B C A

architecture
planning
interiors

PROJECT MANUAL – VOLUME 2

FOR THE

CAÑADA COLLEGE BUILDING 8 PHASE 2 RENOVATION PROJECT

4200 Farm Hill Boulevard
Redwood City, CA 94061

Bid Date: TBD at 2:00 pm.
Bid Number: 86570

SAN MATEO COUNTY COMMUNITY COLLEGE DISTRICT

Cañada College

BCA Project No. 07014
DSA Approval Date: May 22, 2008
Conformed Set Date: June 26, 2008

Prepared for
San Mateo Community College District
3401 CSM Drive
San Mateo, CA 94402

Bunton Clifford Associates, Inc.

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IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT

APPL 01 1 0 9 5 5 4
AC FLS SS T WANG
DATE 5/22/08

DOCUMENT 00 01 07

SEALS PAGE

CANADA COLLEGE BUILDING 8 PHASE 2 RENOVATION PROJECT
SAN MATEO COUNTY COMMUNITY COLLEGE DISTRICT

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END OF DOCUMENT

DOCUMENT 00 04 00

USER GUIDE FOR THE PROJECT MANUAL

1.1 SUMMARY

A. GENERAL: This Guide is provided as a basis for understanding the organization and use of this Project Manual.

B. DESCRIPTION:

1. Construction Documents: Defined as the written and graphic documents prepared or assembled by the Architect for communicating the design of the project and administering the contract for its construction. These include the Procurement Requirements (Invitation to Bid, Instructions to Bidders, and Proposal Forms) and the Contract Documents.

2. Contract Documents: Defined as the legally enforceable requirements that become part of the contract when the agreement is signed, these include the Contract Forms, Conditions of the Contract, Specifications, Drawings, Addenda, and Contract Modifications. They describe the proposed construction (referred to as the "Work") that results from performing services, furnishing labor, and supplying and incorporating materials and equipment into the construction.

3. Contract Forms: Include the agreement, bonds and certificates.

4. Conditions of the Contract: Define the basic rights, responsibilities, and relationships of the parties involved in the construction process.

5. Specifications: Divided into 48 Divisions, the Specifications define the qualitative requirements for products, materials, and systems and the standards of workmanship required for installation. Division 1 sections constitute the GENERAL REQUIREMENTS necessary for the Project; Divisions 2 through 48 comprise the Technical Specifications portion of the Project Manual.

6. Drawings: Graphic representations of the Work, which show the materials and their relationships to one another, including sizes, shapes, fit, location, and connections.

7. Addenda: Written or graphic documents issued to clarify, revise, add to, or delete information in the original bidding documents or in previous addenda.

8. Contract Modifications: Written instruments used to add to, delete from or otherwise modify the Work after the construction agreement has been signed

C. DIVISION 1 - GENERAL REQUIREMENTS. Division 1 of the Specifications expands on certain of the broad provisions of the Conditions of the Contract and governs the execution of all Technical Sections of the Specifications. Sections included in Division 1 specify the administrative and procedural requirements, as well as temporary facilities, required for the Project. All requirements stated in Division 1 apply to and will be in force for all subsequent Sections included in Divisions 2 through 48.

D. PRODUCT REFERENCES: Specification Section titles follow the recommendations of MASTERFORMAT 2004 edition, as published by The Construction Specifications Institute (CSI). The Section titles represent a class of product and may be stated in the singular or plural without regard to the actual quantity used on the project. The organization of product specifications by Section is not meant to define subcontracts or other divisions of work by trades.

E MANUAL FORMAT:

1. General: The first page of each Section appears as a facing (right-hand) page and is graphically defined with boldfaced Section number and title.

2. Underlined and Boldface Type: Underlining and bolding have been used in different combinations throughout the Project Manual to highlight headings and significant text. These devices have been used to assist the user in finding items of information or to emphasize the importance of certain information. No other meaning is attached to the use of boldface and underlined text.

3. Dates: The official date of issue of the Project Manual appears on the cover sheet of this Project Manual. Dates subsequent to that date on individual Section pages indicate reissue of entire Sections for clarification.

1.2 DEFINITIONS AND INTERPRETATIONS

A. WORDS AND TERMS: Those which are frequently used, with special meanings, in this Project Manual are defined in Section 01 42 00 – REFERENCES.

B. GOVERNING DICTIONARY: The definitions of words used in these Specifications, which are not defined in Section 01 42 00 – REFERENCES, the General Conditions, or in referenced standards, are as given in "The American Heritage Dictionary of the English Language".

C. SPECIFICATION LANGUAGE: These Specifications are written in the imperative mood, as defined in the Construction Specifications Institute's Manual of Practice. Imperative language is directed to the Contractor. The indicative mood is employed on occasion when such sentence structure is necessary to convey the intended meaning in a more accurate or understandable form. The text is streamlined, with the colon (:) employed as a symbol for the words "shall be", "shall have", "shall conform with", "shall comply with", or "shall meet the requirements of". The colon is also used to separate a paragraph title or heading from the text that follows.

