories

One sample of type proposed for use.

SD-05 Design Data

Compliance with ICC-ES AC300

Design data substantiating compliance with International Building Code Acceptance Criteria for Access Floors.

Seismic Calculations; G

Design calculations performed by a structural engineer which demonstrate that the proposed floor system meets requirements for seismic loading. Calculations will be forwarded to the Government for review.

SD-06 Test Reports

Factory Tests
Electrical Resistance
Field Tests

Certified copies of test reports from an approved testing

laboratory, attesting that the proposed floor system components meet the performance requirements specified.

SD-07 Certificates

Access Flooring System

Certificate of compliance attesting that the installed access floor system meets specification requirements, including all special equipment loads and specific electrical and or cable requirements.

1.3 SYSTEM DESCRIPTION

Access flooring must be installed at the location and elevation and in the arrangement shown on the drawings. The floor system must be of the rigid bolted grid stringer type, complete with all supplemental items, and be the standard product of a manufacturer specializing in the manufacture of access flooring systems.

a. Provide for self-alignment of floor panels, adjustable pedestals and readily removable floor panels covered as specified.

b. Lateral stability of floor support system must be independent of panels. Finished assembly must be rigid and free of vibration, noises, and rocking panels.

c. Submit Certificates for the complete Access Flooring System including, but not limited to the following:

1) Compliance with ICC-ES AC300.

2) Load-bearing capabilities of pedestals, floor panels, and pedestal adhesive resisting force.

3) Supporting independent laboratory test reports. For panel loads, test results include concentrated loads at center of panel, panel edge midpoint, and uniform loads.

4) Floor electrical characteristics.

5) Material requirements

6) Elevated floor system must be free of defects in materials, fabrication, finish, and installation, and that it will remain so for a period of not less than five years after completion.

d. The Contractor warrants that, upon notification by the Government, defective work will be immediately replaced with new work at no additional cost to the Government.

1.3.1 Allowable Tolerances

a. Floor Panel Flatness: Plus or minus 0.02 inches on diagonal on top of panel or underneath edge.

b. Floor Panel Length: Plus or minus 0.015 inch.

c. Floor Panel Squareness: Plus or minus 0.02 inch in panel length.

d. Finish Floor: Level within plus or minus 0.062 inch in 10 feet, and plus or minus 0.10 inch for entire floor.

1.3.2 Floor Panels

Floor panel testing must be conducted in accordance with CISCA Access Floors. When tested as specified, all deflection and deformation measurements must be made at the point of load application on the top surface of the panel. The metal-clad cementitious filled floor panels must be capable of supporting the following loads:

a. Concentrated load of 2500 pounds on one square inch, at any point on panel, without deflecting more than 0.10 inch, with a safety factor of 2 based on static design load, without permanent deformation in excess of 0.01 inch in any of the specified tests.

b. Uniform live load of 625 psf, without deflecting more than 0.04 inch.

c. A rolling load of 2000 pounds applied through hard rubber surfaced wheel 6 inch diameter by 1 1/2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test shall not exceed 0.010 inch.

d. A rolling load of 1500 pounds applied through a 3 inch diameter by 1-13/16 inch wide caster for 10 cycles over the same path, without deflecting more than 0.04 inch and without permanent deformation in excess of 0.02 inch. In accordance with CISCA Access Floors, the permanent deformation limit under rolling load shall be satisfied in all of the specified tests. In the specified tests, the permanent deformation shall be measured after 10 passes with Wheel 1 and after 10,000 passes with Wheel 2.

e. An impact load of 150 pounds on one square inch from a height of 12 inches with permanent set not to exceed 0.060 inch.

The perforated floor panels and the die cast aluminum grate panels must be capable of supporting the following loads:

a. Concentrated load of 1000 pounds on 1 square inch, at any point on panel, without deflecting more than 0.10 inch, with a safety factor of 2 based on static design load, without permanent deformation in excess of 0.01 inch in any of the specified tests.

b. Uniform live load of 250 psf, without deflecting more than 0.04 inch.

c. A rolling load of 1000 pounds applied through hard rubber surfaced wheel 6 inch diameter by 1-1/2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test shall not exceed 0.010 inch.

d. A rolling load of 800 pounds applied through a 3 inch diameter by 1-13/16 inch wide caster for 10 cycles over the same path, without deflecting more than 0.04 inch and without permanent deformation in excess of 0.02 inch. In accordance with CISCA Access Floors, the permanent deformation limit under rolling load shall be satisfied in all of the specified tests. In the specified tests, the permanent deformation shall be measured after 10 passes with Wheel 1 and after 10,000 passes with Wheel 2.

e. An impact load of 100 pounds on one square inch from a height of 12 inches with permanent set not to exceed 0.060 inch.

1.3.3 Stringers

Stringers must be capable of supporting a 450 pound concentrated load at midspan without permanent deformation in excess of 0.010 inch.

1.3.4 Pedestals

Pedestals axial capacity shall be as determined by the rigid grid access floor engineer, but must be capable of supporting a 5000 pound axial load without permanent deformation.

1.3.5 Bonding Strength of Pedestal Adhesive

Adhesive for anchoring pedestal bases must have a bonding strength capable of resisting an overturning moment, as determined by the rigid grid access floor engineer, but shall be at least 2,000 lbf-in when a force is applied to the top of the pedestal in any direction for all pedestals supporting the 36 inch tall access floors. Panel heights greater than 36 inches require specific structurally designed bracing. Adhesive shall have a VOC content that does not exceed 70 g/L. Diagonal pedestal bracing shall be minimized to maintain an open underfloor space.

1.3.6 Bond Strength of Factory Installed Covering

Bond strength of plastic laminate and linoleum floor covering must be sufficient to permit handling of the panels by use of the panel lifting device, and to withstand moving caster loads up to 1000 pounds, without separation of the covering from the panel.

1.3.7 Seismic Calculations

Submit calculations for special bracing to resist the effects of seismic or other forces in accordance with ICC IBC and ICC-ES AC300. Calculations shall be based on Seismic Design Category C and a Component Importance Factor of 1.5. Seismic load shall be based on spectral accelerations S_s = 0.324 and S_1 = 0.094. Design dead load shall be the dead load of the rigid grid access flooring system. Design live load shall be 150 psf for all areas. Calculations shall be performed for both the 36 inch and 60 inch floor heights.

1.3.8 Air Leakage

When the space below the finished floor is to be an air plenum, air leakage through the joints between panels and around the perimeter of the floor system must not exceed 0.1 cubic foot of air per minute per linear foot of joint subjected to 0.1 inch, water gauge, positive pressure in the plenum. Gasketing shall be applied to the tops of all stringers to reduce air leakage to a minimum.

1.3.9 Grounding

The access flooring system must be grounded for safety hazard and static suppression. Provide positive contact between components for safe, continuous electrical grounding of entire floor system. Total system resistance from wearing surface of floor to building grounding electrode

must be within range of 0.5 to 20,000 megohms.

1.3.9.1 Metal Grilles

Exposed metal is not allowed at wearing surface of access floor system, except at metal grilles and registers. When grilles and metal registers are provided, insulate as required to provide same grounding resistance as wearing surface.

1.3.9.2 Joint Resistance

Electrical joint resistance between individual stringer and pedestal junctions must be less than 0.1 milliohms. Electrical resistance between stringers and floor panels as mounted in normal use must be less than 3 ohms.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials to site in undamaged condition, in original containers or packages, complete with accessories and instructions. Label packages with manufacturer's name and brand designations. Materials covered by specific references must be packaged bearing specification number, type and class as applicable.

1.4.2 Storage

Store all materials in original protective packaging in a safe, dry, and clean location. Panels must be stored at temperatures between 40 and 90 degrees F, and between 20 and 70 percent humidity. Replace defective or damaged materials.

1.4.3 Handling

Materials must be handled and protected in a manner to prevent damage during the entire construction period.

1.5 EXTRA MATERIALS

Provide spare materials as follows:

a. For each carpet type, provide one spare carpeted floor panel for every 1,000 or fraction thereof installed with a minimum of four panels per carpet type.

b. For the linoleum covered floor panels, provide one spare panel for every 100 or fraction thereof installed.

c. For plastic laminate covered floor panels, provide one spare panel for every 500 or fraction thereof installed.

d. For perforated and grate style floor panels, provide one spare panel for every 100 or fraction thereof installed.

e. Provide spare complete pedestal assemblies at the rate of one for every 1,000 or fraction thereof installed for each access floor height.

f. Provide spare stringers at the rate of one for every 1,000 or

fraction thereof installed.

g. Provide at least 500 spare screws of the type used to secure the floor panels to the pedestal heads in areas to receive carpet floor covering. Provide any special tools required to remove or install screws.

1.6 DETAILED INSTALLATION DRAWINGS

The Contractor must take measurements from finished areas at site and submit detailed drawings indicating:

a. Location of panels

b. Layout of supports, panels, and cutout locations

c. Stair, handrail, and ramp framing

d. Sizes and details of components

e. Lateral bracing

f. Typical cutout details

g. Gasketing, supply air registers, and perforated panels. Include air transfer capacity of grilles, registers and panels

h. Floor finishes

i. Location of connection to building grounding electrode

PART 2 PRODUCTS

2.1 RECYCLED CONTENT

The recycled content of the access flooring system, not including the finished floor coverings, shall be a minimum of 30 percent, consisting of at least 13 percent post-consumer content and 17 percent post-industrial content.

2.2 FLOOR PANELS

2.2.1 Floor System Drawings And Planar Quality

a. Submit Fabrication Drawings for elevated floor systems consisting of fabrication and assembly details to be performed in the factory.

b. Indicate on Location Drawings exact location of pedestals, ventilation openings, cable cutouts, and the panel installation pattern.

c. Provide Detailed Drawings showing details of the pedestals, pedestal-floor interlocks, floor panels, panel edging, floor openings, floor opening edging, floor registers, floor grilles, cable cutout treatment, perimeter base, expansion joints, and peripheral support facilities.

d. Design and workmanship of the floor, as installed, must be completely planar within plus or minus 0.060 inch in 10 feet, 0.100 inch for the entire floor, and 0.030 inch across panel joints.

e. Floor-panel joint-width tolerances must be 0.008 inch as measured with a feeler gage at any point in any joint when the panels are in the pressure contact required in final installation.

2.2.2 Panel Construction

a. Base access floor systems on a 24 by 24 inch square module of the heights indicated on the drawings. Fabricate so accurate job cutting and fitting may be done using standard sizes for perimeters and around columns.

b. Do not expose metal on finished top surface of panels. Provide cutouts and cutout closures to accommodate utility systems and equipment intercabling. Reinforce cutouts to meet design load requirements. Provide extra support pedestals at each corner of cutout for cutout panels that do not meet specified design load requirements.

c. Panel design must provide for convenient panel removal for underfloor servicing and for openings for new equipment. Use panels of uniform dimensions within specified tolerances. Panels must be permanently marked to indicate load rating and model number.

d. Floor panels must be machined square to within plus or minus 0.005 inch with edge straightness plus or minus 0.0025 inch. Tolerances apply to the panel before the plastic edging is applied.

2.2.2.1 Metal-Clad Cementitious Fill (Composite Panels)

a. Composite panels must be of die-formed steel construction totally enclosing the panel, including the top surface. The void spaces between the top sheet and the formed steel bottom sheet must be completely filled with an incombustible cementitious or concrete material. Seal cut edges in accordance with manufacturer's recommendations. Gravity held panels with bolted stringer understructure: Fasten end of each stringer and mid-point of each 4 foot stringer positively to pedestal heads, using manufacturer's standard screws. Provide screws that are removable from top. Panels to receive carpet floor covering shall also be screw attached to the pedestal heads.

b. Grid supported panels must be further tested by supporting them at two opposite edges and applying a 500-pound load at the center of a panel selected; the panel must be similarly tested while supported at the other two edges. Weld failure at any point under this loading is not acceptable. This additional test must be applied to one panel per 500 square feet of floor in the system, but in no case less than two panels. When any weld fails, the number of panels designated by the Contracting Officer must be similarly tested, and those that have a weld failure must be replaced at no cost to the Government.

2.2.2.2 Perforated

Perforated panels shall be of all steel construction with 25 percent open area and shall come with an adjustable galvanized slide damper. Panels shall have a uniform perforated pattern to allow even air distribution. Finish shall be plastic laminate with integral edge trim matching that used on the metal-clad cementitious filled panels.

2.2.2.3 Grate Style

Grate style panels shall be of die cast aluminum construction with 56 percent open area. They shall have an epoxy powder coat finish.

2.2.3 Floor Covering

Plastic laminate and linoleum covered floor panels must be surfaced with materials firmly bonded in place with low or no VOC waterproof adhesive. The electrical resistance must remain stable over the life expectancy of the floor covering. Any anti-static agent used in the manufacturing process must be an integral part of the material, and must not be surface applied. Bolt heads or similar attachments must not rise above the traffic surface. Pattern and color shall be as indicated in the FINISH SCHEDULE included in the drawings.

2.2.3.1 High Pressure Laminate

High pressure laminate surfacing must conform to NEMA LD 3, Grade HW 62. Total system electrical resistance from the wearing surface of the floor to the ground connection must be between 150,000 ohms and 20,000,000,000 ohms. Pattern and color shall be as indicated in the FINISH SCHEDULE included on the drawings.

2.2.3.2 Carpet

Carpet surfacing shall be carpet tiles that are factory installed using one full carpet square per panel. Carpet tiles shall be adhered to floor panels with releasable adhesive such that, once adhered, all edges of the carpet tile shall align with the edges of the floor panel. The method of attachment of the carpet tile to the floor panel shall be such that the carpet sits uniformly flat and flush and provides an overall monolithic appearance to the carpeted area. Carpet tiles shall be capable of maintaining proper alignment and fit despite installation, removal, and reinstallation by individuals unskilled in the raised access flooring or carpet installation trades. Carpet tile shall be as specified in Section 09680 CARPET. Carpet color shall be as indicated in the FINISH SCHEDULE included on the drawings.

2.2.3.3 Linoleum

Linoleum surfacing shall be factory-bonded to the floor panels such that the edge of the linoleum shall align exactly with the edge of the floor panels so that, once installed, the linoleum area will have a monolithic appearance. The linoleum shall be as specified in Section 09650 RESILIENT FLOORING. Linoleum color shall be as indicated in the FINISH SCHEDULE included on the drawings.

2.2.4 Edge Strip

Plastic laminate panels shall come with an integral edge strip. Linoleum panels shall have no edge strip.

2.2.5 Accessories

Registers, grilles, perforated and grate style panels, and plenum dividers must be provided where indicated, and must be the manufacturer's standard type. Registers, grilles, and perforated panels must be capable of delivering the air volumes indicated. Registers and perforated panels must

be 25 percent open area and must be equipped with adjustable dampers.

2.2.6 Resilient Base

Base shall be as specified in Section 09650 RESILIENT FLOORING.

2.2.7 Lifting Device

Provide 15 floor panel lifting devices standard with the floor manufacturer.

2.3 PANEL SUPPORT SYSTEM

Design support system to allow for 360 degree clearance in laying out cable and cutouts for service to machines and so that panel and stringer together take up maximum of 2 inches.

2.3.1 Pedestals

Pedestals must be of steel or aluminum or a combination thereof. Ferrous materials must have a factory-applied corrosion-resistant finish. Pedestal base plates must provide a minimum of 16 square inches of bearing surface and must be a minimum of 1/8 inch thick. Pedestal base plate sizes shall be as required to provide an adhesive area sufficient in size to provide adequate overturning resistance. Pedestal shafts must be threaded to permit height adjustment within a range of approximately 2 inches, to permit overall floor adjustment within plus or minus 0.10 inch of the required elevation, and to permit leveling of the finished floor surface within 0.062 inch in 10 feet in all directions. Locking devices must be provided to positively lock the final pedestal vertical adjustments in place. Pedestal caps must interlock with stringers to preclude tilting or rocking of the panels.

2.3.2 Stringers

Stringers must be of rolled steel or extruded aluminum, and must interlock with the pedestal heads to prevent lateral movement. Provide stringers that can be added or removed after floor is in place.

2.4 FASCIA

Aluminum or steel fascia plates must be provided at open ends of floor, at sides of ramps and steps, and elsewhere as required to enclose the free area under the raised floor. Steel plates must have a factory applied baked enamel finish, as selected by the Architect. Finish on aluminum plates must be as standard with the floor system manufacturer. Fascia plates must be reinforced on the back, and must be supported using the manufacturer's standard lateral bracing at maximum 4 feet on center. Trim, angles, and fasteners must be provided as required.

2.5 STEPS AND SLOPED FLOOR

Steps and sloped floor must be securely fastened to the access flooring system and to the structural floor. Construction must include standard floor system components and custom components as required, and must include all supports, fasteners, and trim necessary for a finished installation. Step nosings, threshold strips, and floor bevel strips must be cast or extruded aluminum with non-slip traffic surfaces and must be fully covered with carpet at carpeted areas.

2.5.1 Steps

Height of risers must not exceed 7 inches. Steps must be designed to support a uniform load of 150 psf. Treads must be surfaced with the finish as indicated on the FINISH SCHEDULE in the drawings.

2.5.2 Sloped Floor

The sloped floor in the auditorium shall slope as shown on the drawings and must be designed to support the same loads as specified for floor panels. The sloped floor must be surfaced with the specified carpet. Fixed seating is to be installed in the auditorium at sloped and flat areas. Provide connections as detailed.

2.6 RAILINGS

Railings must be the double rail and post type, fabricated of at least 1 inch round seamless aluminum tubing with a satin natural anodized finish. At steps, the top rail must be a minimum of 36 inches high and parallel to the incline. The top rail must be 42 inches high at open ends of the floor. Space posts maximum of 6 feet oc. Provide railings complete with anchorages, floor plates, and end caps. Handrails and guardrails shall be designed to resist a load to 50 plf applied in any direction at the top and transfer the load through the supports to the structure.

2.7 FACTORY TESTS

Access flooring must be factory tested by an independent laboratory at the same position and maximum design elevation and in the same arrangement as shown on the drawings for installation so as to duplicate service conditions as much as possible.

2.7.1 Load Tests

Floor panel, stringer, and pedestal testing must be conducted in accordance with CISCA Access Floors.

2.7.2 Bond Strength of Plastic Laminate and Linoleum Covering

The test panel must be supported on pedestals and stringers as specified for the installed floor. The supports must be braced as necessary to prevent sideways movement during the test. A test load of 1000 pounds must be imposed on the test assembly through a hard plastic caster 3 inches in diameter and 1 inchwide. The caster must be rolled completely across the center of the panel. The panel must withstand 20 passes of the caster with no delamination or separation of the covering.

2.8 REGISTERS AND GRILLES

Cutouts for perimeter registers and grilles shall be 6 inches wide by 20 inches long. Perimeter registers and grilles will be furnished and installed by the mechanical contractor. Coordinate opening size with the mechanical contractor. Opening locations shall be where shown on the mechanical drawings. Interior round diffusers shall be provided by the floor contractor and they shall be 8 inches in diameter. Material must be high impact polycarbonate plastic. No part of a diffuser may project more than 1/8 inch above the floor. Registers, grilles, and diffusers are not permitted in a laminate floor tile system.

2.9 CUT OUTS

Provide cable cutouts finished with rigid polyvinylchloride or molded polypropylene edging to conform to the appearance level of the floor surface and to cover raw edges of the cutout panel. Extrusion must be of a configuration to permit its effective and convenient use when new cable openings are required. Provide at least 24 feet of additional extrusion for future use.

a. Provide non-metallic adapter for openings less than 4 inches wide. Secure adapter adhesively in cutout to preclude removal from panel. Provide at least two adapters per 1000 square feet for future use.

b. Openings larger than 4 inches wide must use rigid polyvinylchloride or molded polypropylene edging. Cutting of panels, including cutouts, must be performed outside of the building.

c. When size of cutout reduces the performance requirement of panel, provide intermediate stringers adjacent to cutouts.

2.10 UNDERFLOOR STAIRS

Where access under the 60 inch tall access floor is required as indicated on the drawings, the Contractor shall provide a steel ships ladder that extends from just under the raised floor to the concrete floor below. The ladder shall fit within the spacing of the floor pedestals and be attached to the pedestals at the top. As indicated on the drawings, the three floor panels to the front of the ladder shall be easily removable from below along with the first two 2 foot long stringers that support these panels resulting in a clear opening of 2 feet by 6 feet.

PART 3 EXECUTION

3.1 INSTALLATION

The floor system must be installed in accordance with the manufacturer's instructions and with the approved detailed drawings. Open ends of the floor, where the floor system does not abut wall or other construction, must have positive anchorage and rigid support. Areas to receive access flooring must be maintained between 60 and 90 degrees F, and between 20 and 70 percent humidity for 24 hours prior to and during installation.

3.1.1 Preparation for Installation

The area in which the floor system is to be installed must be cleared of all debris. Structural floor surfaces must be thoroughly cleaned and all dust must be removed. Floor coatings required for dust or vapor control must be installed prior to installation of pedestals only if the pedestal adhesive will not damage the coating. If the coating and adhesive are not compatible, the coating must be applied after the pedestals have been installed and the adhesive has cured.

3.1.2 Pedestals

Pedestals must be accurately spaced, and must be set plumb and in true alignment. Base plates must be in full and firm contact with the structural floor, and must be secured to the structural floor with adhesive.

3.1.3 Stringers

Interlock stringers with the pedestal caps in a basketweave pattern to preclude lateral movement, and space uniformly in parallel lines at the indicated elevation. Positively fasten end and midpoint of each 4 foot stringer to pedestal heads using manufacturer's standard screws. Provide screws that are removable from the top. Install gasketing on the top of each stringer.

3.1.4 Auxiliary Framing

Provide auxiliary framing or pedestals around columns and other permanent construction, at open ends of the floor, and beneath panels that are substantially cut to accommodate utility systems. Special framing for additional lateral support must be as shown on the approved detailed drawings. Provide additional pedestals and stringers designed to specific heights and lengths to meet structural irregularities and design loads. Connect auxiliary framing to main framing.

3.1.5 Panels

Interlock panels with supports in a manner that will preclude lateral movement. Panels to receive carpet floor covering shall be both supported on stringers and screw attached to the pedestal heads. Perimeter panels, cutout panels, and panels adjoining columns, stairs, and ramps must be fastened to the supporting components to form a rigid boundary for the interior panels. Floors must be level within the specified tolerances. Cut edges of composite panels must be coated with a silicone rubber sealant or with an adhesive recommended by the panel manufacturer. Extruded vinyl edging must be secured in place at all cut edges of all panel cut-outs to prevent abrasion of cables. Where the space below the floor is a plenum, cutouts for conduit and similar penetrations must be closed using self-extinguishing sponge rubber.

3.1.6 Resilient Base

Base must be provided at vertical wall intersections. Cracks and voids in walls and other vertical surfaces to receive base must be filled with an approved filler. All joints, where the floor panels abut walls and column enclosures, shall be sealed to prohibit the passage of air prior to the installation of the resilient base. The base must be applied after the floor system has been completely installed. Base must be applied with adhesive in accordance with the base manufacturer's recommendations.

3.1.7 Fascia Plates

Exposed openings at stairs must be covered with finish material as indicated on the detailed drawings.

3.1.8 Repair of Zinc Coating

Zinc coating that has been damaged, and cut edges of zinc-coated components and accessories, must be repaired by the application of a galvanizing repair paint conforming to ASTM A 780. Areas to be repaired must be thoroughly cleaned prior to application of the paint.

3.1.9 FLOOR SYSTEM BELOW CERAMIC TILE FLOORS

Where the access floor system is to be installed in areas to receive a

ceramic tile floor finish, bare floor panels may be used. The panels shall be recessed below the level of adjacent panels by a dimension that will allow the installed ceramic tile floor to be at a level that is consistent with the other ceramic tile floor areas in relation to their adjacent floor surfaces. Coordinate amount of recess required with ceramic floor installer. The floor panels shall be both supported on stringers and screw attached to the pedestal heads.

3.2 FIELD TESTS

3.2.1 Acceptance Tests

Conduct acceptance tests after installation of floor system. Make at least one test for each 2000 square feet of floor area. Conduct tests in presence of Contracting Officer and representatives of manufacturer and installer.

3.2.2 Electrical Resistance

Testing of electrical resistance in the completed installation must be conducted in the presence of the Contracting Officer. Testing must be in accordance with NFPA 99 modified by placing one electrode on the center of the panel surface and connecting the other electrode to the metal flooring support. Measurements must be made at five or more locations. Each measurement must be the average of five readings of 15 seconds duration at each location. During the tests, relative humidity must be 45 to 55 percent and temperature must be 69 to 75 degrees F. Select panels used in the testing at random and include two panels most distant from the ground connection. Electrical resistance must be measured with instruments that are accurate within 2 percent and that have been calibrated within 60 days prior to the performance of the resistance tests. The metal-to-metal resistance from panel to supporting pedestal must not exceed 10 ohms. The resistance between the wearing surface of the floor covering and the ground connection, as measured on the completed installation, must be in accordance with paragraph FLOOR COVERING.

3.3 CLEANING AND PROTECTION

3.3.1 Cleaning

The space below the completed floor must be free of all debris. Before any traffic or other work on the completed raised floor is started, clean the completed floor in accordance with the floor covering manufacturer's instructions. Do not permit seepage of cleaner between individual panels..

3.3.2 Protection

Protect traffic areas of raised floor systems with a covering of building paper, fiberboard, or other suitable material to prevent damage to the surface. Cover cutouts with material of sufficient strength to support the loads to be encountered. Place plywood or similar material on the floor to serve as runways for installation of heavy equipment not in excess of design load capacity. Maintain protection until the raised floor system is accepted.

3.3.3 Surplus Material Removal

Surfaces of the work, and adjacent surfaces soiled as a result of the work, must be cleaned. Remove all installation equipment, surplus materials, and

rubbish from the work site.

3.4 OPERATION AND MAINTENANCE MANUALS

Submit maintenance instructions for proper care of the floor panel surface. When conductive flooring is specified, also submit maintenance instructions to identify special cleaning and maintenance requirements to maintain "conductivity" properties of the panel finish.

-- End of Section --

SECTION 10440

INTERIOR SIGNAGE

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings

Drawings showing elevations of each type of sign, dimensions, details and methods of mounting or anchoring, shape and thickness of materials, and details of construction. A schedule showing the location, each sign type, and message shall be included.

SD-03 Product Data

Installation

Manufacturer's descriptive data, catalogs cuts, installation and cleaning instructions.

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

SD-04 Samples

Interior Signage

One sample of each of the following sign types showing typical quality, workmanship and color. The samples may be installed in the work, provided each sample is identified and location recorded.

a. Directional sign.

b. Standard room sign with changeable insert.

c. Specialty room sign.

d. Custom glass lobby sign.

1.2 GENERAL

Interior signage shall be of the design, detail, sizes, types, and message content shown on the drawings, shall conform to the requirements specified, and shall be provided at the locations indicated. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Signage shall be obtained from a single manufacturer with edges and corners of finished letterforms and graphics true and clean. Recyclable materials shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

1.3 QUALIFICATIONS

Signs, plaques, and dimensional letters shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate signs that have been in satisfactory use at least 2 years prior to bid opening.

1.4 DELIVERY AND STORAGE

Materials shall be packaged to prevent damage and deterioration during shipment, handling, storage and installation. Product shall be delivered to the jobsite in manufacturer's original packaging and stored in a clean, dry area in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CUSTOM GLASS LOBBY SIGNAGE

As shown on the drawings.

2.2 SIGNAGE SYSTEM

a. Basis of Design Manufacturer:

ASI-Modulex, 1302 Adams Kansas City, KS or APCO Graphics, Inc., 388 Grant Street, SE, Atlanta, GA or approved equal.

b. Acceptable Product:

IM System/Sign Match matching the NSA Interior Signage Standards included as Attachment A to this section. All standard and specialty insert signs shall be ADA compliant with raised lettering and braille

c. Mounting Type and Size:

Wall mounted with concealed mechanical fasteners. Sign size shall be 8 inch by 8 inch except where indicated otherwise herein or on the drawings.

d. Holder Type:

Precision injection molded, high-impact, engineering grade plastic with square corners and square edges, part code SH-88. Color to be non-painted A72, Bone White.

e. Standard Insert Type:

ADA clear lens insert, part code SI-88-CL, with 2-1/2 inch by 8 inch

ADA laminate band in A88, Royal Blue with an A01 raised white rule line and characters. Copy shall be 3/4 inch high. Raised white rule line shall be 1/4 inch wide located 3/16 inch from the bottom of the band. Sign shall accept computer generated inserts. See Room ID standard design in Attachment A for additional detail.

f. Specialty Insert Type:

Restroom sign inserts shall be part code SI-88-A (ADA), part color A88, Royal Blue with graphic color A01, White. Copy shall be 5/8 inch high. Symbols shall be S14 for Men and S15 for Women with symbol S03 for Handicapped. Size of symbols S14 and S15 shall be 3-1/2 inches, size of Handicapped symbol shall be 1-3/4 inches. Copy below symbols shall be 5/8 inch high. See Restroom ID standard design in Attachment A for additional detail.

Sign inserts at stairs shall be part code SI-88-A (ADA), part color A69, American Red with graphic color A01, White. Copy shall be 5/8 inch high. Symbol shall be S48 (Stair), size 3 inches. See Stair ID standard design in Attachment A for additional detail.

Other specialty insert signs shall have permanent messages as indicated on the drawings. Graphic color shall be A01, White on an A88, Royal Blue or an A69, American Red background as indicated on the drawings.

g. Directional Signs:

Directional signs shall be similar in appearance to the wall mounted specialty insert signs. Signs shall have permanent messages and arrows pointing in the direction of travel on one side only. The layout of the arrows and messages shall be as shown on the drawings. Copy shall be 3 inches high. On the sign front the graphic color shall be A01, White on an A88, Royal Blue background. The rear of the signs shall be solid blue. Signs shall be of the sizes indicated on the drawings. The signs shall be suspended from the ceiling where shown on the drawings with hidden connections using aircraft cable in accordance with the sign manufacturer's recommendations.

h. Building Directory:

The building directory shall be similar in appearance to the wall mounted specialty insert signs. Directory size and layout shall be as shown on the drawings. The directory shall include a list of rooms and areas along with room numbers where rooms are listed and a line drawing of the building perimeter. The list of rooms and areas shall be permanent; interchangeable entries are not required. The graphic color for the directory list and building outline shall be A01, White on an A88, Royal Blue background.

Selected rooms and areas included on the directory are to be further identified with a colored number within a colored circle. Matching colored numbers and circles shall be placed within the building outline to indicate the approximate location of the room or area within the building. Rooms and areas on different levels shall be designated through the use of different colors. The color of the numbers and circles shall be A69, American Red for rooms or areas on the Lower Level; A80, Tangerine for rooms or areas on the First Level; and A22, Chrome Yellow for rooms or areas on the Second Level.

2.3 FABRICATION - GENERAL

a. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

b. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reasemmbly and installation, in a location not exposed to view after final assembly.

c. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.

d. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

e. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

PART 3 EXECUTION

3.1 EXAMINATION

a. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accorance with manufacturer's instructions.

b. Scheduling of installation implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.2 INSTALLATION

a. Install product in accordance with supplier's instructions.

b. Install product in locations indicated using mechanical mounting methods free from distortion, warp, or defect adversely affecting apprearance.

c. Install product level, plumb, and at heights indicated.

d. Install product at 60 inches above the finished floor to the top of the sign.

e. Install signs within the following tolerances and in accordance with manufacturer's recommendations:

1. Interior Signs: Within 1/4 inch vertically and horizontally of intended location.

3.3 CLEANING, PROTECTION, AND REPAIR

a. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.

b. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to

Owner's aceptance. Remove construction debris from project in accordance with provisions in Division 1.

3.4 SIGN SCHEDULE

a. Schedule: Refer to signage schedule and drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

-- End of Section --

SECTION 10500

LOCKERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2005a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 526/A 526M	(1990) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
ASTM A 568/A 568M	(2005) Standard Specifications for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A 653/A 653M	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(2004) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 456	(2003) Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
ASTM D 2092	(2001) Standard Guide for Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting

U.S. DEPARTMENT OF DEFENSE (DOD)

MS MIL-C-22750	(1992e) Coating, Epoxy, High Solids
MS MIL-C-22751	(Rev D; Notice 1) Coating System, Epoxy-Polyamide, Chemical and Solvent Resistant, Process for Application of
MS MIL-P-23377	(1989f) Primer Coatings: Epoxy, Chemical and Solvent Resistant

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS AA-L-00486 (1993j) Lockers, Clothing, Steel

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. ubmit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

The following drawings shall be submitted in accordance with paragraph entitled, "General Information," of this section.

Fabrication Drawings
Installation Drawings

SD-03 Product Data

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Provide products manufactured within a 500 mile radius of the project site. Provide products with a minimum 17% post-consumer recycled content and a minimum 4% post-industrial recycled content.

Documentation indicating distance between manufacturing facility and the project site.

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

Manufacturer's catalog data shall be submitted for the following items, including material qualities, locking devices, handles, finish assembly instructions, and other similar items.

A lock-control chart shall be submitted showing each lock required for the project, the locker identification plate number, and the lock combination or lock key number.

Locker Materials
Hardware and Accessories

SD-04 Samples

Three Color Chips, not less than 12-inches square, of each color schedule shall be submitted.

SD-07 Certificates

Certificates shall be submitted in accordance with paragraph

entitled, "General Information," of this section.

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be protected from weather, soil, and damage during delivery, storage, and construction.

Materials shall be delivered in their original packages, containers, or bundles bearing the brand name and the name of the material.

1.4 FIELD MEASUREMENTS

To ensure proper fits, field measurements shall be taken prior to the preparation of drawings and fabrication.

1.5 FIELD TESTS

Government may request performance-characteristic tests on assembled lockers. Tests and results shall conform to FS AA-L-00486. Lockers not conforming will be rejected.

1.6 LOCKER TYPES

Locker shall be the following type and size in the location and quantities indicated. Locker finish colors shall be as scheduled.

1.7 SINGLE-TIER LOCKERS

Single-tier lockers shall be as follows:

Type STC-1: Single-tier locker 12 inches wide, 18 inches deep, and 60 inches high, attached to 6-inch closed base

1.8 DOUBLE-TIER LOCKERS

Double-tier lockers shall be as follows:

Type DTC-1: Double-tier locker 12 inches wide, 18 inches deep, and 60 inches high, attached to a 6-inch high closed base

1.9 GENERAL INFORMATION

Fabrication Drawings shall be submitted for lockers consisting of fabrication and assembly details to be performed in the factory.

Installation Drawings shall be submitted for lockers indicating the locker type required, location, locker-number sequence, and installation details.

Certificates showing Lockers will be free of defects in materials, fabrication, finish, and installation, and that they will remain so for a period of not less than 10 years after completion.

Three Color Chips, not less than 12-inches square, of each color schedule shall be submitted.

PART 2 PRODUCTS

2.1 LOCKER MATERIALS

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

2.1.1 Steel Sheet

Steel sheet used for the fabrication of lockers shall be cold-rolled, commercial-quality material conforming to ASTM A 1008/A 1008M and ASTM A 568/A 568M. Sheet thickness shall be as specified. Surface preparation and phosphate pretreatment of material shall be provided as required for subsequent finishing.

2.1.2 Galvanized Steel Sheet

Galvanized steel sheet used for fabrication of lockers shall be hot-dipped commercial quality minimized spangle material conforming to ASTM A 526/A 526M with not less than a 1.25-ounce zinc coating conforming to ASTM A 653/A 653M and ASTM A 924/A 924M. Surface preparation of material for finishing shall conform to ASTM D 2092, Method A. Sheet thickness indicated shall be the uncoated sheet-steel thickness.

2.1.3 Chromium Coating

Chromium coating shall be nickel and chromium electrodeposited on the specified base metal. Coating shall conform to ASTM B 456, SC-3, as applicable to the base metal.

2.1.4 Locker Finish

Primer shall conform to MS MIL-P-23377 and topcoat as specified in MS MIL-C-22750. Application shall conform to MS MIL-C-22751. Color shall be as indicated on the finish schedule.

2.2 LOCKER FABRICATION

Hardware and Accessories for locker fabrication and construction shall meet all design specifications for referenced standards within this section.

2.2.1 Locker Bodies

Locker-body fabrication including the back, sides, top, and bottom shall conform to FS AA-L-00486 and as herein modified. Locker bodies shall be fabricated from not less than 0.0239-inch thick steel sheet.

2.2.1.1 Sloping Locker Tops

Sloping locker tops shall be provided in addition to the locker-section flat tops. Sloping tops shall be continuous in length. Fillers or closures shall be provided at the exposed end of sloping tops. Sloping tops shall be fabricated from not less than 0.0478-inch thick steel sheet.

2.2.1.2 Closed Locker Bases

Closed locker base shall be 6 inches high with edges flanged inward. Bases shall be continuous in length and placed in a plane flush with the locker

surfaces. Bases shall be provided for all surfaces exposed-to-view. Closed locker bases shall be fabricated from not less than 0.0598-inch thick steel sheet.

2.2.1.3 Locker Finish

Application of the locker finish, including surface preparation, priming, and enameling, shall conform to FS AA-L-00486.

2.2.2 Doors, Door Frames, and Door Louvers

Doors, door frames, and door louvers shall conform to FS AA-L-00486 as herein modified. Doors, door frames, and door louvers shall be fabricated from not less than 0.0598-inch thick steel sheet.

2.2.3 Latch Strikes

Latch strikes shall conform to FS AA-L-00486 as herein modified. Latch strikes shall be fabricated from not less than 0.0747-inch thick steel sheet.

2.2.4 Shelves

Shelves shall conform to FS AA-L-00486 as herein modified. Shelves shall be fabricated from not less than 0.0359-inch thick steel sheet.

2.2.5 Hinges

Hinges shall conform to FS AA-L-00486 as herein modified. Hinges shall be not less than the 5-knuckle type welded to the door frame and bolted to the door. Hinges shall be fabricated from not less than 0.0747-inch thick steel sheet.

2.2.6 Latching Mechanisms

Latching mechanisms shall conform to FS AA-L-00486.

2.2.7 Door Handles

Door handles shall conform to FS AA-L-00486 as herein modified. Zinc alloy or steel handles shall have a chromium coating as specified.

2.2.8 Coat Hooks

Coat hooks shall conform to FS AA-L-00486. Hooks shall be chromium coated.

2.2.9 Hanger Rods

Hanger rods shall conform to FS AA-L-00486.

2.2.10 Number Plates

Number plates shall conform to FS AA-L-00486.

2.2.11 Label Holders

Label holders shall conform to FS AA-L-00486.

2.2.12 Fastening Devices

Fastening devices shall conform to FS AA-L-00486.

PART 3 EXECUTION

3.1 ASSEMBLY

Lockers shall be assembled according to the locker manufacturer's instructions.

Lockers shall be carefully assembled, lined up horizontally and vertically, and rigidly screwed to the base and wall. Adjacent lockers shall be bolted together.

Doors shall be adjusted to operate freely without sticking or binding and shall close tightly.

3.2 ACCEPTANCE PROVISIONS

3.2.1 Repairing

Damaged and unacceptable portions of completed work shall be removed and replaced with new work at no additional cost to the Government.

3.2.2 Cleaning

Surfaces of the work, and adjacent surfaces soiled as a result of the work, shall be cleaned in an approved manner. Equipment, surplus materials, and rubbish from the work shall be removed from the site.

-- End of Section --

SECTION 10523

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2006; Errata 2006) Standard for Portable Fire Extinguishers

UNDERWRITERS LABORATORIES (UL)

UL 154	(2005; Rev thru Sep 2007) Standards for Carbon Dioxide Fire Extinguishers
UL 299	(2002; Rev thru Aug 2007) Standards for Dry Chemical Fire Extinguishers

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Manufacturer's Data for each type of required Fire Extinguisher with all related details, cabinets, accessories, and recommended operation manuals.

SD-03 Product Data

Submit Manufacturer's catalog and warranty data for the following items:

Fire Extinguishers
Types of Cabinets
Wall Brackets
Replacement Parts

SD-07 Certificates

Submit Manufacturer's Warranty with Inspection Tag on each extinguisher.

Guarantee that Fire Extinguishers are free of defects in materials, fabrication, finish, and installation and that they will remain so for a period of not less than five years after completion.

1.3 DELIVERY, HANDLING, AND STORAGE

Protect materials from weather, soil, and damage during delivery, storage, and construction.

Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

PART 2 PRODUCTS

2.1 TYPES OF FIRE EXTINGUISHERS

Fire Extinguishers shall conform to NFPA 10.

2.1.1 Material

Extinguisher shell shall be aluminum.

2.1.2 Schedule

Provide the following types and sizes of fire extinguishers:

FE1: 2-1/2 gallon stored-pressure water type. (2A)
FE2: 15 pound carbon dioxide type (BC) compliant with UL 154. (10B:C)
FE3: 5 pound dry chemical type (ABC) compliant with UL 299. (2A:10B:C)

Submit Manufacturer's Data for Fire Extinguishers required, detailing all related Cabinets and Wall Mounting information, complete with Manufacturer's Warranty with Inspection Tag.

2.2 TYPES OF CABINETS

2.2.1 Box Material

Provide aluminum cabinets with clear satin anodized finish.

2.2.2 Door and Trim

Door and trim for FEC1 through FEC4 shall be extruded or fabricated aluminum with clear satin anodized finish. Pull handle and hinges with matching satin finish. Doors shall be manufacturer's standard half glass panel type. Glazing to be clear, tempered safety type.

Door and trim for FEC7 to be extruded or fabricated aluminum with clear satin anodized finish. Pull handle and hinges with matching satin finish. Door shall be manufacturer's standard solid type with die cut vertical lettering style indicating "FIRE EXTINGUISHER."

2.2.3 Trim Projection

Fully recessed cabinet to have a maximum of 3/8 inch flat trim.

Semi-recessed type cabinet to have a maximum of 1-1/2 inch square trim.

2.2.4 Schedule

As noted on the drawings, provide the following types of double extinguisher cabinets. Each to contain both FE1 and FE2 fire extinguishers:

FEC1 - Recessed cabinet.
FEC2 - Semi-recessed cabinet in a 4-1/4 inch wall.
FEC3 - Semi-recessed cabinet in a 7-1/4 inch wall.
FEC4 - Surface mounted.

As noted on the drawings, provide the following type of cabinets at exterior locations. Each to contain a single FE3 fire extinguisher:

FEC7 - Surface mounted exterior cabinet.

2.2.5 Size

Dimensions of cabinets must be of adequate size to accommodate the specified fire extinguishers.

2.3 WALL BRACKETS

Provide fire extinguisher wall brackets per manufacturer's standard. Wall brackets must be approved.

2.3.1 Schedule

Provide wall brackets for the following types of fire extinguishers:

FE1, FE2, FE3: Single fire extinguisher installation.
FEB: Double fire extinguisher installation consisting of Types FE1 and FE2 fire extinguishers.

Anchor FEC7 cabinets to exterior steel tube columns as required. Mounting details and components shall be approved prior to installation.

2.4 SIGNAGE

Provide signage, Seton Style No. 39445 or equal. Signage must be approved.

PART 3 EXECUTION

3.1 INSTALLATION

Install Fire Extinguishers where indicated on the drawings. Verify exact locations prior to installation.

Comply with the manufacturer's recommendations for all installations.

Provide extinguishers which are fully charged and ready for operation upon installation. Provide extinguishers complete with Manufacturer's Warranty with Inspection Tag attached.

Install bottom of signage 80 inches above finished floor at all fire extinguisher locations.

3.2 ACCEPTANCE PROVISIONS

3.2.1 Repairing

Remove and replace damaged and unacceptable portions of completed work with new work at no additional cost to the Government.

Provide Replacement Parts list indicating specified items replacement part,

replacement cost, and name, address and contact for replacement parts distributor.

3.2.2 Cleaning

Clean all surfaces of the work, and adjacent surfaces which are soiled as a result of the work. Remove from the site all construction equipment, tools, surplus materials and rubbish resulting from the work.

-- End of Section --

SECTION 10650

OPERABLE PARTITIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 413	(2004) Rating Sound Insulation
ASTM E 557	(2000) Installation of Operable Partitions
ASTM E 84	(2007) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E 90	(2004) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2006) Life Safety Code, 2006 Edition
NFPA 70	(2005; TIA 2005) National Electrical Code

1.2 GENERAL REQUIREMENTS

The Contractor shall supply and install electric operation, acoustical operable partitions, factory finished, supported from overhead track without floor guides, as shown on the drawings including all hardware, seals, track and rollers as needed to close the specified opening. This operable partition specification covers wall panel partitions.

1.2.1 Electric Operation

The pressure-sensitive leading edge shall be designed so that a 4 lbf force will stop the forward motion; system shall stop the partition movement if people or objects are in the path of the partition when it is being extended or in the pocket area when the panels are being stacked. Weight-sensitive floor mat in the storage pocket shall prevent partition movement with as little as 5 lbs of weight applied. The electric control shall be wall mounted.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G
Wiring Diagrams; G
Layouts; G

Drawings containing complete schematic diagrams and details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show dimensions and weight of stacked partition; layout of the work, track and jamb fastening methods; seal details and installation details; proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearances for maintenance and operation. Submit wiring diagram and installation details.

SD-03 Product Data

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's product data or MSDS for all field applied adhesives used within the building interior highlighting VOC content, expressed in g/L, indicating that adhesives meet or exceed the VOC limits of SCAQMD Rule # 1168.

Manufacturer's product data or MSDS for all field applied sealants used within the building interior highlighting VOC content, expressed in g/L, indicating that sealants meet or exceed Bay Area Resources Board Reg. 8, Rule 51.

Operable Partitions; G

Manufacturer's descriptive data, performance charts, catalog cuts, and installation instructions for framework, suspension system, covering, accessories, and electrical operators.

SD-04 Samples

Operable Partitions; G

Three Color samples of specified surfaces and finishes to match those specified. Finish and color requirements shall not be limited to manufacturer's standard selections in order to meet these requirements.

SD-06 Test Reports

Acoustical Test; G
Flame and Smoke Development Tests; G

Reports on laboratory acoustical requirements and acoustical

test. Reports on flame and smoke development tests.

SD-07 Certificates

Materials; G
Operable Partitions; G

Certificate attesting that the materials meet the requirements specified and that partitions have specified acoustical and flame retardant properties, as determined by test.

SD-10 Operation and Maintenance Data

Operable Partitions

Data Package 1 for wall panel partitions, and Data Package 5 for electrical operators in accordance with Section 01781 OPERATION AND MAINTENANCE DATA. Six complete copies of operating instructions outlining the procedures required for electrically operated partitions. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and operating features. Data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 1 year and 3 years of service. Six complete copies of maintenance instructions explaining routine maintenance procedures including inspection, adjustments, lubrication, and cleaning. The instructions shall list possible breakdown, methods of repair, and a troubleshooting guide. The instructions shall include equipment layout and simplified wiring and control diagrams of the system as installed.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the jobsite in the manufacturer's original, unopened, and undamaged packages with labels legible and intact. Provide labels to indicate the manufacturer, brand name, size, finish, and placement location. Store partitions and accessories in unopened packages in a manner that will prevent damage. Handle partition materials in accordance with manufacturer's instructions. Materials shall be protected from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

PART 2 PRODUCTS

2.1 MATERIALS

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site. Provide heavy-duty type hardware standard with the manufacturer. Provide pulls and latches for all partitions. Provide partitions with keyed locks. Hardware finish shall be selected by the Architect from the Manufacturer's standard finishes.

2.2 OPERABLE WALL PANEL PARTITIONS

Operable wall panel partitions shall consist of top hung ball bearing carriers which support modular panels. Partitions shall be Modernfold, Inc. Acousti-Seal Model #933E with suspension system #14 or approved equal.

a. Provide partitions made up of a series of rigid panels, each panel being a one-piece assembly. Unless otherwise specified, the wall shall comprise the least number of panels. The mechanical seal of the panel shall actuate with a single operating action.

b. Provide panels continuously hinged type as indicated.

c. Lengths of panels shall vary as required to form tight seal against sloping floor. Manufacturer to field verify dimensions of installed access flooring to verify sloped and flat areas.

2.2.1 Panels

Provide panels of steel skin, laminated to appropriate structural acoustical backing, mounted in full perimeter protective frame. Steel for the panel frames shall be a minimum of 16 gauge thick steel with minimum 22 gauge thick face panels spot welded to the frame. Frame shall enclose and protect all edges of the surface material. Panels shall be not more than 4 feet wide, except for end closure panels, and shall be full height to track. Panels shall lock in place to form a stable, rigid partition; low profile hinges shall project 1/4 inch maximum from panel edge. Panel surfacing shall wrap around the vertical panel edges without vertical trim.

2.2.2 Finish Covering

Finish material shall be fabric. Fabric shall be Fabric Number 116-13, Intersect, as manufactured by HBF Textiles, color shall be French Grey Shadow. Fabric shall be stain-resistant, shall not mildew, rot or support growth of bacteria and shall be non-allergenic.

2.2.3 Track

Track shall be recessed as shown and shall be of enamel finish steel. Track shall be manufacturer's standard product designed for the weight of the finished partition. Track sections shall be provided in the maximum lengths practicable, not less than6 feet long except for narrow doors and at ends of runs where short length is required. Suitable joint devices such as interlocking keys shall be provided at each joint to provide permanent alignment of track.

2.2.4 Suspension System

Provide a suspension system consisting of steel track connected to the structural support by threaded rods, and trolleys designed to support the weight of the partition. Provide steel track of 7 gage minimum, phosphate treated or painted. Provide 2 trolleys per panel with 2 ball bearing polymer or steel tired wheels.

2.2.5 Single Pass Door

Provide one 3 feet 0 inch wide pass door through each partition. Door shall be centered in full-width panel and be of same thickness and appearance of panel. Door shall be trimless, ADA compliant, and come with

friction latch and flush pulls. Doors shall be located approximately where shown on the drawings.

2.3 ACCESSORIES

2.3.1 Pocket Doors

Provide pocket doors to fully-close the panel storage area when doors are either in the open or stored position. Pocket doors shall be of the same construction and finish as the operable panels.

2.3.2 Ceiling Guards

Furnish partitions with ceiling guards or integral track and ceiling guards as recommended by the manufacturer.

2.3.3 Metal Soffit

Soffit shall be provided when steel track is recessed. Soffit shall be of metal of adequate thickness to protect the ceiling from damage by door operation and shall be provided with the door manufacturer's standard finish, as selected by the Architect.

2.4 SEALS AND SWEEPSTRIPS

Provide perimeter seals or sound insulation, of manufacturer's standard product, to achieve the sound transmission class specified and to pass the visual field test specified, without crack or craze when subjected to severe usage. Provide manufacturer's vertical seals between panels to ensure acoustical rating. Bottom seals shall consist of a vinyl sweep mechanical seal which will expand in place or shall be accomplished by using panels which can be lowered by a removable operating device. Vertical seal between panels shall be anodized, architectural grade, aluminum extrusion with vinyl sound seal. Sweep strips shall be vinyl or other material which will not crack or craze with severe usage. Sweep strip shall control STC to the specified rating.

2.5 ELECTRICAL OPERATORS

Provide manufacturer's recommended standard 208 volt, 3-phase, 60 hertz electrical operator for partition. Provide wiring diagrams.

2.6 PERFORMANCE REQUIREMENTS

2.6.1 Fire Endurance

For partitions more than 60 square feet in area, provide covering and lining with flame spread rating of 25 or less, fuel contribution rating of 15 or less, smoke generation of 50 or less in accordance with NFPA 101 when tested in accordance with ASTM E 84. The Contractor shall submit flame and smoke development tests reports. Door and partition finishes shall have a Class A rating when tested in accordance with ASTM E 84.

2.6.2 Laboratory Acoustical Requirements

Partitions shall have been tested in accordance with ASTM E 90 by a laboratory accredited by the U.S. Bureau of Standards and have attained a sound transmission class (STC) of not less than 50 in a fully extended position, with a Noise Reduction Coefficient (NRC) of 0.25-0.30 for napped,

tufted or looped fabric. Partition tested shall be of the same construction, materials, and model number as the partition to be provided and shall be fully operable. Test specimen shall be not less than 126 square feet in area. Panel weight shall be a minimum of 8.0 psf for STC up to 50. Panel thickness (4 inch nominal) and composition shall be designed to provide the required STC rating in accordance with ASTM E 90 and ASTM E 413.

2.7 COLOR

Color shall be as indicated in Paragraph Finish Covering.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's approved instructions.

3.1.1 Preparation Work

Check openings scheduled to receive operable partitions for correct dimensions. Install partitions in accordance with the approved partition layouts, manufacturer's directions, and ASTM E 557. Structural support for the track support elements shall be as indicated.

3.1.2 Electrical Operators

Conform electrical components and installation to the requirements of NFPA 70 and Section 16402 INTERIOR DISTRIBUTION SYSTEM. Provide the partition manufacturer's standard drive and control components required to operate the partition. Power source is as indicated.

3.1.3 Adjustment

Adjust drive components and limit switches of electrically operated partitions to ensure the partitions operate properly upon activation of the control switch.

3.2 FIELD TESTS

3.2.1 Operational Test

In the presence of the Contracting Officer, operate partition at least three times to demonstrate that partition is capable of being moved from the stored position to the fully extended position smoothly and quietly and without overloading the drive components. Adjust partitions which do not operate properly and retest.

3.2.2 Visual Test

Conduct visual field tests for light leakage with all room lights turned on in the space on one side of the partition. Darken space on the other side of the partition. There shall be no light leakage from the lighted space to the darkened space. If light leakage does occur, adjust the partition to correct the problem and retest.

3.3 CLEANING

Clean any soiled parts of the partition in accordance with manufacturer's printed instructions.

-- End of Section --

SECTION 10800

TOILET ACCESSORIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C 1036 (2001) Flat Glass

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Finishes
Accessory Items

Manufacturer's descriptive data and catalog cuts indicating materials of construction, fasteners proposed for use for each type of wall construction, mounting instructions, operation instructions, and cleaning instructions.

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

SD-04 Samples

Finishes
Accessory Items

One sample of each accessory proposed for use. Incorporate approved samples into the finished work, provided they are identified and their locations noted.

SD-07 Certificates

Accessory Items

Certificate for each type of accessory specified, attesting that the items meet the specified requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Wrap toilet accessories for shipment and storage, then deliver to the jobsite in manufacturer's original packaging, and store in a clean, dry area protected from construction damage and vandalism.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

Toilet accessories shall be provided where indicated on the drawings. Each accessory item shall be complete with the necessary mounting plates of sturdy construction with corrosion resistant surface. Give preference to products manufactured within 500 miles of the project site.

2.1.1 Anchors and Fasteners

Provide anchors and fasteners capable of developing a restraining force commensurate with the strength of the accessory to be mounted and suited for use with the supporting construction. Provide exposed fasteners with finish to match the accessory.

2.1.2 Finishes

Except where noted otherwise, provide the following finishes on metal:

Metal	Finish
Stainless steel	No. 4 satin finish

2.2 ACCESSORY ITEMS

Conform to the requirements for accessory items specified below.

2.2.1 Grab Bar (GB)

Provide an 18 gauge, 1-1/2 inch grab bar OD Type 304 stainless steel. Provide form and length for grab bar as indicated. Provide concealed mounting flange. Provide grab with peened non-slip surface. Furnish installed bars capable of withstanding a 500 pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Allow 1-1/2 inch space between wall and grab bar.

2.2.2 Mirrors, Glass (M)

Provide Type I transparent flat type, Class 1-clear glass for mirrors mounted in one-piece roll-formed satin finish stainless steel angle frame. Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Coat glass on one surface with silver coating, copper protective coating, and mirror backing paint. Provide highly adhesive pure silver coating of a thickness which provides reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, free of pinholes or other defects. Provide copper protective coating with pure bright reflective copper, homogeneous without sludge, pinholes or other defects, of proper thickness to prevent "adhesion pull" by mirror backing paint. Provide mirror backing paint with two coats of special scratch and abrasion-resistant paint and baked in uniform thickness to provide a protection for silver and copper

coatings which will permit normal cutting and edge fabrication. Bobrick Model B-290 1836 or approved equal.

2.2.3 Mirror, Tilt (TM)

Provide surface mounted tilt mirror with full visibility for persons in a wheelchair. Furnish fixed tilt mirror, extending at least 4 inch from the wall at the top and tapering to 1 inch at the bottom. Provide size in accordance with the drawings. Conform to ASTM C 1036 and paragraph Glass Mirrors. Bobrick Model B-293 1836 or approved equal.

2.2.4 Paper Towel Dispenser (PTD)

Provide surface-mounted Silhouette universal roll towel dispenser Model Number 16000 with push dispensing mechanism.

2.2.5 Soap Dispenser (SD)

Provide surface mounted Silhouette 1200 ml controlled soap dispenser Model Number 92000 with push lever dispensing mechanism.

2.2.6 Shelf, Metal, Light Duty (SMLD)

Support light duty metal shelf between brackets or on brackets. Purpose of brackets is to prevent lateral movement of the shelf. Furnish 24 inch long shelf. Provide stainless steel shelf and brackets. Bobrick Model B-296 or approved equal.

2.2.7 Towel Pin (TP)

Provide towel pin with concealed wall fastenings, and a pin integral with or permanently fastened to wall flange with maximum projection of 3 inch. Provide satin finish. Bobrick Model B-6777 or approved equal.

2.2.8 Robe Hook (RH)

Provide robe hook with concealed wall fastenings. Hook shall be one piece casting secured to concealed mounting plate by three stainless steel setscrews. Finish shall be satin nickel plated. Bobrick Model B-2116 or approved equal

2.2.9 Toilet Tissue Dispenser (TD)

Provide surface mounted Silhouette jumbo tissue dispenser Model Number 88700 with serrated plastic edge for easy sheet tear-off.

2.2.10 Waste Receptacle (WR)

Provide Rubbermaid waste receptacle Model Number 9058-86 Atrium style heavy-duty plastic construction container with funnel top and textured finish. Size shall be 25 inches in diameter by 33-1/4 inches tall. Capacity shall be 35 gallons.

2.2.11 Toilet Seat Cover Dispenser (SCD)

Provide surface mounted Silhouette toilet seat cover dispenser Model Number 19510 with two pack capacity.

2.2.12 Mop and Broom Holder (MBH)

Stainless steel hat channel base, 36 inches long with 4 holders. Bobrick Model B223 x 36 or approved equal.

2.2.13 Benches

Provide locker room benches with tops of 1-1/2 inch thick solid high density polyethylene resins, as manufactured by Scranton Products or approved equal. Bench tops shall have 1/4 inch radius edge and be 24 inches by 48 inches in size. Pedestals shall be aluminum with aluminum plates at the top and bottom for attaching pedestals to the bench and floor. Bench color shall be as selected by the architect from the manufacturer's standard colors.

PART 3 EXECUTION

3.1 INSTALLATION

Provide the same finish for the surfaces of fastening devices exposed after installation as the attached accessory. Provide oval exposed screw heads. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. Use sealants for brackets, plates, anchoring devices and similar items in showers (a silicone or polysulphide sealant) as they are set to provide a watertight installation. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

3.1.1 Surface Mounted Accessories

Mount on concealed backplates, unless specified otherwise. Conceal fasteners on accessories without backplates. Install accessories with sheet metal screws or lead expansion shields, or with toggle bolts or other approved fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal or wood studs or to solid wood blocking secured between wood studs, or to metal backplates secured to metal studs.

3.2 CLEANING

Clean material in accordance with manufacturer's recommendations. Do mot use alkaline or abrasive agents. Take precautions to avoid scratching or marring exposed surfaces.

-- End of Section --

SECTION 11161

DOCK LEVELERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 143/A 143M	(2003) Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A 153/A 153M	(2005) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM D 2000	(2005) Rubber Products in Automotive Applications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(1996; R 2004) Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems: Enclosures
NEMA MG 1	(2003; R 2004) Motors and Generators

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 943	(2006) Ground-Fault Circuit-Interrupters

1.2 DEFINITIONS

1.2.1 Industrial Dock Leveler

A manufactured structure designed to span and compensate space and height differentials between a loading dock and freight carrier to facilitate

safe, efficient, freight transfer.

1.2.2 Adjustable Loading Ramp

Synonym for Fixed Type Industrial Dock Leveler.

1.2.3 Fixed Type Industrial Dock Leveler

A dock leveler that is permanently affixed to the dock structure, incorporating an electro-hydraulic system recessed into the dock face to position the dock leveler with respect to the freight carrier at the lip end while being fixed at the opposite hinged end.

1.2.4 Velocity Fuse

A valve or similar device that goes into the hydraulic line. If the dock leveler becomes inadvertently or accidentally unsupported, this fuse will freeze the movement of dock leveler within 4 inches of the dock leveler original position.

1.2.5 Carrier

A wheeled, enclosed trailer or container that, when attached to a heavy-duty truck or van, is used to carry bulk freight over long distances.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings

Drawings depicting dimensions, tolerances, surface finishes, hardnesses, flush edge angles, method of mounting and anchoring, and control schematics and diagram.

SD-03 Product Data

Loading Dock Levelers
Dock Bumpers
Restraining Device
Dock Seals

Data including a complete list of equipment and materials, manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions.

SD-10 Operation and Maintenance Data

Operating and Maintenance Instructions; G

Six copies of operation and six copies of maintenance manuals for the equipment furnished. Furnish one complete set prior to performance testing and furnish the remainder upon acceptance. Operating manuals shall detail the step-by-step procedures

required for system startup, operation, and shutdown. Operating manuals shall include the manufacturer's name, model number, parts list, and brief description of all equipment and their basic operating features. List routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides in the maintenance manuals. Also include piping and equipment layout and simplified wiring and control diagrams of the system as installed. After approval of the detail drawings, and not later than 2 months prior to the date of beneficial occupancy, spare parts data for each different item of material and equipment specified are required. Provide a complete list of parts and supplies, with current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after 1 and 3 year(s) of service.

Loading Dock Levelers; G
Restraining Device; G

Submit Data Package 3 for Dock Leveler and Data Package 2 for Restraining Device in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

1.4 GENERAL REQUIREMENTS

1.4.1 Standard Products

Provide materials and equipment that are the standard products of a manufacturer regularly engaged in the manufacture of the products and essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

1.4.2 Exposed Surfaces

All exposed metal surfaces and fastening materials must fully comply with the minimum requirements of ASTM A 123/A 123M, ASTM A 143/A 143M, and ASTM A 153/A 153M.

1.5 NAMEPLATE

Attach corrosion-resistant metal plate securely and legibly on the exterior surface of the dock leveler. Include the following information indented or embossed on the plate:

a. Description of the equipment: Describe procedures for operating and services equipment, and warnings or cautions of hazardous procedures.

b. Name of the manufacturer.

c. Serial and model number.

d. Rated capacity in pounds.

e. Shipping weight.

f. Date of manufacture (month and year).

1.6 DELIVERY AND STORAGE

Matchmark and tag parts which are disassembled for shipment with metal tags. Provide waterproofed tags and markings. Protect the delivered equipment in storage from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

1.7 MANUFACTURER'S REPRESENTATIVE

Furnish services of Fixed Type Industrial Dock Leveler technicians, experienced in installation and operation of the type of system being provided, to supervise installation, testing, adjustment of system, and instruction to Government personnel.

1.8 QUALITY ASSURANCE

1.8.1 Detail Drawings

Submit drawings with complete wiring, schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Show proposed layout and anchorage of equipment and appurtenances. Show the concrete pit details including flush edge angles, dock bumpers including fastening materials in compliance with ASTM A 123/A 123M and ASTM D 2000, and sloped pit bottom; method of mounting and anchoring; and location of control stations and disconnect switches. Show all proposed dock bumper locations on drawings.

1.8.2 Verification of Dimensions

The Contractor shall become familiar with all details of the work, shall verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

PART 2 PRODUCTS

2.1 LOADING DOCK LEVELERS

Provide permanent loading dock levelers with minimum performance characteristics based on the following:

a. Fork Lift Loads:
   (1) Design levelers to accommodate 4 wheel fork trucks.
   (2) Design levelers to handle 30,000 pounds gross dynamic load.

Provide electro-hydraulic type loading dock leveler with electric motor and hydraulic pump operating a hydraulic cylinder that adjusts dock leveler board position. Coordinate a truck restraint system with the dock leveler via an interconnect function such that the restraint and dock leveler will engage with a single push-button, if a powered trailer restraint is selected to lock truck or trailer into position during loading and for overnight security. Incorporate a visual signal to inform dock operator and driver of locked or unlocked status. Make provision for maintenance access to understructure and lifting mechanism. Provide steel tread plate lip and platform, hinged and supported from beneath by steel framework that contains lifting, positioning, and lowering assembly. Ensure that platform surface is flush with surrounding floor surface of loading dock when not in service. Provide integral positive restraint when leveler is in maintenance position.

2.1.1 Environmental Requirements

Design, fabricate, and finish loading ramp to permit washing with water and detergents, and operating in an ambient temperature from 0 to plus 110 degrees F.

2.1.2 Dock Leveler Height Adjustment

Provide a ramp whose incline can be adjusted to suit the height of the freight carrier. Allow the loading ramp a minimum of 24 inches of vertical adjustment. Divide height adjustments 12 inches above and 12 inches below the dock level to provide coverage between 30 inches and 54 inches above grade.

2.1.3 Dock Leveler Extension and Retraction

Extend non-fixed end of the dock leveler from a retracted position behind the line of the loading dock platform bumpers to at least 12 inches beyond the forward edge of the dock platform bumpers so as to rest on the bed of the freight carrier. The difference in length of the platform from its fully retracted position to its fully extended position shall be practically constant throughout the ramp, including the ramp extension.

2.1.4 Loading Ramp Compensation

Provide automatic compensation with ramp platform loaded or unloaded for:

2.1.4.1 Freight Carrier Out of Level

Out of level freight carrier bed condition (difference in elevation from side to side at the rear of the carrier bed): Allow a minimum correction of one inch for each 18 inches and maximum 4 inch correction of ramp width over the width of the ramp. Ensure the rear edge of the ramp parallel with the rear of the frame in order to prevent tripping or be a pinching hazard.

2.1.4.2 Loading and Unloading of the Freight Carrier

Provide semi automatic air powered dock levelers for trailer movement. When the lip is extended so as to rest on the bed of motor truck or trailer, provide compensation of 4 inches for carrier spring deflection so that contact will be maintained between lip and carrier bed.

2.1.5 Safety Devices

2.1.5.1 Electro-Hydraulic System

Provide velocity fuse, ballcheck valve, or other device to automatically prevent a drop of more than 4 inches of the lip, should the freight carrier move away from the dock leaving the lip unsupported. Activate this device with a static, dynamic, or impact load exceeding 10 percent of the rated load on the lip and ramp.

2.1.5.2 Dock Bumpers

Provide ramp and load dock face with laminated rubber, tire-fabric, or equivalent dock bumpers recommended by the dock leveler manufacturer.

a. Finish: Metal for dock bumpers, including Hardware Items, must be hot-dip galvanized conforming to ASTM A 123/A 123M.

2.1.6 Rated Capacity

Minimum 30,000 pounds roll over capacity.

2.1.7 Ramp Load Carrying Surface

The live load carrying surface of the ramp shall be 6 feet plus or minus 3 inch wide and 8 feet plus or minus 9 inch long with the dock leveler lip retracted.

2.2 OPERATION

2.2.1 Electro-Hydraulic Control

Provide each dock leveler with a pushbutton station to activate motor, pump, and valves.

2.2.1.1 Pushbutton

Heavy-duty dust tight and oil tight type rated in accordance with NEMA ICS 2, Part ICS2-216 for alternating current. To prevent accidental operation and damage, ensure each button to be recessed in its station or be protected by a peripheral collar (ring) or shroud. Indelibly identify each pushbutton by means of cast or etched letters on the station. Provide emergency "STOP" button of momentary type with manual reset or continuous pressing (constant pressure) type. This stop button must stop all dock leveler movement, regardless of the position of the ramp or lip at the time the "STOP" button is depressed.

2.2.1.2 Hinged Lip Ramp Movement

Apply continuous pressure on the "UP" button to raise the loading ramp, descend the lip onto the bed of the freight carrier. Once the freight carrier has departed, the lip shall automatically fall or retract to its down position, and the ramp shall return to its stored dock level position. The ramp, in its stored position, shall have the capability of being lowered below dock level without extending the lip of the ramp to service truck end loads which may be lower than loading dock surface position. Allow 4 to 6 seconds to fully extend or retract the lip.

2.3 CONSTRUCTION AND MATERIALS

Construct all load carrying parts of forged or welded steel.

2.3.1 Structure

The entire live load carrying surface of the ramp and rear attachment shall be not less than 1/4 inch thick, 55 ksi minimum yield strength, low alloy, nonskid steel tread plate. Provide minimum 5/8 inch vertical projections on the live load carrying surface. Bevel the lip or ramp extension. Design load carrying surfaces to permit free movement of powered hand or platform trucks, low lift pallet trucks, and fork lift trucks. Fabricate lip hinge of not less than 1/4 inch wall seamless steel tubing.

2.3.2 Toe Guards or Skirts

Provide sides or edges, except front and rear edges, of the ramps which rise above the surrounding loading dock with sheet carbon steel skirts or

toe guards of minimum 14 U.S.S. gage nominal thickness. Furnish smooth faced toe guards or skirts and mount flush with the edges of the ramp surface. Ensure sufficient depth of toe guards or skirts to protect the full operating range of dock travel. Ensure the construction capable of resisting a minimum lateral force of 10 pounds with a maximum deflection of 1/2 inch.

2.4 ELECTRO-HYDRAULIC SYSTEM

Provide a separate and complete system for each dock leveler. Include an electric motor, motor drive, hydraulic pump, hydraulic ram, pressure relief valve, fluid reservoir, strainer, filter, hydraulic control-valve cylinders, hose, piping, fittings, and hydraulic fluid. Incorporate a means for filling and draining hydraulic fluid. Design cylinders, pump, and control valves to withstand not less than 150 percent of the design operating pressure. Provide hydraulic hose, fittings, pipe, and tubing with working pressures based upon a minimum 4 to 1 safety factor of bursting pressure.

2.5 ELECTRICAL REQUIREMENTS

NFPA 70, NEMA ICS 2, NEMA ICS 6 and NEMA MG 1. Provide 460 volt electrical characteristics, three phase, 60 Hz alternating current power supply. Provide all electrical equipment on the loading ramp. Provide interconnecting wiring for components of packaged equipment as an integral part of the equipment. Include motor, switches, junction box, conduit, wiring cables, panel enclosed control station, motor controller, heater coils, timer, transformer, terminal blocks, and fuses. Provide NEMA ICS 6, Type 4, electrical enclosures. Color code all wiring.

2.5.1 Motor

Conform to NEMA MG 1 and continuous duty or 60-minute time rated, industrial type, single speed rated for operating conditions. Provide electrical insulation systems conforming to NEMA MG 1, Class B. Provide permanently lubricated antifriction ball or roller bearings. Equip each electrohydraulic loading dock leveler with a totally enclosed non-ventilated (TENV) squirrel cage induction electric motor.

2.5.2 Controls

NEMA ICS 2, size 0 controller for heavy industrial service. Provide an electrically operated, full magnetic, nonreversing type controller for the motor. Equip all control enclosures with locks and keys.

2.5.3 Transformer

Totally enclosed, self-cooled, dry type. Feed the transformer from the load side of the main disconnecting device. Incorporate circuit breakers with ground fault interrupting protection conforming to UL 943.

2.6 ACCESSORIES

2.6.1 Dock Truck or Trailer Restraining Device

Self-aligning device. Mount this device as recommended by the manufacturer to engage the ICC bar of the truck/trailer with a positive restraining force of not less than 18,000 pounds. This device must be able to service all truck or trailers having ICC bars located between 12 and 30 inch above

ground level (when truck or trailer is unloaded) and recessed up to 9 inch from the rear of truck or trailer. Provide a means to protect the device from disabling damage in the event that more than 18,000 pounds of force is exerted by the restrained truck or trailer. Manually control activation and deactivation from inside the building. Units shall come with red and green signal lights.

2.6.2 Dock Seals

Provide door seals where indicated on all 8 feet-0 inch wide by 8 feet-0 inch high elevated dock doors. Head and side pads shall enclose a polyurethane foam pad which is chemically welded to a 2 inch thick pressure treated frame. The cover shall wrap behind the wood to form a weather-tight construction. Air exhaust and drain holes shall be provided in the covers and shall be designed to prohibit moisture infiltration. Side pads shall include full length, highly visible guide strips. All hardware shall be galvanized steel. Standard units shall consist of side pads that mount vertically on both sides of the dock door opening with a head pad that mounts horizontally across the top of the side pads.

The dock seals shall be model TS111 as manufactured by W.B. McGuire Company or approved equal. Color shall be as selected by the architect from the manufacturer's standard colors.

PART 3 EXECUTION

3.1 INSTALLATION OF DOCK LEVELER

Install and adjust in accordance with NFPA 70, manufacturer's approved detail drawings, and as-built system assembly drawings. Install controls so operator can see dock leveler while manipulating controls. Do not pour the pit for the adjustable loading ramp until the design and detail drawings have been approved. If the pit size is limited by construction conditions involved, alter the dock leveler equipment to fit the pit. Clearly indicate these alterations or modifications on the drawings. Check and verify the appropriate measurements at the building. Do not exceed 2 inch clearances between the ramp and pit.

3.2 CLEANING, TREATMENT AND PAINTING OF DOCK LEVELER

In accordance with manufacturer's standard practice, shop clean, treat and paint ferrous surfaces including platform, lip, frame, springs, motor, pump, cylinders, valves, and any other non-cadmium plated or non-galvanized surface (but not including bearings, gear contact surfaces, parts protected by lubrication, or other surfaces not usually painted or coated). Clean ferrous surfaces, shot pen, and protect the base metal with an application of 99.9% pure zinc coating with a thickness of 0.010 to 0.012 IAW ANSI/ANS C2.18-93. Protect nonferrous parts against corrosion as necessary.

3.2.1 Workmanship

Conduct field touch-up work as to avoid damaging other surfaces and public property in the area. Do not apply field applied paint during foggy, damp, rainy weather, or the ambient temperatures below 45 degrees F and above 95 degrees F.

3.2.2 Dissimilar Metals Protection

Insulate control surfaces by electrolytically inactive materials.

3.2.3 Finish Coat Color

Brilliant yellow and black. Paint 3 inch wide black and yellow diagonal stripes on all vertical surfaces of pit, skirts, and platform edges exposed above adjacent surfaces at any ramp position. Paint similar stripes on top of ramp surfaces in 6 inch wide band around outside edges (except for fixed edge).

3.3 FIELD TESTS FOR DOCK LEVELER

The Contractor is fully responsible to provide personnel, instruments, materials, and equipment including test vehicles, for the administration and direction of the tests. Correct defects and repeat tests under the cognizance of the Contracting Officer and the dock leveler manufacturer. The Contracting Officer is responsible for certifying the test load.

3.3.1 Roll-Over Load Tests

Move roll-over load of 30,000 pounds over the dock leveler between the bed of a freight carrier and the building loading dock surface for 10 cycles. With the ramp extension retracted and the ramp platform leveled with the building loading dock surface, run a 30,000 pound roll-over load over the ramp in various directions for 20 cycles. Do not allow permanent deformation or hydraulic system leakage to occur subsequent to examination after these roll-over tests.

3.3.2 Drop Tests

Twice, drop test the dock leveler at the indicated rated capacity as follows: With the load on the platform and the lip resting on a vehicle carrier bed not less than 10 inches above loading dock surface, pull the carrier or pull away from the lip, leaving the loading ramp unsupported. Do not exceed 4 inch for the measured vertical drop of the dock leveler taken at the point where the lip rests on the vehicle carrier during each of the drop tests. Inspect the loading ramp after each drop and ensure no damage or distortion to the mechanical, electrical or structural components. Do not allow leakage from the hydraulic system.

3.3.3 Acceptance Tests

Perform an acceptance test in the presence of the dock leveler manufacturer and the Contracting Officer subsequent to roll-over load tests and drop tests. Conduct operation of the equipment through all of its motions and specified checks as follows: (a) extend lip to rest on a variety of freight carriers with beds up 12 inch above and below dock level; (b) test 4 inch drop limitation with 7000 pound load on ramp, evenly distributed; (c) test level compensation with the ramp, loaded with a minimum of 7000 pounds; and (d) test proper compensation (float) for various compression of countersprings, with ramp loaded and unloaded.

3.4 INSTALLATION OF TRUCK RESTRAINING DEVICE

Install truck restraining devices at face of dock wall, where indicated on the drawings. Install red and green signal lights on wall adjacent to dock seal. Installation shall be in accordance with manufacturer's instructions.

3.5 INSTALLATION OF DOCK SEALS

Install dock seals at perimeter of dock doors where indicated on the drawings in accordance with the manufacturer's instructions.

3.6 INSTRUCTION TO GOVERNMENT PERSONNEL

Upon completion of the work and at a time designated by the Contracting Officer, provide the services of a competent Technician regularly employed or authorized by the manufacturer's of the dock leveler and truck restraining deviceto instruct Government personnel in the proper operation, maintenance, safety, and emergency procedures of the dock leveler truck restraining device. A minimum of one and no more than two eight-hour working days of instruction is required. Conduct the training at the job site or at any other location mutually satisfactory to the Government and the Contractor. Submit Operating and Maintenance Instructions as specified in the Submittals paragraph.

-- End of Section --

SECTION 11243

CHEMICAL TREATMENT OF WATER FOR MECHANICAL SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASME INTERNATIONAL (ASME)

ASME B40.100	(2000) Pressure Gauges and Gauge Attachments

ASTM INTERNATIONAL (ASTM)

ASTM D 2688	(1994; R 1999e1) Corrosivity of Water in the Absence of Heat Transfer (Weight Loss Methods)
ASTM D 596	(2001) Reporting Results of Analysis of Water

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(2003; R 2004) Motors and Generators

1.2 SYSTEM DESCRIPTION

This section covers the provisions and installation procedures necessary for a complete and totally functional chemical treatment system or systems. The system shall be provided and installed with all necessary System Components, Accessories, Piping Components, and Supplemental Components/Services.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Water Treatment System
Water Analysis

Six complete copies, at least 5 weeks prior to the purchase of the water treatment system, of the proposed water treatment plan including a layout; control scheme; a list of existing make-up water chemistry, including the items listed in paragraph Water Analysis; a list of treatment chemicals to be added; the proportion of chemicals to be added; the final treated water

control levels; and a description of health, safety and environmental concerns for handling the chemicals plus any special ventilation requirements.

Spare Parts

Spare parts data for each different item of material and equipment specified.

Field Instructions

Instructions, at least 2 weeks prior to construction completion, including equipment layout, wiring and control diagrams, piping, valves and control sequences, and typed condensed operation instructions. The condensed operation instructions shall include preventative maintenance procedures, methods of checking the system for normal and safe operation, and procedures for safely starting and stopping the system. The posted instructions shall be framed under glass or laminated plastic and posted where indicated by the Contracting Officer.

Tests

Test schedules, at least 2 weeks prior to the start of related testing, for the condenser/chilled water quality tests. The schedules shall identify the date, time, frequency and collection location for each test.

Demonstrations

A schedule, at least 2 weeks prior to the date of the proposed training course, which identifies the date, time, and location for the training.

SD-06 Test Reports

Condenser Water Quality Assurance Tests

Test reports shall be in bound 8-1/2 by 11 inch booklets. The reports shall identify the chemical composition of the condenser water. The reports shall also include a comparison of the manufacturer's or chemical vendor's recommended operating conditions for the cooling tower and condenser in relation to the actual condition of the condenser water. Any required corrective action shall be documented within the report.

SD-10 Operation and Maintenance Data

Water Treatment System

Six complete copies of operating and maintenance manuals for the step-by-step water treatment procedures. The manuals shall include testing procedures used in determining water quality.

1.4 SAFETY REQUIREMENTS

Exposed moving parts, parts that produce high operating temperature, parts which may be electrically energized, and parts that may be a hazard to operating personnel shall be insulated, fully enclosed, guarded, or fitted

with other types of safety devices. Safety devices shall be installed so that proper operation of equipment is not impaired. Catwalk, Ladder, and guardrail shall be provided where indicated and in accordance with Section 05500 METAL: MISCELLANEOUS AND FABRICATIONS.

1.5 DELIVERY, STORAGE, AND HANDLING

All equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

1.6 PROJECT/SITE CONDITIONS

1.6.1 Verification of Dimensions

After becoming familiar with all details of the work, the Contractor shall verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy, before performing any work.

1.6.2 Drawings

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the plumbing, fire protection, electrical, structural and finish conditions that would affect the work to be performed and shall arrange such work accordingly, furnishing required offsets, fittings, and accessories to meet such conditions.

PART 2 PRODUCTS

2.1 STANDARD PRODUCTS

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of a similar material, design and workmanship. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two-year use shall include applications of equipment and materials under similar circumstances and of similar size. The two years experience shall be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturer's catalogs, or brochures. Products having less than a two-year field service record shall be acceptable if a certified record of satisfactory field operation, for not less than 6000 hours exclusive of the manufacturer's factory tests, can be shown. All products shall be supported by a service organization. The Contractor shall submit a certified list of qualified permanent service organizations for support of the equipment, including their addresses and qualifications. These service organizations shall be reasonably convenient to the equipment installation and shall be able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

2.2 NAMEPLATES

Each major component of equipment shall have the manufacturer's name, address, type or style, and catalog or serial number on a plate securely attached to the item of equipment. Nameplates shall be provided for:

a. Pump(s)

b. Pump Motor(s)

2.3 ELECTRICAL WORK

Electrical equipment, motors, motor efficiencies, and wiring shall be in accordance with Section 16402 INTERIOR DISTRIBUTION SYSTEM. Electrical motor driven equipment specified shall be provided complete with motors, motor starters, and controls. Electrical characteristics and enclosure type shall be as shown, and unless otherwise indicated, all motors of 1 horsepower and above with open, dripproof, or totally enclosed fan cooled enclosures, shall be high efficiency type. Field wiring shall be in accordance with manufacturer's instructions. Each motor shall conform to NEMA MG 1 and be of sufficient size to drive the equipment at the specified capacity without exceeding the nameplate rating of the motor. All motors shall be continuous duty with the enclosure specified. Motor starters shall be provided complete with thermal overload protection and other appurtenances necessary for the motor control indicated. Motors shall be furnished with a magnetic across-the-line or reduced voltage type starter as required by the manufacturer. Manual or automatic control and protective or signal devices required for the operation specified and any control wiring required for controls and devices specified, but not shown, shall be provided.

2.4 GAUGES

Gauges shall conform to ASME B40.100, Class 1, 2, or 3, Style X, Type I or III as required, 4-1/2 inches in diameter with phenolic or metal case.

2.5 WATER ANALYSIS

Conditions of make-up water to be supplied to the boilers, cooling towers and chilled water systems reported per ASTM D 596 are as follows:

Date of Sample	_____
Temperature	_____ degrees C.
Silica (SiO 2)	_____ ppm (mg/L)
Insoluble	_____ ppm (mg/L)
Iron, total (Fe)	_____ ppm (mg/L)
Aluminum (Al)	_____ ppm (mg/L)
Calcium (Ca)	_____ ppm (mg/L)
Magnesium (Mg)	_____ ppm (mg/L)
Carbonate (HCO 3)	_____ ppm (mg/L)
Sulfate (SO 4)	_____ ppm (mg/L)
Chloride (Cl)	_____ ppm (mg/L)
Nitrate (NO 3)	_____ ppm (mg/L)
Turbidity	_____ ntu
pH	_____
Residual Chlorine	_____ ppm (mg/L)
Total Alkalinity	_____ ppm (mg/L)
Non-Carbonate Hardness	_____ ppm (mg/L)
Total Hardness	_____ ppm (mg/L)
Dissolved Solids	_____ ppm (mg/L)
Conductivity	_____ micromho/cm

2.6 CONDENSER WATER TREATMENT SYSTEMS

The use of chemical-treatment products containing hexavalent chromium (Cr) is prohibited. Water to be used in the condenser water systems shall be

treated to maintain the conditions recommended by this specification as well as the recommendations from the manufacturers of the condenser and evaporator coils. Chemicals shall meet all required federal, state, and local environmental regulations for the treatment of condenser-side heat exchangers, cooling towers and direct discharge to the sanitary sewer.

2.6.1 Condenser Water Limits

The condenser water limits shall be as follows, unless dictated differently by the cooling tower or chiller manufacturer's recommendations:

Treatment type	Phosphonate/Polymer
Puckorius Index	4 minimum
Langelier Index	4 maximum
Total Dissolved Solids	5000 ppm maximum
Calcium Hardness	1200 ppm maximum
Silica	150 ppm maximum
PH	7.5 - 8.5

For treated condenser/cooling tower water, blowdown must be minimized until the first of one of the top 5 limits is reached. Specific requirements for treatment chemicals and levels are listed below in paragraphs dealing with small and large systems.

2.6.2 Water Treatment Services

The services of a company regularly engaged in the treatment of condenser water systems shall be used to provide the chemicals required, the concentrations required, and the water treatment equipment sizes and flow rates required. The company shall provide all chemicals required for the [condenser] [condenser and chilled] water systems and fill the systems with chemicals to the levels specified. The chemical shall meet the requirements of this specification as well as the recommendations from the manufacturers of the condenser and cooling tower. Acid treatment chemicals shall not be used.

2.6.3 Chemical Treatment for Large Systems

For cooling systems with capacities greater than 50 tons one of the three following chemical treatments shall be provided with the limits indicated. The zinc and molybdate in the last two treatments help to meet the maximum corrosion requirements in waters that tend to be more corrosive. Biocides must be maintained to control bacteria below 10,000 colony forming units per milliliter.

a. Phosphonate Type Treatment

Phosphonate	(3-5 ppm)
Polymer	(3-4 ppm)
TT	(1-2 ppm)
Biocides	as required

b. Zinc-Phosphonate Type Treatment

Phosphonate	(3-5 ppm)
Polymer	(3-4 ppm)
Zinc	(1-2 ppm)
TT	(1-2 ppm)
Biocides	as required

c. Zinc-Molybdate Type Treatment

Phosphonate	(3-5 ppm)
Polymer	(3-4 ppm)
Molybdate	(10-15 ppm)
Zinc	(2-3 ppm)
TT	(1-2 ppm)
Biocides	as required

2.6.3.1 General Requirements

The water treatment system shall be capable of automatically feeding chemicals and bleeding the system to prevent corrosion, scale, and biological formations. Automatic chemical feed systems shall automatically feed chemicals into the condenser water based on makeup water rate. Electrical signals from a water meter on the makeup water line shall be used to control the output of chemical feed pumps. The system shall be initially set manually based on the water analysis of the make-up water.

2.6.3.2 Chemical Feed Pumps and Tanks

Chemical feed pumps and tanks shall be furnished as a package with the pumps mounted on and piping connected to the tank. The chemical feed pumps shall be positive displacement diaphragm type. The pump's cylinders, plungers, ball check valves, and check valve bodies shall be of corrosion resistant materials suitable for the chemicals being pumped. Cylinders shall be replaceable for increased or reduced pressure or capacity ranges. The flow rate of the pumps shall be adjustable from 0 to 100 percent while in operation. Volumetric accuracy of the pumps shall be within one percent over the range indicated. Pump capacities shall be adjustable by positioning crank pin with micrometer setscrews. Stroke length scale shall be divided in percentage graduations engraved on scale. The discharge pressure of pumps shall not be less than 1.5 times the line pressure at the point of connection. The pumps shall be provided with a pressure relief valve and a check valve mounted in the pump discharge. The pumps shall be controlled by an external controller/timer receiving signals from the makeup water meter. Drive motors shall be 110 volt, single phase and shall have drip-proof enclosures. Two chemical tanks shall be provided. The tanks shall be constructed of materials compatible with the chemicals to be stored in the tank with a hinged cover and mounted on legs. Tanks shall have filling and drain connections and gauge glass. Each tank shall be furnished with one pump, mounted and piped with black iron pipe and fittings, with suction strainer and stainless steel screen, and with 1/2 inch relief valve with steel body and stainless steel trim. Tank bottom shall be dished concave to a radius equal to the diameter of the tank. Motor-driven agitator shall be provided. The tanks shall have sufficient capacity to require recharging only once per 7 days during normal operation.

2.6.3.3 Chemical Injection Assembly

An injection assembly shall be provided at each chemical feed point. The injection assembly shall be located downstream of recirculating pumps and upstream of the condenser. The injection assemblies shall be constructed of stainless steel. The discharge of the assemblies shall extend to the centerline of the condenser water piping. Each assembly shall include a shutoff valve and check valve at the point of entrance into the condenser water line.

2.6.3.4 Water Meter

Water meters shall be provided with an electric contacting register and remote accumulative counter. The meter shall be installed within the make-up water line, as indicated.

2.6.3.5 Timers

Timers shall be of the automatic reset, adjustable type, and electrically operated. The timers shall be designed to work with the contacting head water meters. The timer should include the water meter cable. The timers will control operation of the chemical feed pumps. The timers shall be suitable for a 120 volt current. The timers shall be located within the water treatment control panel.

2.6.3.6 Bleed (Blowdown) Line

Control of flow through the bleed line shall be controlled by a conductivity meter. A conductivity meter and probe shall be installed to measure the conductivity of the condenser water. The conductivity meter shall have a high and low set point above which the conductivity meter shall open a solenoid valve on the bleed line. The bleed line attachment to the condenser water piping shall be located downstream of the recirculating pumps and upstream of the chemical injection point. The bleed line shall be extended to the nearest drain for continuous discharge.

2.6.3.7 Control Panel

The control panel shall be a NEMA 12 enclosure suitable for surface mounting. The panel shall be constructed of coated steel with a hinged door and lock. The panel shall contain a laminated plastic nameplate identifying each of the following functions:

(1) Main power switch and indicating light
(2) MAN-OFF-AUTO selector switch
(3) Indicating lamp for bleed-off valve
(4) Indicating lamp for each chemical feed pump
(5) Set point reading for each timer
(6) Bacnet compatible

2.6.3.8 Chemical Piping

The piping and fittings shall be constructed of schedule 80 PVC suitable for the water treatment chemicals.

2.6.3.9 Sequence of Operation

The chemicals shall be added based upon sensing the make-up water flow rate and activating appropriate timers. A separate timer shall be provided for each chemical. The blow down shall be controlled based upon the conductivity of the condenser water. The injection of the chemical required for biological control shall be controlled by a timer that can be manually set for proper chemical feed. All timer set points, blow down rates, and chemical pump flow rates shall be determined and set by the water treatment company.

2.6.3.10 Test Kits

One test kit of each type required to determine the water quality as outlined within the operation and maintenance manuals shall be provided.

2.7 CHILLED WATER SYSTEM

A 5 gallon shot feeder shall be provided on the chilled water piping as indicated. The feeder shall be furnished with an air vent, gauge glass, funnel, valves, fittings, and piping.

2.7.1 Chilled Water Treatment

Chilled water shall be treated with either a borax/nitrite type treatment or a molybdate type treatment. Both types of treatment can be used with glycol. Borax/nitrite treatment shall be maintained at the limits of 600 to 1000 ppm nitrite, 40 - 50 ppm copper corrosion inhibitor (TT or MBT), and pH of 8.5 to 9.5. Molybdate treatment shall be maintained at the limits of 100 to 125 ppm molybdate, 40 - 50 ppm copper corrosion inhibitor (TT or MBT), and pH of 8.0 to 9.0.

2.7.2 Chilled Water Test Kits

One test kit of each type required to determine the water quality as outlined within the operation and maintenance manuals shall be provided (e.g. pH and nitrite or molybdate).

PART 3 EXECUTION

3.1 INSTALLATION

Contractor shall provide all chemicals, equipment and labor necessary to bring all system waters in conformance with the specified requirements. All work shall be performed in accordance with the manufacturer's published diagrams, recommendations, and equipment warranty requirements.

3.2 PIPING

Connections between dissimilar metals shall be made with a dielectric union.

3.3 TESTS

If the waters of the mechanical systems are not in conformance with the specified requirements or per manufacturer's recommendations, the water treatment company shall take corrective action to enable compliance. Daily operational tests shall be performed in the directed frequencies to maintain required control to prevent corrosion, scaling and damage to equipment during operation

3.3.1 Condenser Water Quality Tests

3.3.2 Quality Assurance Testing

Quality assurance testing shall be conducted periodically by an independent water treatment lab/consultant to verify to managers that the mechanical and water treatment systems are being maintained properly. The Quality Assurance evaluation reports shall be provided to the government COR.

3.3.2.1 Condenser Water Quality Assurance Tests

a. For cooling systems with capacities greater than 50 ton), the condenser water shall be analyzed a minimum of once a month for a period of one year by the water treatment company. The analysis shall include the following information recorded in accordance with ASTM D 596.

Date of Sample	_____
Temperatures (before & after condenser)	_____ _____ degrees F.
pH	_____
Silica (SiO2)	_____ ppm (mg/L)
Iron (total, as Fe(2)O(3))	_____ ppm (mg/L)
Copper (Cu)	_____ ppm (mg/L)
Calcium Hardness(CaCO3)	_____ ppm (mg/L)
Total Hardness (as CaCO3)	_____ ppm (mg/L)
Chloride (Cl)	_____ ppm (mg/L)
Total Alkalinity (as CaCO3)	_____ ppm (mg/L)
Conductivity	_____ micromho/cm
Total Dissolved Solids	_____ ppm (mg/L)
Phosphonate (as PO4)	_____ ppm (mg/L)
Zinc (if used) (Zn)	_____ ppm (mg/L)
Molybdate (if used) (Mo)	_____ ppm (mg/L)
Tolyltriazole (TT)	_____ ppm (mg/L)
Biocide	_____ ppm (mg/L)
Bacteria colony count	_____ colonies/mL
Makeup water pH	_____ ppm (mg/L)
Makeup water Iron	_____ ppm (mg/L)
Makeup water Silica	_____ ppm (mg/L)
Makeup water Calcium Hardness	_____ ppm (mg/L)
Makeup water Total Hardness	_____ ppm (mg/L)
Makeup water Total Alkalinity	_____ ppm (mg/L)
Makeup water Chloride (Cl)	_____ ppm (mg/L)
Makeup water Conductivity	_____ micromho/cm
Written evaluation summary	

3.3.2.2 Chilled Water Quality Assurance Testing (quarterly)

Quarterly, the following tests shall be performed on chilled water.

PH	_____
Nitrite or Molybdate	_____ ppm (mg/L)
Conductivity	_____ micromho/cm
Iron (total, as Fe(2)O(3))	_____ ppm (mg/L)
Written evaluation summary	

3.3.3 Corrosion Testers

Corrosion coupon and rack systems shall be installed to verify corrosion control in the systems. Testers or coupons are installed in flowing system water through a sidestream or rack system. Both mild steel and copper metal samples are to be tested in the corrosion testers in accordance with ASTM D 2688. Samples are to be replaced and analyzed every 3 months. Rates of corrosion less than 3 mpy for steel and 0.2 mpy for copper are acceptable. Corrosion testers shall be installed on the piping systems of the following systems.

Condenser loop
Chilled water system

3.4 INSPECTIONS

3.4.1 Inspection General Requirements

Thirty days after project completion the cooling tower and condenser shall be inspected for problems due to corrosion, scale, and biological growth. If the cooling tower and condenser are found not to conform to the manufacturer's recommended conditions, and the water treatment company recommendations have been followed; the water treatment company shall provide all chemicals and labor for cleaning or repairing the equipment as required by the manufacturer's recommendations.

3.5 DEMONSTRATIONS

Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total 8 hours of normal working time and start after the system is functionally completed but prior to final acceptance tests. The field instructions shall cover all of the items contained in the Operation and Maintenance Manuals as well as demonstrations of routine maintenance operations.

-- End of Section --

SECTION 11312

GRINDER PUMP LIFT STATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 198	(2005) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.11	(1996) Forged Steel Fittings, Socket Welded and Threaded
ANSI B16.3	(1998) Malleable Iron Threaded Fittings Classes 150 and 300

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C110	(2003) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1219 mm), for Water
AWWA C115	(1999) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C151	(2002) Ductile-Iron Pipe, Centrifugally Cast, for Water
AWWA C500	(2002; A C500a-95) Metal-Seated Gate Valves for Water Supply Service
AWWA C509	(2001) Resilient-Seated Gate Valves for Water Supply Service
AWWA C600	(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 126	(2004) Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 53/A 53M	(2004a) Pipe, Steel, Black and Hot-Dipped,

	Zinc-Coated, Welded and Seamless
ASTM A 615	(2005a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 443	(2005) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 478	(2003a) Precast Reinforced Concrete Manhole Sections

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1	(2003; R 2004) Motors and Generators

1.2 DESCRIPTION OF WORK

The work includes providing submersible sewage grinder pump station and related work. Provide system complete and ready for operations. Grinder pump station system including equipment, materials, installation, and workmanship shall be as specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Pipe and fittings; G

Check valves; G

Gate valves; G

Submersible sewage grinder pumps; G

Pump motor; G

Flexible flanged coupling; G

SD-10 Operation and Maintenance Data

Submersible Sewage Grinder Pumps Data Package 3; G

Submit in accordance with Section 01781 OPERATION AND MAINTENANCE DATA.

Include pumps, alarms, and motors. Include all information on all equipment, alarm panel and controls, pumps and pump performance curves, and station layout in data for submersible sewage grinder pump station.

1.4 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

1.4.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials in enclosures or under protective covering. Store rubber gaskets not to be installed immediately under cover, out of direct sunlight. Do not store materials directly on the ground. Keep interior of pipes and fittings free of dirt and debris.

1.4.2 Handling

Handle pipe, fittings, valves, and other accessories in such manner as to ensure delivery to the trench in sound, undamaged condition. Avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry pipe to the trench; do not drag it.

1.5 EXCAVATION, TRENCHING, AND BACKFILLING

Provide in accordance with Section 02300 EARTHWORK, except as specified herein.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

Provide pressure piping, air release valves, and related accessories for force main piping outside the sewage wet well and valve vault in accordance with Section 02532 FORCE MAINS AND INVERTED SIPHONS; SEWER.

2.1.1 Ductile-Iron Pipe

AWWA C151, thickness Class 52.

2.1.1.1 Flanged Pipe

AWWA C115, ductile iron.

2.1.1.2 Fittings

AWWA C110, flanged. Provide flanged joint fittings within wet well and valve vault as indicated. Provide mechanical joint fittings outside valve vault enclosure as indicated. Use fittings with pressure rating at least equivalent to that of the pipe.

2.1.1.3 Joints

AWWA C115 for flanged joints. Use bolts, nuts, and gaskets for flanged connections recommended in the Appendix to AWWA C115.

2.1.2 Insulating Joints

Provide between pipes of dissimilar metals a rubber gasket or other approved type of insulating joint or dielectric coupling to effectively prevent metal-to-metal contact between adjacent sections of piping.

2.1.3 Accessories

Provide flanges, connecting pieces, transition glands, transition sleeves,

and other adapters as required.

2.1.4 Flexible Flanged Coupling

Provide flexible flanged coupling applicable for sewage as indicated. Use flexible flanged coupling designed for a working pressure of 350 psi.

2.2 VALVES AND OTHER PIPING ACCESSORIES

2.2.1 Gate Valves in Valve Vault

AWWA C500 and AWWA C509. Valves conforming to AWWA C500 shall be outside-screw-and-yoke rising-stem type with double disc gates and flanged ends. Valves conforming to AWWA C509 shall be outside-screw-and-yoke rising-stem type with flanged ends. Provide valves with handwheels that open by counterclockwise rotation of the valve stem. Bolt and construct stuffing boxes to permit easy removal of parts for repair. Use valves from one manufacturer.

2.2.2 Check Valves 4 in and Larger Diameter

Nonclogging swing check valve rated for not less than 175 psig working pressure capable of passing 3-inch diameter solids. Cast iron conforming to ASTM A 126. Buna-N disc and integral seat. Flanged ends conforming to AWWA C110.

2.2.3 Identification Tags and Plates

Provide valves with tags or plates numbered and stamped for their usage. Use plates and tags of brass or nonferrous material and mounted or attached to the valve.

2.2.4 Pipe Support

Use pipe support schedule 40 galvanized steel piping conforming to ASTM A 53/A 53M. Provide either ANSI B16.3 or ANSI B16.11 galvanized threaded fittings.

2.2.5 Miscellaneous Metals

Use stainless steel bolts, nuts, washers, anchors, and supports for installation of equipment.

2.2.6 Quick Disconnect System with Hydraulic Sealing Flange

Use quick disconnect system consisting of a steel base plate for supporting the pumps, a hydraulic sealing flange, pump guide rails and the discharge pipe supports. Use two guide rails of galvanized steel in accordance with ASTM A 123/A 123M. Provide a steel lifting chain for raising and lowering the pump in the basin. Build guides onto pump housing to fit the guide post to assure perfect alignment between pump and guide rails.

2.2.7 Wet Well Vent

Galvanized ASTM A 53/A 53M pipe with insect screening.

2.3 SUBMERSIBLE SEWAGE GRINDER PUMPS

Provide submersible sewage pumps with grinder units as shown on the

drawings. Provide submersible grinder units capable of grinding all materials found in normal domestic sewage, including plastics, rubber, sanitary napkins, disposable diapers, and wooden articles into a finely ground slurry with particle dimensions no greater than 1/4 inch. Pump capacity and motor characteristics as indicated. Design pump to operate in a submerged or partially submerged condition. Provide an integral sliding guide bracket and two guide bars capable of supporting the entire weight of the pumping unit. The two-pump submersible pump station shall be designed for one pump to handle the total flow and the other pump as a backup pump. The backup pump shall also be designed to handle the total flow.

2.3.1 Casing

Provide hard, close-grained cast iron casing which is free from blow holes, porosity, hard spots, shrinkage defects, cracks, and other injurious defects. Design casings to permit replacement of wearing parts. Design passageways to permit smooth flow of sewage and to be free of sharp turns and projections.

2.3.2 Impeller

Provide non-clogging type cast-iron, or bronze impeller. Make impeller with smooth surfaces, free flowing with the necessary clearance to permit objects in the sewage to pass. Fit and key, spline, or thread impeller on shaft, and lock in such manner that lateral movement will be prevented and reverse rotation will not cause loosening.

2.3.3 Shaft and Shaft Seals

Provide shaft of stainless steel. Provide mechanical seal of double carbon and ceramic construction with mating surfaces lapped to a flatness tolerance of one light band. Hold rotating ceramics in mating position with stationary carbons by a stainless steel spring. Oil lubricate bearings.

2.3.4 Bearings

Provide heavy duty ball thrust bearing or roller type bearing of adequate size to withstand imposed loads. Oil lubricate bearings.

2.3.5 Pump and Motor

Use pump and motor assembled on a single stainless steel shaft in a heavy duty cast-iron shell. Use free standing pump support legs of cast-iron providing enough clearance for the solids to get into the grinder.

2.4 PUMP MOTOR

Provide submersible sewage pumps in wet well NEMA MG 1, 1800 RPM, 480 volt, 3 phase, and 60 Hz cycle and for submersible pumps. Motor horsepower shall be not less than 25 pump horsepower at any point on the pump performance curve. Fit motors with lifting "eyes" capable of supporting entire weight of pump and motor.

2.5 PUMP CONTROL SYSTEM

Provide a sealed mercury float switch control system as indicated. Automatically alternate operation from one pump to the other and start second pump in the event first pump cannot handle incoming flow. Provide

manual "on-off" switch for each pump. Provide independent adjustable high and low water level switches. Provide floats, supports, and alarm. Metal parts, if used, shall be of bronze or equivalent corrosion resistant material.

2.5.1 Float Assembly Description

Use a direct acting float switch consisting of a normally-open mercury switch enclosed in a float. Use pipe mounted float assembly. Use float molded of rigid high-density polyurethane foam, color-coded and coated with a durable, water and corrosion-resistant jacket of clear urethane. Provide connecting cable and support pole in accordance with manufacturers recommendations. Provide a cast aluminum NEMA Type 4 junction box to connect float assembly. Use box with a gasketed cover with tapped float fitting and conduit entrance pipe threaded opening. Mount floats at fixed elevations as shown. Use floats designed to tilt and operate their switches causing sequential turn-on turn-off of the pump, when the liquid level being sensed rises or falls past the float.

2.5.2 Alternator

Provide an alternator control switch to operate in connection with each float. Use alternator control switch to alternate the operation of the pumps and operate both pumps if the sewage water level rises above the second high sewage water level. Incorporate time delay function and devices in the alternator controls such that both sewage pumps cannot be started simultaneously for an adjustable period of 10 to 120 seconds after shutdown. Use delay function designed to operate in any condition of start-up in either normal or emergency operational mode.

2.5.3 Sewage Pump Alarm and Control Panel with PLC/SCADA

The pump station shall be provided with a PLC/SCADA system for the control/operation of the lift station including providing alarm and pump status information to the operator console. The programmable logic controller (PLC) shall also provide SCADA operational outputs to be relayed by radio frequency back to the Public Works Department.

The pumps shall operate as a lead/lag setup with an alternator. The pumps shall be level driven utilizing a level/pressure transducer, with "low level alarm", "all pumps off", "lead pump on", "lag pump on", and "high water level alarm."

The Control Panel shall include an Operator's Console and Alarm Panel. Enclose the control panel in NEMA IV enclosure and with a flashing red light with long life bulb in guarded enclosure and 6 inch diameter horn. Horn shall emit 120 DB at 10 feet. Power alarm horn and light from 12V DC power supply with battery backup. Provide a rechargeable battery rated to power both the horn and light for a minimum of two hours upon loss of main power. Provide circuitry to automatically recharge the battery after main power is restored. Full charge of battery shall take no more than 20 hours. Use panel swith power on light, push to test button for horn and light and push to silence button for horn and light with automatic reset for next alarm. Use alarm designed to activate under the following conditions:

a. High liquid level as sensed by float switch

b. Loss of main power

c. No flow light as sensed by limit switch on the check valve

2.5.4 Electrical Requirements

Furnish motors with their respective pieces of equipment. Motors, controllers, contactors, and disconnects shall be as specified in Section 16402 INTERIOR DISTRIBUTION SYSTEM. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field installed equipment.

2.5.5 Electric Motor

Use hermetically sealed electric motor. The power cable shall be sealed inside the motor end bell. The cable shall be neoprene covered with a flexible metal cover over it for its full length.

2.6 UNDERGROUND EQUIPMENT ENCLOSURE

2.6.1 Access Hatch Cover

Provide aluminum access hatch cover as indicated. The access hatch shall include lifting mechanism, automatic hold open arm, slam lock with handle, and flush lift handle with red vinyl grip. Use automatic hold open arm that locks in the 90 degree position. Use cover that is 1/4 inch diamond plate with 1/4 inch channel frame and continuous anchor flange. USe access hatch cover capable of withstanding a live load of 300 lbs./sq. ft. Provide stainless steel cylinder lock with two keys per lock. Key all the locks the same.

2.6.2 Wet Well and Valve Vault

Provide concrete wet well and Valve Vault with inside diameter as indicated. Precast structures may be provided in lieu of cast-in-place structures. Wet well shall be lined with a 40 mil epoxy coating. Epoxy coating shall be as approved by the Contractor's Quality Control Representative. Contractor shall install in accordance with the manufacturer's recommendations.

2.6.2.1 Cast-In-Place Concrete Structures

Provide wet well and valve vault with a compressive strength of 4000 psi at 28 days as specified in Section 03411 PLANT-PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION.

2.6.2.2 Precast Concrete Structures

ASTM C 478, except as specified herein. Provide precast concrete structures with a compressive strength of 4000 psi at 28 days and an air entrainment of 6 percent, plus, or minus 2 percent and a minimum wall thickness of 5 inches. ASTM A 615 reinforcing bars. ASTM C 443 or AASHTO M 198, Type B gaskets for joint connections. Use monolithic base and first riser.

2.6.3 Wet Well Base Material

Provide crushed stone as indicated and specified in Section 02300 EARTHWORK. Provide polyethylene vapor barrier as indicated and specified in Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE.

PART 3 EXECUTION

3.1 INSTALLATION

Provide pump station in accordance with drawings and requirements of the respective equipment manufacturers. Dampen and isolate equipment vibration.

3.1.1 Installation of Ductile-Iron Pressure Lines

Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled, "General Requirements for Installation of Pipelines" of Section 02531 SANITARY SEWERS, and with the requirements of AWWA C600 for pipe installation, joint assembly, and valve-and-fitting installation.

a. Make flanged joint with gaskets, bolts, and nuts specified for this type joint. Make flanged joints up tight, taking care to avoid undue strain on flanges, fittings, and other accessories. Align bolt holes for each flanged joint. Use size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without overstraining the flange.

3.1.2 Valves

Installation of Valves: Install gate valves conforming to AWWA C500 in accordance with AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves conforming to AWWA C509 in accordance with AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

3.1.3 Force Main

Provide in accordance with Section 02532 FORCE MAINS AND INVERTED SIPHONS; SEWER.

3.1.4 Equipment Installation

Install equipment in accordance with these specifications and the manufacturer's installation instructions. Grout equipment mounted on concrete foundations before installing piping. Install piping to avoid imposing stress on any equipment. Match flanges accurately before securing bolts.

3.2 FIELD TESTS AND INSPECTIONS

Perform all field tests, and provide all labor, equipment, and incidentals required for testing, except that water and electric power needed for field tests will be furnished as set forth in Division 01. Produce evidence, when required, that any item of work has been constructed in accordance with contract requirements. Allow concrete to cure a minimum of 5 days

before testing any section of piping where concrete thrust blocks have been provided.

3.2.1 Testing Procedure

Test piping in accordance with the Section 02531 SANITARY SEWERS. Test in operation all equipment to demonstrate compliance with the contract requirements.

3.2.2 Sewage Grinder Pump Lift Station

Test pumps and controls, in operation, under design conditions to insure proper operation of all equipment. Provide all appliances, materials, water, and equipment for testing, and bear all expenses in connection with the testing. Conduct testing after all equipment is properly installed, electrical services and piping are installed, liquid is flowing, and the pump station is ready for operation. Correct all defects discovered to the satisfaction of the Contracting Officer, and all tests repeated, at the expense of the Contractor, until the equipment is in proper working order.

-- End of Section --

SECTION 11400

FOOD SERVICE EQUIPMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-2092S	(2004) Industrial Ventilation: A Manual of Recommended Practice

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8/A5.8M	(2004) Filler Metals for Brazing and Braze Welding

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 167	(2004) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 240/A 240M	(2004ae1) Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels for General Applications
ASTM A 269	(2004) Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A 36/A 36M	(2005) Carbon Structural Steel
ASTM B 32	(2004) Solder Metal
ASTM D 520	(2000) Zinc Dust Pigment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2005) National Electrical Code
NFPA 96	(2001) Ventilation Control and Fire Protection of Commercial Cooking Operations

NSF INTERNATIONAL (NSF)

NSF 2	(2002e) Food Equipment

NSF 7	(2001) Commercial Refrigerators and Freezers
NSF Product Listing	(2002) NSF Product Listings of Food Equipment and Related Products, Components, and Materials

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA HVAC Duct Const Stds	(1995, 2nd Ed) HVAC Duct Construction Standards - Metal and Flexible

UNDERWRITERS LABORATORIES (UL)

UL 1046	(2000) Grease Filters for Exhaust Ducts
UL 197	(2003) Commercial Electric Cooking Appliances
UL 207	(2001) Refrigerant-Containing Components and Accessories, Nonelectrical
UL 471	(2006) Commercial Refrigerators and Freezers
UL 489	(2002; Rev thru May 2003) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 710	(1995; Rev thru Apr 1999) Exhaust Hoods for Commercial Cooking Equipment
UL Elec Equip Dir	(2003) Electrical Appliance and Utilization Equipment Directory

1.2 GENERAL REQUIREMENTS

Food service equipment shall be of the sizes and types shown. Equipment, materials, and fixtures required for use in conjunction with the items to be furnished by the Government shall be furnished and installed by the Contractor. Equipment, materials, and fixtures indicated on the drawings and schedules shown as Contractor furnished and installed, shall be furnished and installed by the Contractor.

1.2.1 Mechanical, Electrical, and Plumbing Work

Plumbing systems, including final connections, shall be in accordance with Section 15400 PLUMBING, GENERAL PURPOSE. Electrical equipment, motors, wiring, and final connections shall be in accordance with Section 16402 INTERIOR DISTRIBUTION SYSTEM. Duct work and accessories shall be in accordance with Section 15895 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS. Painting shall be in accordance with Section 09900 PAINTS AND COATINGS. Air-conditioning systems shall be in accordance with Section 15700 UNITARY HEATING AND COOLING EQUIPMENT.

1.2.2 Kitchen Fire Protection Systems

Each exhaust hood system that serves cooking equipment, associated exhaust

hood system ducts, and all cooking equipment served by the exhaust hood system shall be protected with a wet chemical fire extinguishing system. The wet chemical fire extinguishing systems shall be in accordance with Section 13965 WET CHEMICAL FIRE EXTINGUISHING SYSTEM. Grease extracting type hoods that have an internal hood fire protection system do not require wet chemical fire extinguishing protection for those components of the exhaust system, and for cooking equipment protected by a UL listed internal hood fire protection system complying to NFPA 96.

1.2.3 National Sanitation Foundation Standards

Food service equipment shall meet the requirements set forth by the National Sanitation Foundation (NSF). Acceptable evidence of meeting the requirements of the applicable NSF standards shall be either the equipment listed in NSF Product Listing displaying the NSF seal for the year the equipment was manufactured, a certification issued for special or specific food service equipment by NSF under their special one time contract evaluation and certification, or a certified test report from an independent testing laboratory, approved by the Office of the Surgeon General, indicating that the specific food service equipment has been tested and conforms to the applicable NSF standards.

1.2.4 Verification of Dimensions and Coordination of Project Data

The Contractor shall become familiar with all details of the work and shall advise the Contracting Officer of any discrepancy before performing any work. The Contractor shall perform the following:

a. Horizontal and vertical dimensions shall be field verified.

b. Contract drawings and submittal data shall be reviewed for accuracy and completeness.

c. The installed utility capacity and location shall be field checked.

d. Critical systems/components shall be reviewed for application and capacities such as for exhaust hoods, refrigeration systems, fire suppression systems, gas, water, and steam/condensate line sizes and manifold configurations.

e. Delivery shall be coordinated for access through finished openings and vertical handling limitation within the building.

1.2.5 Standard Products

Materials and equipment shall be the standard products of manufacturer regularly engaged in the manufacture of the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The experience used shall include applications of equipment and materials under similar circumstances and of similar size. When two or more of the same products are supplied they shall be products of one manufacturer. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

1.2.6 Nameplates

Each item of equipment shall bear a stainless steel, aluminum, or engraved polyester nameplate, as standard with the manufacturer, located in a

conspicuous position and permanently fastened to the equipment. Name or identification plates shall be of the size standard with the manufacturer for the particular piece of equipment provided. Name plates shall reflect the name of the manufacturer/trade name, serial number, make, and model number, pertinent ratings, operating characteristics, and other information as standard with the manufacturer, date of manufacture, electrical characteristics, and other applicable data, such as flow rate, temperature, pressure, capacity, and material of construction. Separate equipment identification plates with the contract number marked thereon, shall be securely fastened to the surface of each piece of equipment.

1.2.7 Underwriters Laboratories Standards

Electrically operated equipment shall be in accordance with applicable UL standards such as UL 471, UL 489, UL 710 and UL 197. Evidence of meeting the requirements shall be a UL label on the equipment, a UL listing mark per UL Elec Equip Dir or a certified test report from a nationally recognized independent testing laboratory indicating that the specific food service equipment has been tested and conforms to the applicable UL standards.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings
Installation

Detail drawings, as specified.

SD-03 Product Data

Food Service Equipment

Manufacturer's descriptive and technical literature, catalog cuts, and installation instructions. Brochures shall have front and rear protective covers with labeled project name and include an index indicating item number, quantity, description, and manufacturer, a fly sheet for each component indicating item number, name, quantity, manufacturer, optional equipment, modification, special instruction, and utility requirements, and catalog specifications sheets.

SD-10 Operation and Maintenance Data

Food Service Equipment

Six complete copies of the service manual, not later than 3 months prior to the date of beneficial occupancy, with data for each different item of material and equipment specified.

1.4 DELIVERY AND STORAGE

1.4.1 Delivery

Unless otherwise directed, the following procedures shall apply:

a. Field assembled fixed equipment integrated into structure shall be sent to jobsite when required.

b. Fixed equipment not integrated into structure shall be sent to the jobsite after completion of finished ceilings, lighting, and acidizing of the finished floor and wall systems, including painting.

c. Major movable equipment shall be delivered to inventory in a secured area for interim jobsite storage, or if secured area is not available, when fixed equipment installation/clean-up has been completed.

d. Minor appliances and loose items shall be delivered to the jobsite when the Contracting Officer is prepared to receive and inventory such items.

1.4.2 Storage

Items delivered and placed into storage shall be stored with protection from weather, humidity, and temperature variation, dirt and dust, or other contaminants.

1.4.3 Protection of Fixed/Fabricated Manufactured Equipment

Fiberboard or plywood shall be taped to surfaces as required by equipment shape and installation access requirements.

1.4.4 Prohibited Use of Equipment

Food service equipment shall not be used as tool and material storage, work bench, scaffold, or stacking area.

1.4.5 Damaged Equipment

Contractor shall immediately submit documentation to the Contracting Officer with a recommendation of action for repair or replacement and the impact on project schedule.

1.5 DETAIL DRAWINGS

Data consisting of a complete list of equipment and materials shall be submitted. Detail drawings showing complete wiring, piping, and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work, including clearances for maintenance and operation.

a. Detail drawings by Contractor shall be separate drawings and shall be the Contractor's standard sheet size, but not smaller than the contract drawings, and indicate the food service equipment and cold storage assemblies with itemized schedule, and special conditions drawings indicating size and location of slab depressions, cores, wall

openings, blockouts, ceiling pockets, blocking grounds, ceiling, wall, access panels, and above ceiling hanger assemblies, rough-in plumbing/mechanical systems and rough-in electrical systems.

b. Detail drawings by manufacturer shall be separate drawings; sheet size shall be manufacturer's standard size and indicate item number, name, and quantity, construction details, sections, and elevations, adjacent walls, columns, and equipment, plumbing and electrical schematics, and fabricated fixtures with single electrical or plumbing connection, and service access panels required for maintenance or replacement of mechanical or electrical components.

c. Detail drawings by the Contractor that show the size, type, and location of equipment drain lines, and floor drains. Drawings shall indicate drain lines from equipment, distances of drain lines and floor drain receptacles from equipment and aisles, and elevation views of drain piping and floor drains.

PART 2 PRODUCTS

2.1 MATERIALS

The Contractor shall comply with EPA requirements in accordance with Section 01670 RECYCLED/RECOVERED MATERIALS. Other materials shall conform to the following:

2.1.1 Stainless Steel, Nonmagnetic

ASTM A 167 or ASTM A 240/A 240M: 18-8, 300 Series, austenitic, polished to No. 3 or 4 finish on exposed surfaces.

2.1.2 Stainless Steel Pipe and Tubing

ASTM A 269. Pipe and tubing shall be seamless or welded, of the gauge specified, of true roundness, and of material as specified for stainless steel. Seamless tubing shall be thoroughly annealed, pickled, and ground smooth. Welded tubing shall be thoroughly heat-treated, quenched to eliminate carbide precipitation and then drawn true to size and roundness, and ground. Tubing shall be given a No. 3 or 4 finish when exposed to view.

2.1.3 Galvanizing Repair Compound

ASTM D 520, Type I pigment.

2.1.4 Brazing Material

AWS A5.8/A5.8M, class shall be as applicable.

2.1.5 Steel Structural Shapes for Framing

ASTM A 36/A 36M. Structural shapes shall be uniform, ductile in quality, and shall be free of hard spots, runs, checks, cracks and other surface defects. Sections shall be galvanized by the hot-dip process, conforming to ASTM A 123/A 123M.

2.1.6 Coatings

Coatings shall be of a durable, nontoxic, nondusting, nonflaking, and mildew-resistant type, suitable for use with food service equipment and in

conformance with NSF 2. Application shall be in accordance with the recommendations of the manufacturer.

2.1.6.1 Exterior Parts

Exterior, galvanized parts, exposed members of framework, and wrought steel pipe, where specified to be painted, shall be cleaned, and free of foreign matter before applying a rust inhibiting prime and two coats of epoxy-based paint in accordance with Section 09900 PAINTS AND COATINGS, unless otherwise specified. Color shall be selected by the Contracting Officer from manufacturer's standard colors.

2.1.6.2 Solder Material

ASTM B 32, Sn96.

2.2 COUNTERS

Counters shall be constructed in accordance with applicable portions of NSF 2.

2.2.1 Counter Tops

Counter tops shall be constructed of 14 gauge stainless steel with all seams and corners welded, ground smooth, and polished.

2.2.2 Counter Edges and Backsplashes

2.2.2.1 Counter Edges

Counter edges shall be one of the following types:

a. Turned Down: Two inch at 90 degrees with 3/4 inch tight hem at bottom. Free Corners shall be rounded on 3/4 inch radius.

b. Marine Edge: Turned up 1/2 inch 45-degree angle and turned down 2 inch at 135 degree angle with 3/4 inch tight hem at bottom.

c. Rolled Rim: Coved up 3 inch with 1-1/2 inch wide rim rolled 180 degrees and turned down to table top; hem edges, and bullnose corners.

2.2.2.2 Counter Backsplash

Counter backsplash shall be:

Turned up 6 inch at 90 degrees on 5/8 inch radius with edge turned back 1 inch at 90-degree angle with 1 inch turn down at 90 degrees at rear of splash with the ends closed to the bottom of the top turn down. Splash turn down shall be secured to wall with 4 inch long, 14 gauge stainless steel "zee" clips anchored to wall, 36 inch on center.

2.2.3 Sound Deadening of Counters and Sinks

Counter tops and sinks shall be sound deadened with 1/2 inch wide rope sealant positioned continuously between all contact surfaces of the frame-members and the underside of counter top, overshelves and undershelves. Stud bolts shall be tightened for maximum compression and

the excess sealant trimmed.

2.3 COUNTER BASES

Counter bases shall be open or closed as indicated.

2.3.1 Closed Bases

Closed bases shall be constructed with 1-1/2 by 1-1/2 inch, 1/8 inch galvanized steel angle with all corners mitered, welded, and ground smooth. Horizontal and vertical angles shall be provided on 24 inch centers or less. The enclosure panels on closed bases shall be of 18 gauge stainless steel. Joint trim on enclosed bases shall be 2 inch wide, 14 gauge stainless steel, attached with concealed stud bolts and sealed to interior partition. Enclosed bases shall be double walled on interior, exposed ends, and at interior exposed partitions. Service access shall be provided for utilities supplying equipment designed to fit atop the counter.

2.3.2 Open Bases

Open bases shall be constructed of 1-5/8 inch outside diameter, 16 gauge stainless steel rails welded 360 degrees to the legs.

2.3.3 Gussets

Gussets shall be stainless steel, fully enclosed, a minimum of 3 inch in diameter at the top, reinforced with a bushing, and shall be continuously welded to channel or angle.

2.3.4 Legs

Legs shall be of 16 gauge, 1-5/8 inch outside diameter stainless steel tubing. Legs shall be continuously welded to gussets, channel, or angle as specified.

2.3.5 Feet

Feet shall be sanitary, die-stamped stainless steel bullet-shaped, fully enclosed and shall provide for a 1 inch adjustment without threads being exposed. The bottom of the legs shall be finished off smoothly and the stem overlapped to provide a sanitary closed fitting. Feet for free-standing fixtures requiring utility connections shall be as above except with a flanged plate at the bottom which shall be anchored to the floor with noncorrosive bolts.

2.3.6 Undercounter Shelving

2.3.6.1 Open Base Shelves

Open base shelves shall be constructed of16 gauge stainless steel with all edges turned down 1-1/2 inches at 90 degrees with a 3/4 inch tight hem at bottom. Corners shall be notched a full 90 degrees and welded from underside to completely fill the gap, ground and polished. Undershelf shall be braced with 1 by 4 inch, 14 gauge stainless steel channel at longitudinal center line and between each intermediate pair of legs.

2.3.6.2 Closed Base Shelves

Interior shelves on closed bases shall be constructed of 16 gauge stainless

steel. Side edges of the shelf shall be turned up 2 inch at 90 degrees on a 1/4 inch radius and sealed to the side walls. Rear of the shelf shall be coved up at 90 degrees on a 5/8 inch radius to shelf above or counter top, flanged out for attachment with no open space at interior. Vertical joints shall be sealed. Front edge shall be turned down 2 inch at 90 degrees with a 3/4 inch tight hem. The vertical seam of shelf turn down/turn up shall be welded to the face of body partition. Maximum depth of shelves shall be 22 inch. Shelves shall be reinforced with 1 by 4 inch, 14 gauge stainless steel closed hat channel. Shelf slides, where indicated, shall be 14 gauge stainless steel, 1-1/2 by 1-1/2 inch angles, and shall have front and back corners rounded and finished smooth.

2.3.7 Protector Shelf

2.3.7.1 Protector Glass

Protector glass sheet shall be no less than 1/4 inch thick in transparent, tempered plate glass or heat- and mar-resistant clear acrylic framed in an all welded stainless steel channel edging and shall be installed under the protector shelf and in front of the food display. At the top and bottom of the installed glass shall be a 1 inch space for vapor venting. The protector glass or clear acrylic shall be pivoted for easy cleaning. Design shall be such that glass or clear acrylic can be replaced in the event of breakage.

2.4 SINKS

Sink shall be of the dimensions indicated and conform to the applicable requirements of NSF 2. Sinks shall be constructed of a minimum of 14 gauge stainless steel. Vertical and horizontal corners shall be rounded to a radius of not less than 3/4 inch with double walls at partitions. Continuous 14 gauge stainless steel exterior filler panels shall be provided between compartments of multiple-compartment sinks and shall be ground and polished to match the adjacent surfaces. The sink bottom shall be scored and sloped to assure drainage to the waste outlet. Sinks shall be equipped with waste and overflow fittings, drain plugs with quick-opening valves, and faucets of the type specified. Faucet and drain plug, and overflow fitting shall be required for each sink compartment, unless otherwise indicated. Spout outlet of faucets shall be a minimum of 5 inches above the rim of the sink. Sink legs shall be as specified for counters, except that closed gussets shall be welded to the support channels. Sinks installed adjacent to walls or enclosures shall be anchored and sealed thereto. Sinks shall be sound-deadened as specified for counters.

2.4.1 Plumbing/Trim Requirements

2.4.1.1 Drain Plug and Overflow Fittings

Drain shall consist of a 1-1/2 inch quick opening brass body valve with side outlet overflow connection with a stainless steel twist lever handle. Removable perforated stainless steel strainer plate shall be not less than 3 inch in diameter. Overflow fittings shall consist of 1-1/4 inch diameter chrome-plated brass tubing of not less than 0.036 inch thickness connected to an overflow head in the back of the sink compartment. Overflow head shall have a removable perforated chrome-plated brass or stainless steel strainer plate of not less than 1-1/2 inch diameter. Overflow head shall be installed in die-stamped opening 1 inch below counter top.

2.4.1.2 Backsplash-Mounted Faucets

Backsplash-mounted faucets shall be combination fitting-type with an exposed body and concealed supply connections at the back of the sink. Fitting shall have a swinging spout of approximately 8 inches in length and inlets with 3/4 inch pipe thread. Faucets shall have adjustable flanges. Valves shall have indexed metal lever handles and replaceable seats.

2.4.1.3 Counter Top or Ledge-Mounted Faucets

Counter top or ledge-mounted faucets shall be combination fitting-type with a concealed body and with the supply connections under the sink ledge or counter top. The faucets shall have replaceable valve seats, swinging spout elevated to clear valve handle, and four-arm or lever-style indexed metal handles. Chrome-plated copper alloy or stainless steel escutcheons for valves and spout, locknuts and washers or lock-nut type escutcheons together with coupling nuts, and 1/2 inch pipe size union-tailpieces shall be provided.

2.4.1.4 Control Valve Mountings

Gusset-shaped 14 gauge stainless steel panel for the control valves shall be mounted on open base fixtures with 3-1/2 inch setback from the countertop edge/rim to the valve handle.

2.4.2 Pot Washing Sinks

2.4.2.1 Temperature Gauge

Temperature gauge shall have a 3 inch diameter face with stainless steel flange.

2.4.2.2 Valves, Temperature Gauge, and Controls Mounting

Valves, temperature gauge, and controls shall be installed in a stainless steel recessed panel, ready for final connections. A perforated stainless steel casing shall be provided over the temperature bulb.

2.5 EXHAUST HOODS OVER COOKING EQUIPMENT

Hoods and duct work systems shall conform to ACGIH-2092S, NFPA 96, and SMACNA HVAC Duct Const Stds. Hoods shall be U.L. listed per UL 710 and NSF approved. These standards represent only the minimum requirements; subsequent subsections of this clause may require construction that exceeds these minimum requirements. Unless otherwise specified, ducts and hoods shall be secured to building so as to be level and free from vibration under all conditions of operations.

2.5.1 Hood Support

Wall mounted or island type hoods shall be supported from the structure with stainless steel mounting brackets provided with hoods. Hanger rods shall be 1/2 inch diameter stainless steel, threaded at the bottom and designed at the top to fit into inserts in building slats above or shall have hanger attachments fastened to structural steel members. Hanger rods shall be spaced 48 inch on center, maximum.

2.5.2 Integral Make-up Air System

Hood shall be provided with an integral make-up air system which automatically replaces the air volume that is exhausted by the hood. The make-up air system shall be in accordance with NFPA 96. Air supplied upstream of the hood suction opening does not qualify as make-up air. The exhaust air flow rate for ventilation of cooking equipment shall be drawn through the open area between cooking surfaces and the perimeter entrance of the hood. Make-up air diffusers shall be provided at the front panel and at the exterior length of the hood producing a low velocity discharge. The supply air plenum shall have a 1 inch thick foil-faced fiberglass insulation at the interior of the plenum. The temperature differential between the make-up air and the air in the conditioned space shall not exceed 10 degrees F, except for air that is part of the air-conditioning system or air that does not decrease comfort conditions of the occupied space.

2.5.3 Hood Lights and Wiring

Fixtures shall be U.L. Listed, recessed mounted, vapor proof fluorescent fixtures located along the full length of hood. The light fixtures shall be prewired to junction box on top of the hood. Regular or deluxe cool-white T-8 energy efficient fluorescent lamps shall be supplied. Hoods shall be factory prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with inter-connecting junction boxes for field connection of light fixtures.

2.5.4 Closure Panels

Vertical corner mullions, at removable closure panels, shall be 2 by 2 inch wide, 16 gauge stainless steel, and shall be welded integrally to the furring and head channel. Exhaust hood closure panels shall be 1/2 inch pan-formed, 18 gauge stainless steel. Upper edge of panels shall be retained in 1 by 2 inch continuous 16 gauge stainless steel head channel secured to the hood superstructure. Lower edge of panels shall be mounted on perimeter furring cap, and shall be turned back 1 inch and flanged up 1 inch for "zee" clip retention.

2.5.5 Wall Panels

Wall panels shall be 18 gauge stainless steel. Lower edge and sides shall be leveled and squared. Panels shall have butt joints.

2.5.6 Hand Held Fire Extinguishers

Hand held fire extinguishers shall be located at each exhaust hood and shall be suitable for gas, electric, and grease fires.

2.5.7 Filter Type Hoods

Filter type hoods over cooking equipment shall be of canopy or noncanopy construction, UL listed, NSF approved, pre-engineered, and factory fabricated. Hoods shall be constructed of 18 gauge stainless steel. Internal hood joints, seams, filter support frames, and appendages attached inside the hood shall be sealed or otherwise made grease tight. Internal joints, seams, filter support frames and appendages shall be mechanically sound and sealed grease tight in accordance with the hood manufacturer's listing procedure and NFPA 96. Hoods over 12 feet in length shall be provided in multiple, equal-length sections for mounting end to end; no

section shall be less than 6 feet in length. Hoods comprised of multiple sections shall be factory preassembled and shall be provided with predrilled mounting holes and stainless steel fasteners. Welded field joints inside the capture area and exposed to view shall be ground and polished to match the adjacent finish. UL listed full joints shall be provided per terms of the manufacturer's listing. Hoods shall be factory prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with junction boxes for field connection.

2.5.7.1 Canopy Hoods

Canopy hoods shall completely cover the cooking equipment. The hood shall overhang the cooking equipment a minimum of 6 inches at each end and 12 inch in front of the equipment. Exhaust air volumes for hoods, wall or double island type, shall be a minimum of 100 cfm per square foot of suction opening, to provide for capture and removal of grease-laden cooking vapors, except when over wood, charcoal, and grease-burning charbroilers, which shall be a minimum of 200 cfm per square foot of suction opening. Exhaust air volumes for single island type hoods shall be a minimum of 150 cfm per square foot of suction opening, to provide for capture and removal of grease-laden cooking vapors, except when over wood, charcoal, and grease burning charbroilers, which shall be a minimum of 300 cfm per square foot of suction opening. Test data or performance acceptable to the authority having jurisdiction over both shall be provided and displayed.

2.5.7.2 Noncanopy Hoods

Noncanopy hoods shall be located a maximum of 36 inch above the cooking surface; the edge of the hood shall be set back a maximum of 1 foot from the edge of the cooking equipment. Exhaust air volume for the hood shall be a minimum of 300 cfm per linear foot of cooking surface to provide for capture and removal of grease-laden cooking vapors. Test data or performance acceptable to the Contracting Officer shall be provided and displayed.

2.5.7.3 Grease Filters

Grease filters shall be in accordance with UL 1046. Filters shall remove heat, odor, smoke, residue, and grease vapors from the exhaust of the applicable cooking process. Filter design shall result in optimum air velocity for the removal of residues and grease. Construction shall be stainless steel in an overlapping staggered arrangement to restrict the passage of flame upstream of the filter media.

2.5.8 Grease Extracting Type Hoods

Grease extracting exhaust hoods shall be pre-engineered, factory fabricated and assembled with built-in washdown systems. Grease extracting exhaust hoods shall be of the size and type as indicated and shall be welded to the exhaust ductwork as required by NFPA 96. Hoods shall have a minimum grease extracting efficiency of 95 percent to be accomplished without the use of filters, cartridges or constant running water.

2.5.8.1 Construction

Construction shall be entirely of stainless steel. Grease extraction chamber and exhaust capture chamber shall be not less than 18 gauge stainless steel. Seams or joints that direct and capture grease laden vapors shall be continuously welded, with the weld ground and polished to

match the adjacent finish where exposed. The vertical joint where the front outside face of the hood meets the end panel of the hood shall be continuously welded, with the weld ground and polished to match the adjacent finish. Joints, seams, extractor chambers, and appendages shall be mechanically sound and sealed grease tight in accordance with the hood manufacturer's listing procedure and NFPA 96. Hoods over 12 feet in length shall be provided in multiple, equal-length sections for mounting end to end; no section shall be less than 6 feet in length. Hoods comprised of multiple sections shall be factory preassembled and provided with predrilled mounting holes and stainless steel fasteners. Welded field joints inside the capture area and exposed to view shall be, ground and polished to match the adjacent finish. Hoods shall be factory preplumbed and prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with unions and junction boxes for field connections. Grease extracting exhaust hoods shall be of the overhead type suitable for wall or ceiling mounted island-type. Steel mounting brackets shall be provided by the manufacturer.

2.6 CONDENSATE HOODS

2.6.1 Ducts at Dishwashing Machines

Ducts at dishwashing machines shall consist of two vertical ducts, one at each end of the dishwasher. Exposed, seamless, ducts shall be constructed of not less than 18 gauge stainless steel and shall be sized to accommodate the machine exhaust vent. The intake of each duct shall be at the top edge of the dishwasher and the ducts shall extend to 6 inch above the finished ceiling for final connection. The duct shall be trimmed at the ceiling with a 16 gauge stainless steel angle flange with corners welded. The exhaust outlet shall be connected to the exhaust system.

2.7 PREFABRICATED WALK-IN REFRIGERATORS

Refrigerators shall be prefabricated, commercial, walk-in type suitable for the intended use. Mercury shall not be used in thermometers. Units shall conform to UL 207, UL 471, and NSF 7 floor panel design type and size as indicated, and the following:

2.7.1 Miscellaneous Requirements

2.7.1.1 Closure Panels

Closure panels and/or trim strips to the building walls and ceiling shall be installed with concealed attachments. Closure/trim shall be of the same material as the wall panels unless otherwise noted.

2.7.1.2 I-Beam Supports

Wherever compartment dimension exceeds the clear-span ability of ceiling panels, I-beam supports shall be provided on the exterior of the ceiling or supported by spline-hangers. Half inch diameter steel rods shall be installed through beam/hangers and secured to the structure above. Beams or posts within compartments will not be acceptable.

2.7.1.3 Identification Signs

Engraved phenolic plastic compartment identification signs 12 by 2 inch high in selected color with 1 inch high letters shall be mounted on door.

2.7.1.4 Door

Door panels inner and outer skins shall be of finished stainless steel skins. Doors shall be filled with insulation 4 inch thick. Hardware shall be stainless steel.

2.7.1.5 Strip Curtains

Transparent flexible vinyl reinforced strip curtains shall be provided which are anchored at top and able to be replaced individually. Strips shall be a minimum of 8 inch in width and 0.08 inch thick.

2.7.1.6 Door Stops

Door stops shall be provided, where necessary, to prevent walk-in refrigerator doors from striking adjacent walls, plumbing fixtures or food service equipment when door is open.

2.7.1.7 Gasket

Gasket material shall be either natural or synthetic rubber and conform to NSF 2. Where frames are used, the panels shall fit together with gaskets that are designed for 50 percent compression.

2.7.1.8 Alarm System

An alarm system shall be provided consisting of a controller, pilot and warning lights, and audible alarm as specified by the manufacturer. The controller shall be equipped with normally-open and normally-closed contacts for remote monitoring of the temperature warning alarms and the power-off conditions.

2.7.2 Floor

2.7.2.1 Prefabricated Floor Panels

Prefabricated floor panels shall be of the same construction as wall/ceiling except with 14 gauge galvanized skin, sealed watertight. One hard-alloy aluminum tread plate, 3/16 inch thick, with all joints caulked, shall be field applied with 3/4 inch plywood underlayment. Nonskid floor strips shall be 4 by 36 inch and shall be field applied at 12 inch spacing in all aisles. Prefabricated floor panels which are layed on, shall have sloping interior floor ramps at exterior entrance doors. Two sets of erection tools, compatible with fasteners, shall be furnished with each unit.

2.8 DRAIN TRENCH LINER/GRATING

Drain trench liner/grating shall be of 14 gauge stainless steel in sizes as indicated with a 1 inch wide perimeter shoulder at the top, turned up flush and level with finished floor, tight-hemmed back down to the shoulder level and flanged out 2 inch for attachment to the slab.

2.8.1 Interior of the Liner

Interior of the liner shall be 6 inch deep with corners coved on 3/4 inch radius; sloped and scored 1 inch to an integrally welded box pattern drain (drain housing only). Drains shall be at 48 inch on center maximum and shall be fitted with 6 inch long welded tailpiece. A safety chain shall be

connected to the basket strainer assembly and the top of the liner wall. Underside of sloping portion of liner shall have 2 inch long "zee" clips.

2.8.2 Stainless Steel Grating

stainless steel grating shall be removable, without the use of tools, with 1-1/2 by 3/16-inch bearing bars and a perimeter frame. Close bearing bars shall have a 1-5/16 by 4 inch centerline to centerline grid. Section quantities and sizes shall be as indicated on the drawings with a maximum of 24 inch long sections.

2.9 ELECTRICAL WORK

Electrical systems, components and accessories shall be certified to be in accordance with NFPA 70 and the following:

2.9.1 Installed Equipment Load

Should the electrical load of the approved equipment differ from that specified or shown on the drawings, the Contractor shall provide and install electrical service compatible with the approved equipment.

2.9.2 Electrical Equipment and Components

Food service equipment furnished under this section shall have loads, voltages, and phases compatible with building system, and shall conform to manufacturer standards.

2.9.3 Cords and Caps

Food service equipment cord/caps shall be coordinated with related receptacles. All 120/208/240 volt "plug-in" equipment shall have Type SO or SJO cord and a plug with ground, fastened to frame/body of item. Mobile equipment shall have a strain-relief assembly at the cord connection of the appliance. Mobile electrical support equipment (heated cabinets, dish carts, etc.) and counter appliances mounted on mobile stands (mixers, food cutter, toaster, coffee makers, microwave ovens, etc.) shall have cord/cap assembly with cord-hanger as provided by the manufacturer.

2.9.4 Switches and Controls

Each motor-driven appliance or electrically-heated unit shall be equipped with control switch and overload protection per UL 197 and UL 471. Switches, controls, control transformers, starters, equipment protection and enclosures shall be Industry standards for the equipment environment.

2.9.5 Motors

Motors at 120, 240, 208/240 and 460/480 volts shall have starter with overload protection and short circuit motor protection per manufacturer standards.

2.9.6 Heating Elements

Electrically-heated equipment shall have thermostatic controls. Water heating equipment shall be equipped with a positive low-water shut-off.

2.9.7 Receptacles and Switches

Receptacles which are located in vertical panels of closed base bodies shall be installed in 12 by 8-1/2 by 3 inch deep recessed mounting panel sloped on a 60-degree angle and turned up to the top of the opening. Receptacles which are located in closed base fixtures shall be prewired to a junction box located within 6 inch from the bottom of the utility compartment. Receptacles which are installed in/on fabricated equipment shall be horizontally-mounted in a metal box with a stainless steel cover plate.

2.9.8 Light Fixtures

Light fixtures with lamps which are installed in/on fabricated or field-assembled equipment shall be prewired to a junction box for final connection (fixtures shall be continuous run when indicated). Fluorescent display light shall be installed the full-length of the display stand and serving shelf with stud bolts or as indicated, and shall be prewired through a support post to a recess-mounted switch. Heat lamps shall be installed to underside of serving shelf assemblies as specified. Heat lamp length for chassis shall be sized per manufacturer or as indicated on the drawings. Cold storage light fixtures shall be electrically connected through the hub fitting located on the top of the fixture. Horizontal conduit shall be above the ceiling panels. Plastic sleeves shall be installed through ceiling panels for electrical conduit and the penetrations shall be sealed airtight at both sides of panel.

2.9.9 Final Electrical Connection Provisions

Final electrical connection points of equipment shall be tagged with item number, name of devices on the circuit, total electrical load, voltage, and phase. Fabricated equipment containing electrically-operated components or fittings, indicated on utility connections drawings to be direct-connected, shall have each component, fitting, or group thereof prewired to a junction box for final connection. Refer to the drawings for circuit loading. Field-assembled equipment (example, prefabricated cold storage assemblies, conveyor systems, exhaust hoods) shall have electrical components completely interconnected by this section for final connection as indicated on utility connection drawing. The following groups of cold storage assembly electrical devices shall be prewired to a top-mounted junction box for final connection per compartment grouping, unless otherwise indicated.

a. Light fixtures, switches, and heated pressure-relief vent.

b. Door/jamb heater and temperature monitors/alarms.

c. Evaporator fans, defrost elements, freezer fan door switch, and drain line heaters.

2.9.10 Lamps

Food service equipment containing light fixtures shall have standard appliance type bulbs or energy efficient appliance type bulbs as indicated on the drawings. Exposed fluorescent lamps above or within a food zone shall have plastic coated T-8 energy efficient lamps or standard lamps, sleeved in plastic tube with end caps.

2.9.11 Steam Connection Provisions

Steam-injected equipment shall have a steam inlet globe control valve with cold handle, relief valve, strainer, condensate gate valve, bucket steam trap, and swing check valve. Compartment steam cookers shall have piping manifolded from all compartment exhaust valves to a floor drain, floor sink, or drain trench. Steam generators specified within this section shall have automatic boiler blowdown and a cold water condenser. Separate equipment, devices or components indicated to be connected to a steam-generator, provided under this section, shall be provided with all unions, ells, gate valves, nipples, brackets, clamps, etc., required for the complete operating system for final connection. The steam supply piping shall be insulated with 1 inch fiberglass insulation (3 pounds/cubic foot density) and shall have factory-applied fire retardant. A full-length 16 gauge stainless steel pipe enclosure with sloping top, jacket, and vapor barrier shall be installed over steam lines.

PART 3 EXECUTION

3.1 INSTALLATION

Equipment shall be installed at locations shown in accordance with NSF Product Listing and the manufacturer's written instructions. The Contractor shall make provision for the plumbing, heating, and electrical connections and for equipment indicated as being furnished and installed by the Government.

3.1.1 Equipment Connections

Equipment connection to utilize is the responsibility of the elect.

3.1.2 Backflow Preventers

Backflow preventers shall be furnished as specified in Section 15400 PLUMBING, GENERAL PURPOSE. The Contractor is responsible to install backflow preventers as shown on the contract drawings and at all other locations necessary to preclude a cross-connect or interconnect between a potable water supply and any source of nonpotable water, or other contaminant. Backflow preventers shall be installed at all locations where the potable water outlet is below the flood level of the equipment, or will be located below the level of the contaminant. Backflow preventers shall be provided of sufficient size to allow unrestricted flow of water to the equipment, and preclude the backflow of waste or other contamination into the potable water system.

3.1.3 Plumbing Work

Plumbing final connection points of equipment shall be tagged, indicating item number, name of devices or components, and type of utility (water, steam, drain). Extensions of indirect waste fitting shall be provided to open-sight hub drain, floor sink or floor drains from food service equipment.

3.2 CONSTRUCTION OF FABRICATED EQUIPMENT

3.2.1 Grinding, Polishing, and Finishing

Exposed welded joints shall be ground smooth and finished to match the adjoining material. Wherever materials have been depressed or sunken by

welding operation, such depressions shall be hammered and peened flush with the adjoining surface, and again ground to eliminate high spots. Ground surfaces shall then be polished or buffed to match adjoining surfaces. Care shall be exercised in the grinding operations to avoid excessive heating of the metal and metal discoloration. Abrasives, wheels, and belts used in grinding shall be free of iron and shall not have been used on carbon steel. In all cases, the grain of rough grinding shall be removed by several successively finer polishing operations. The texture of the final polishing operation shall be uniform, smooth, and consistent. The grain direction of horizontal stainless steel surface shall be longitudinal, including the splash back. Polishing at right angle corners shall provide a mitered appearance. Butt and contact joints shall be close fitting and not require solder as a filler. Wherever brake bends occur, the bends shall be free of open texture or orange peel appearance. Where brake work does mar the uniform appearance of the material, such marks shall be removed by grinding, polishing, and finishing. Sheared edges shall be free of burrs, projections, and fins. Where miters or bullnosed corners occur, such miters and corners shall be finished with the underage of the material and ground to a uniform condition. Overlapping of material is not acceptable. Exposed stainless steel surfaces shall have a No. 3 or 4 finish. Finishes of materials, other than stainless steel, shall be comparable in appearance to commercial mill finish. Exposed surfaces shall include:

a. Exterior surfaces exposed to view.

b. Interior surfaces exposed to view in doorless cabinets.

c. Undersides of shelves shall have a ground finish of No. 90 grit or finer.

3.2.2 Fastening Devices

Fastening devices shall be of the same material as the metal being joined when joint pieces are of similar metal. Fastening devices shall be stainless steel when stainless steel is joined to dissimilar metal. Stud bolts shall be a minimum of 1/4-20 stainless steel with length necessary to accept washers, and required nuts, and shall be welded 9 inches on center maximum. Exposed surfaces of equipment shall be free of bolts, screws, and rivet heads. Stainless steel stud bolts shall be used to fasten tops of counters or tables to angle framing and trim to other surfaces. Such bolts shall be of the concealed type. Threads of stud bolts which are on the inside of fixtures and are either visible or might come in contact with a wiping cloth, shall be capped with chrome plated washers, lock washers, and chromium-plated brass cap nuts. Wherever bolts are welded to the underside of trim or tops, the reverse side of the welds shall be finished uniform with the adjoining surface of the trim or the top. Dimples at these points will not be acceptable.

3.2.3 Welding

3.2.3.1 Welding Rods

Welding shall be done with welding rods of the same composition as the sheets or parts welded.

3.2.3.2 Weld Quality

Welds shall be strong and ductile. Welds shall be free of imperfections

such as pits, runs, spatter, cracks, low spots, voids, and shall be finished to have the same color as the adjoining surfaces. Butt welds made by welding straps under seams, or by filling in with solder, or by grinding will not be acceptable. Welded joints shall be homogeneous with the sheet metal. Spot welding shall not be substituted for continuous welding. Joints in tops of counters, tables, drainboards, exposed shelving, and sinks shall be joined by heli-arc welding or a process other than carbon-arc welding or one that will permit carbon pick-up. Joints shall be fully welded. Counter tops shall be factory welded into lengths as long as practical in order to reduce field welded joints to a minimum. Exposed welds shall be ground smooth, flush with adjacent surface and free of burrs and sharp edges. Wherever welds occur on nonfood contact surfaces not suitable for grinding or polishing, such welds and the accompanying discoloration shall be sandblasted and coated in the factory with a nontoxic metallic-base paint. Bolts and screws shall be welded by a process that will minimize the possibility of carbide precipitation. Welds in galvanized steel made after galvanizing, and the adjacent areas where galvanizing is damaged, shall be cleaned and coated with galvanizing repair compound.

3.2.4 Soldering

Soldering shall serve only as a filler to prevent leakage and shall be made with solder material. Stainless steel requiring soldering shall first be cleaned of discoloration and then have a soldering flux applied. Excess or remaining flux and catalytic material shall be removed after the soldering has been completed, and the entire soldered joint and adjacent metallic surfaces shall be cleaned with a liquid alkaline or neutralizing agent to prevent any attack on the surrounding metallic surfaces by the soldering flux.

3.2.5 Brazing

Brazing shall be accomplished with brazing material. Brazing shall be used only on copper tubing to brass and bronze connection fittings.

3.3 TESTING

Equipment shall be inspected and tested under operating conditions after installation. If inspection or test shows defects, such defects shall be corrected, and inspection and test shall be repeated. Refrigerator tests shall include the following:

3.3.1 Clean and Adjust

Debris resulting from this work, as the installation progresses, shall be removed from the jobsite. All food service equipment, prior to demonstration, shall be cleaned and polished, both interior/exterior. Drawer slides and casters shall be lubricated and adjusted. Pressure regulating valves, timed-delay relays, thermostatic controls, temperature sensors, and exhaust hood grilles shall be adjusted, as required, for proper operation. Faucet aerators and line strainers shall be cleaned or replaced. Damage to painted finishes shall be touched up.

3.3.2 Equipment Start-Up/Demonstration

The Contractor shall obtain the services of the manufacturer's representative experienced in the installation, adjustment and operation of the equipment specified. The representative shall supervise the start-up,

adjustment, and testing of the equipment, prior to the demonstration. Selected items of equipment and attendees shall be scheduled, with the Contracting Officer, at least 2 weeks in advance of demonstration periods. Equipment shall be carefully tested, adjusted, and regulated in accordance with the manufacturer's instructions and shall be so certified in writing. A thorough operational demonstration shall be provided of all equipment and instructions furnished for general and specific care and maintenance. The Contractor shall submit maintenance manuals as specified in the Sumbittals paragraph containing the following:

a. Front and rear protective covers with labeled project name.

b. Index indicating item number, quantity, description, manufacturer's name, and model number.

c. Maintenance instructions for stainless steel and plastic laminate.

d. Manufacturer's catalog specification sheets and manufacturer's detail and control drawings.

e. Manufacturer's operation manual outlining the step-by-step procedures for equipment installation, startup, basic operation features, and operation shutdown.

f. Manufacturer's maintenance manual listing routine maintenance procedures, possible breakdowns, repairs, and troubleshooting guides. The instructions shall include simplified diagrams for the equipment as installed.

g. Manufacturer's list of parts and supplies with current unit price and address of manufacturer's parts supply warehouse.

3.4 EQUIPMENT LIST

The following attached list includes a specification of all Government and Contractor-furnished kitchen equipment identified by number, as shown on the drawings.

-- End of Section --

SECTION 12485

ENTRANCE FLOOR MATS

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's product data, including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials, were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Documentation indicating distance between manufacturing facility and the project site.

SD-04 Samples

Submit manufacturer's standard color charts for Entrance and Floor Mats showing the manufacturer's recommended color and finish selections.

Submit one sample 12 inch square, assembled sections of floor mat to show corners, intersections, and other details of construction. Provide any graphics in drawing for approval.

Comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG) for installed entrance and floor mats.

PART 2 PRODUCTS

2.1 AFFIRMATIVE PROCUREMENT

Give preference to products manufactured and harvested/extracted/recovered within 500 miles of the project site.

Mats are listed in the EPA's Comprehensive Procurement Guidelines (CPG) at http://www.epa.gov/epaoswer/non-hw/procure/products/mats.htm.

EPA's recommended Recovered Materials Content Levels for Mats.

Product	Material	Percent Of Post Consumer Materials	Percent Of Total Recovered Materials
Mats	Rubber	75 - 100	85 - 100

Product	Material	Percent Of Post Consumer Materials	Percent Of Total Recovered Materials
	Plastic	10 - 100	100
	Rubber/ Plastic composite	100	100

The recommended recovered materials content levels are based on the dry weight of the raw materials, exclusive of any additives such as adhesives, binders, or coloring agents. EPA's recommendation does not preclude procuring agencies from purchasing mats manufactured from another material. It simply recommends that procuring agencies, when purchasing mats made from rubber or plastic, purchase these items made from recovered materials.

For informational purposes, a list of known sources for mats using recycled material is provided in the EPA/CPG Supplier database at http://www.ergweb2.com/cpg4review/user/cpg_search.cfm.

Note that the Contractor is not limited to these sources. A product meeting CPG recycle requirements from other sources may be submitted for the Government's approval.

Contractor must submit recycled material content data for protective flooring materials indicating compliance with affirmative procurement.

Contractor must submit total weight and volume quantities of protective flooring materials with recycle material.

2.2 TYPE OF MATS

2.2.1 Carpet-Type Mats

Provide Carpet-Type Mats of Nylon carpet. Carpet mats shall have flexible vinyl backing to form mats 3/8 inch thick with non-raveling edges. Carpet type mat shall be InterFaceFlor style Entry Level or approved equal. Carpet-type mats are to be installed on the interior at the entrance to the Operations Building.

Color of Carpet-Type Mats must be Olive 7191.

Size of Carpet-Type Mats must be 19-11/16 inch square.

2.2.2 Aluminum Mats

Provide heavy gauge 6061-T-6 aluminum mats with post-industrial recycled aluminum content of 40 percent. Provide mats with embedded frame. Mats shall be, as manufactured by Matsinc with Type VV embedded frames or approved equal.

a. Mat at entrance to Operations Building shall be Safe Track style of Foot Grille with cross-cut square surface with bolted cross supports.

b. Mats at Visitor Control Centers shall be Ultra Track style of Foot Grille with linear rails with bolted cross supports.

PART 3 EXECUTION

3.1 DELIVERY OF MATERIALS

Deliver materials to the project site in their original packages or containers bearing labels clearly identifying the manufacturer, brand name, and quality or grade.

Store materials in their original unbroken packages or containers in the area in which they will be installed.Unwrap, inspect, and place mats at indicated location.

Contractor must remove and dispose excess packing materials.

3.2 EXAMINATION

Comply with manufacture's requirements of substrates and floor conditions for location, sizes, and other conditions affecting installation of floor mats and frames.

3.3 INSTALLATION

Install only in satisfactory conditions. Comply with manufacturer's written printed instructions for recessed mat frames. Coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level. Install carpet-type units to comply with manufacturer's written printed instructions at locations indicated. Coordinate with other trades, entrance locations and traffic patterns.

-- End of Section --

SECTION 12490

WINDOW TREATMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2004) Fire Tests for Flame Propagation of Textiles and Films

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES

SD-03 Product Data

Manufacturer's product data including percentages of post-consumer recycled content and post-industrial recycled content.

Manufacturer's letter certifying that products specified as regionally manufactured materials were manufactured in a facility within 500 miles from the project site. Provide a written statement of the cost of each product.

Manufacturer's product data or MSDS for each product including printed statement of VOC content.

Window Blinds
Window Shades

Manufacturer's data composed of catalog cuts, brochures, product information, and maintenance instructions.

SD-04 Samples

Window Blinds
Window Shades

Samples of each type and color of window treatment. Provide blind slats or louvers 6 inch in length for each color. Track must be 6 inch in length. Shade material must be minimum6 by 6 inch in size.

SD-06 Test Reports

Window Shades

Fire resistance.

SD-08 Manufacturer's Instructions

Window Blinds
Window Shades

SD-10 Operation and Maintenance Data

Window Blinds
Window Shades

1.3 GENERAL REQUIREMENTS

Provide window treatment, complete with necessary brackets, fittings, and hardware. Each window treatment type must be a complete unit provided in accordance with paragraph WINDOW TREATMENT PLACEMENT SCHEDULE. Mount and operate equipment as per manufacturer's instructions. Windows to receive a treatment must be completely covered. Take measurements at the building for the proper fitting and hanging of the equipment.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver components to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated and free from dust, water, or other contaminants and has easy access for inspection and handling. Store materials flat in a clean dry area with temperature maintained above 50 degrees F. Do not open containers until needed for installation unless verification inspection is required.

1.5 FIELD MEASUREMENTS

Become familiar with details of the work, verify dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

PART 2 PRODUCTS

2.1 WINDOW BLINDS

Provide each blind, including hardware, accessory items, mounting brackets and fastenings, as a complete unit produced by one manufacturer. All parts must be one color, unless otherwise indicated, to match the color of the blind slat. Treat steel features for corrosion resistance.

2.1.1 Horizontal Blinds

Horizontal blinds shall have 1 inch slats. Blind units shall be capable of nominally 180 degree partial tilting operation and full-height raising. Blinds shall be inside mount. Tapes for slats should be braided polyester or nylon.

2.1.1.1 Head Channel and Slats

Provide head channel made of steel or aluminum with corrosion-resistant finish nominal 0.024 inch. Provide slats of aluminum, not less than 0.008

inch thick, and of sufficient strength to prevent sag or bow in the finished blind. Provide a sufficient amount of slats to assure proper control, uniform spacing, and adequate overlap. Enclose all hardware in the headrail.

2.1.1.2 Controls

The slats must be tilted by a transparent tilting wand, hung vertically by its own weight, and must swivel for easy operation. The tilter control must be of enclosed construction. Provide moving parts and mechanical drive made of compatible materials which do not require lubrication during normal expected life. The tilter must tilt the slats to any desired angle and hold them at that angle so that any vibration or movement of ladders and slats will not drive the tilter and change the angle of slats. Include a mechanism to prevent over tightening. Provide a wand of sufficient length to reach to within 5 feet of the floor.

2.1.1.3 Bottom Rail

Provide bottom rail made of steel, corrosion-resistant, with baked-on polyester paint, color coordinated with slats, and formed with a double-lock seam into a closed oval shape for optimum strength. Provide end caps to match the rail in color.

2.1.1.4 Braided Ladders

Provide braided ladders of 100 percent polyester yarn of a color to match the slat color. Space ladders a maximum of and a minimum 15.2 slats per foot of drop in order to provide a uniform overlap of the slats in a closed position.

2.1.1.5 Hold-Down Brackets

Provide universal type hold-down brackets for sill or jamb mount.

2.2 WINDOW SHADES

Roller tube must operate smoothly and be of sufficient diameter and thickness to prevent excessive deflection. Provide brackets that are appropriate for inside mount. The shade cloth must meet the performance described in NFPA 701, small scale test. Treat steel features for corrosion resistance.

2.2.1 Light Filtering Shades

Conform light filtering shades to the following: Roller tube must be steel and operate by clutch and bead operation mechanism. Provide fascia mounting brackets made of steel to support roller tube and fascia panel. Provide fascia panel channel shaped, extruded aluminum with standard enamel finish. Provide shade made from a single piece of PVC free coated fabric.

2.3 COLOR

Provide color, pattern and texture as indicated on the MATERIAL LEGEND drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers.

PART 3 EXECUTION

3.1 WINDOW TREATMENT PLACEMENT SCHEDULE

Provide window blinds on all exterior windows in the Warehouse, Vehicle Inspection Building, and Kennel.

Provide rolling shades on all windows in the Visitor control Center and on all punched windows in the Operations Building and on the curtainwall windows in Room 2E01. Provide roller shades at sloped interior glass in Rooms 2C11, 2C19, 2C20, and 2C24. No window treatment is required at the curtainwall in the Atrium and Cafeteria. No window treatment is required at the storefront entrances to the Visitor Control Center.

3.2 IDENTIFICATION

In accordance with the numbering plan, mark each opening and the corresponding window treatment with identical numbers. For multiple windows separated by mullions, the space required by each blind must be numbered separately. Use brass, aluminum, plastic, durable paper plates, or stamp to place corresponding numbers on unexposed surfaces of openings and inside or on top of the headrail track.

3.3 INSTALLATION

3.3.1 Window Blinds

Perform installation in accordance with the approved detail drawings and manufacturer's installation instructions. Install units level, plumb, secure, and at proper height and location relative to window units. Furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Do not start installation until completion of room painting and finishing operations.

3.3.2 Window Shades

Perform installation in accordance with the approved detail drawings and manufacturer's installation instructions. Install units level, plumb, secure, and at proper height and location relative to window units. Furnish and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Do not start installation until completion of room painting and finishing operations.

3.4 CLEAN-UP

Upon completion of the installation, free window treatments from soiling, damage or blemishes; and adjust them for form and appearance and proper operating condition. Repair or replace damaged units as directed by the Contracting Officer. Isolate metal parts from direct contact with concrete, mortar, or dissimilar metals. Ensure blinds installed in recessed pockets can be removable without disturbing the pocket. The entire blind, when retracted, must be contained behind the pocket. For blinds installed outside the jambs and mullions, overlap each jamb and mullion 0.75 inch or more when the jamb and mullion sizes permit. Include all hardware, brackets, anchors, fasteners, and accessories necessary for a complete, finished installation.

-- End of Section --

SECTION 12610

FIXED SEATING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 3597	(2002) Woven Upholstery Fabrics-Plain, Tufted, or Flocked

HARDWOOD PLYWOOD AND VENEER ASSOCIATION (HPVA)

HPVA HP-1	(2004) American National Standard for Hardwood and Decorative Plywood

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Placement of Standards
Installation

Drawings indicating metal thickness, fastenings, details of hinge mechanism, seat and back dimensions, proposed finish, and including seating plans showing row spacing, row lengths, the varying lateral spacing at backs and seats, back pitch, and seat widths for the various section lengths, floor pitch, and riser height, where applicable.

SD-03 Product Data

Seating System

Manufacturer's descriptive data, catalog cuts, and installation instructions.

SD-04 Samples

Seating System

Samples of upholstery, plywood, laminate, paint, and plastic finish materials and one complete chair. Fabric samples shall be of sufficient size to show color range, pattern, and finish. Chair sample may be incorporated into the installation, provided it is identified and the location noted.

1.3 DELIVERY AND STORAGE

Components shall be delivered to the site in unopened containers clearly labeled with the manufacturer's name and container contents. Materials shall be stored in a safe, dry, and clean location. Handling of items shall be in a manner that will protect the materials from damage.

PART 2 PRODUCTS

2.1 MATERIALS

Recyclable materials (seat padding, plastics, etc.) shall conform to EPA requirements in accordance with Section 01670 RECYCLED / RECOVERED MATERIALS.

2.1.1 Woven Fabric Upholstery

Woven fabric shall conform to ASTM D 3597, except that it shall be 100 percent flat nylon homespun weave. Fabric shall be treated to resist staining and soiling.

2.1.2 Polyurethane Foam

Polyurethane foam shall be high density, fire retardant, nonhardening and nonoxidizing and shall have a high resistance to alkalies, oils, grease, soaps, abrasions, moisture, mildew, and tearing.

2.1.3 Plywood

Plywood shall conform to HPVA HP-1. Face veneers for exposed surfaces shall be of Grade A hard maple. Unexposed veneers shall be sound grade hardwood or Grade A fir. All face veneers shall be not more than 1/16 inch in thickness, of clear stock, and free from imperfections.

2.1.4 Laminated Plastic Sheets

Laminated plastic sheets shall conform to NEMA LD 3, Type 1, Grade GP 50, nominal thickness 0.050 inch.

2.1.5 Molded Plastic

Molded plastic shall be high density with a minimum tensile strength of 3300 psi. Material shall be capable of withstanding outdoor temperatures ranging from plus 175 degrees to minus 50 degrees F. Pigments used shall be of such quality to eliminate painting plastic parts. Component surfaces shall have a textured finish.

2.2 SEATING SYSTEM

Components and assembly shall be free from objectionable projections or irregularities. Corners and edges shall be smooth and rounded. Bolts, nuts, and other fastenings shall be capped. Steel shall be well-formed to shape and size required. Jointing of members shall be welded, riveted, or

interlocked. Exposed welds shall be ground and dressed smooth. Casting shall be fine textured, sound, and free of pits, blow holes, and fins. Lines shall be true, accurate, and true-to-pattern with excess metal or imperfections removed. Fastening shall be concealed where possible.

2.2.1 Backs

Back assembly shall consist of an exposed, plastic rear panel with an upholstered steel front panel. Back assembly length shall be between 20 and 27-1/2 inch for a total height of 29 to 38 inch above the floor measured parallel to the back. Rear panel shall completely conceal and protect the rest of the seat assembly when in the raised position. Back shall be fixed type.

2.2.1.1 Steel Panels

Steel panels shall be fabricated from not less than 20 gauge, compound-curved, die-formed steel. The perimeter of the front upholstered panel shall be hemmed.

2.2.1.2 Plastic Panels

Plastic rear panels shall be one-piece injection molded plastic or high pressure laminated plastic adhered to hardboard or plywood. Color and texture of plastic panels shall be as selected.

2.2.1.3 Foam Padding

Polyurethane foam shall be high density, fire retardant and shall be not less than approximately 3 inch in thickness and shall be securely attached to the steel or plywood panel and completely covered with the approved upholstery material.

2.2.2 Seats

Foundation for upholstered seats shall be formed of not less than 20 gauge upholstered steel. The seat foundation shall be free from visible screws, bolts, open holes, and projections on the bottom, front, and sides. The upholstered seat unit shall be easily removable without removing the foundation unit; and the covering shall be fastened to the frame in a manner that will permit easy reupholstering.

2.2.2.1 Steel Seat Units

Upholstered steel seat unit shall be coil-spring type construction or nonsag spring-type construction. Springs shall be attached to a die-formed steel framework. Coil-spring units shall contain no less than 16 coil springs. Springs shall be connected in both directions to control spring axial depression. Nonsag spring units shall contain at least five serpentine design springs suspended under tension; cross bracing, if required, shall be welded to frame so as not to interfere with spring action. Cushions shall be polyurethane foam cemented to burlap sheeting; shall have a minimum thickness of 1-3/4 inches throughout for coil-spring type construction, and 3 inch at front edge, 1-3/4 inch at rear edge, and 1 inch throughout the other portions for nonsag spring units. Panel side covers shall be made without welts. Top and front cover shall have size boxing of fabric upholstery material.

2.2.3 Hinges

Hinges shall be a counterweight mechanism using gravity to return to the upright position or of the full compensating type, completely enclosed, totally independent, free and easy in operation, and capable of compensating for circular installation, variation in installation conditions, and unevenness of floors. Each hinge shall have a noiseless, self-rising seat device, shall rise automatically to a uniform safety position of 3/4 fold at all times, and shall fold 100 percent when additional pressure is applied, to provide additional clearance. The hinges shall have oil-impregnated, self-lubricating, metal or brass alloy bearings that will not require further lubrication, or nylon bushings. Hinges shall have a spring tension adjustment mechanism to allow manual compensation for normal wear and fatigue.

2.2.4 Standards

2.2.4.1 Floor Standards

Floor standards shall be tublar steel, sheet steel, or cast iron. The standards shall be formed to fit the floor incline so that the standards will be vertical and the hinge point will be at a height that will maintain proper relation of seat to floor. The feet shall be formed to eliminate tripping hazards and shall have holes for bolt attachment to the floor.

2.2.4.2 Riser Standards

Riser standards shall meet the requirements for floor mounted standard, except the standard shall be formed to approach the riser face at an angle to allow maximum clearance. Riser attachment shall be made through a 1/4 inch steel plate welded to the standard or on an integrally cast foundation.

2.2.4.3 Cantilevered Standards

The assembly shall be of not less than 11 gauge seamless tube-steel construction, designed to support three seats by the use of continuous horizontal rail and stanchions with floor plates welded thereto. Horizontal rails shall be provided in the longest practicable lengths with welded spliced ends centered on stanchions. Each length of horizontal rail shall be supported by not less than two stanchions. Stanchions shall be located at the center of every other seat, except at aisles where they shall be 12 inch in from aisle lines. Floor plates shall be formed to floor incline so stanchions will be vertical and hinge point at a height that will maintain proper relation of seat to floor.

2.2.4.4 Aisle and End Standards

Aisle or end standard panels shall be of the design indicated and shall have decorator panels of molded plastic. Middle standards shall be designed to match basic aisle or end standard configuration.

2.2.5 Armrests

Armrests shall be plastic.

2.2.6 Tablet Arm

Each chair shall be equipped with a fold-away tablet arm assembly. Tablet arm shall be fabricated of manufacturer's standard core material faced with

plastic laminate. All edges shall be rounded. When in a writing position, the arm shall lock firmly in place so that it cannot be accidentally disengaged. A spring actuated device shall automatically lock the folded tablet arm in position beside the seat.

2.3 COLOR

Fixed seating shall be KI Concerto with Tablet Arm. Colors shall be as follows:Frame and Armcaps: Black, Shell Back: Blue Grey, Tablet Arms: Maple, Upholstery: Pallas Textiles, Savoy 27.115.171. Color listed is not intended to limit the selection of equal colors from other manufacturers.

PART 3 EXECUTION

3.1 PLACEMENT OF STANDARDS

Standards in each row shall be placed laterally so the aisle-end standards will be in alignment as indicated on seating layout drawing. The angle of inclination of backs shall be adjusted for variations in sightlines. Seat and back attachments shall absorb inaccuracies in lateral spacing of standards at point of attachment caused by unevenness of floor. Varying lateral dimensions of backs and seats shall be in accordance with approved seating layout. Minimum width of seating unit shall be 20 inch and may be used only to complete a specific row dimension.

3.2 INSTALLATION

Installation of the seating system shall be in accordance with the seating drawings and approved installation instructions.

-- End of Section --