END OF DOCUMENT

CALIFORNIA DEPARTMENT OF GENERAL SERVICES
DIVISION OF THE STATE ARCHITECT

DSA

STRUCTRUAL TESTS AND INSPECTIONS **DSA-103**

STRUCTURAL TESTS AND INSPECTIONS

Testing Laboratory:	Date:	File Number:
Name:		Application Number:

District / Owner: San Mateo County Community College District

Architect: Bunton Clifford Associates

Structural Engineer: RINNE & PETERSON STRUCTURAL ENGINEERS

The following tests and inspections, as checked, will be required as detailed in applicable specifications

	Concrete	Shotcrete	Grout	Mortar	
COMPACTED FILL					
☐ Fill material. acceptance tests	X				Test of aggregates for mix design only
☐ Compaction control. continuous	X				Suitability tests of aggregates as detailed below
☐ Compaction tests only as ordered	X				Mix designs METHOD B
☐ Bearing capacily of compacted fill					Continuous batch plant inspection
REINFORCING STEEL					Inspect placing
☒ Sample and test bar steel	X				Sample
☒ Sample and test mesh	X				Compression tests
☒ Inspect placing at job	X				Pick up samples at job
STRUCTURAL STEEL	X				Samples delivered to laboratory
☒ Sample and test as detailed below					Deliver sample forms to job site
☒ Shop fabrication inspection	X				Sample and test cement
☒ Field erection inspection					
☒ Inspection of welds – Shop					
☒ Inspection of welds – Field					
☒ Inspection of bolting – Shop					
☒ Inspection of bolting – Field					
☐ Sample and test high strength bolts and washers					
BRICK AND BLOCK					
☐ Sample and test					
☐ Test only					
☐ Inspection of placing					
☐ Core drill samples					
GLUED LAMINATED STRUCTURAL LUMBER					
☐ Fabrication inspection					
☐ Sample and test steel accessories					
☐ Inspect fabrication of steel accessories					

Suitability Tests	Concrete	Shotcrete	Mortar	Grout
☐ Sodium sulphate				
☐ Structural strength	X			
☐ Los Angeles rattler				
☐ Clay (Hydrometer method)				
☐ Reactivity tests				
☐ Volume change				

Mix Designs: Concrete, Shotcrete, Mortar or Grout

Material	Maximum Size	Compressive Strength. PSI. Minimum					
CONCRETE	1 1/2" & 3/4"	3,000					

List of structural steel members to be tested:

Provide Mill Certificate, or Test All Steel Members that cannot be Identified per CBC

Is this list continued on reverse? ☐ YES ☐ NO

Other tests and inspections. together with special instructions:

Expansion Anchors Drilled Dowels

Are these instructions continued on reverse? ☐ YES ☒ NO

Copies of reports to:

By: _____
Authorized Representative

SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

A+A COMMERCIAL INTERIORS
SAN JOSE, CA 95112
(408) 792-3818

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Demolishing designated building equipment and fixtures.
2. Demolishing designated construction.
3. Cutting and alterations for completion of the Work.
4. Removing designated items for Owner's retention.
5. Protecting items designated to remain.
6. Removing demolished materials.

1.2 SUBMITTALS

A. Section 01 32 19 - Submittal Procedures: Requirements for submittals.

B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.

C. Shop Drawings:
1. Indicate demolition and removal sequence.
2. Indicate location of items designated for Owner's retention
3. Indicate location and construction of temporary work.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

C. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

1.4 QUALITY ASSURANCE

A. Conform to applicable local code for demolition work, dust control, and products requiring electrical disconnection and re-connection.

B. Conform to applicable local code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.6 SCHEDULING

A. Section 01 32 16 - Progress Schedules and Report: Requirements for scheduling.

B. Schedule Work to coincide with new construction.

C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation and occupancy in adjoining spaces.

D. Perform noisy, malodorous, or dusty, or work:
1. Between hours as designated by Owner's representative. [to be determined].

E. Coordinate utility and building service interruptions with Owner.
1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.7 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.

D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches of any stressing tendon. Notify Architect/Engineer three days in advance of cutting post-tensioned concrete.

E. Erect and maintain weatherproof closures for exterior openings.

F. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy of adjacent Building 5 and 6.

G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

H. Provide appropriate temporary signage including signage for exit or building egress.

I. Do not close or obstruct building egress path.

J. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

3.2 SALVAGE REQUIREMENTS

A Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.

B. Tag components and equipment Owner designates for salvage.

C. Protect designated salvage items from demolition operations until items can be removed.

D. Carefully remove building components and equipment indicated to be salvaged.

E. Disassemble as required to permit removal from building.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.3 DEMOLITION

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Maintain protected egress from and access to adjacent existing buildings at all times.

C. Do not close or obstruct roadways or sidewalks without permits.

D. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.

E. Disconnect and remove designated utilities within demolition areas.

F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

G. Demolish in orderly and careful manner. Protect existing improvements, supporting structural members and built-in items designated to remain.

H. Carefully remove building components indicated to be reused.
1. Disassemble components as required to permit removal.
2. Package small and loose parts to avoid loss.
3. Mark components and packaged parts to permit reinstallation.
4. Store components, protected from construction operations, until reinstalled.

I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

K. Remove temporary Work

3.4 SCHEDULES

A. Remove the following equipment for Owner's retention. Deliver to location designated by Owner's Representative:
1. Designated (e) wall-mounted accessories.

B. Protect the following materials and equipment remaining:
1. Designated (e) door frames to remain.
2. Designated (e) stairs and railings to remain.
3. Designated (e) balcony guardrail to remain.

C. Demolish the following materials and equipment:
1. Designated (e) doors and hardware.
2. Designated (e) doors and door frames.
3. Designated (e) partitions.
4. Designated (e) casework
5. Designated (e) finish flooring materials.
6. Designated (e) window glazing and frames.
7. Designated (e) rubber stair tread and risers.
8. Designated (e) 12x12 acoustical ceiling tile system.
9. Designated (e) surface-mounted light fixtures.
10. Designated (e) suspended T-bar ceiling system.
11. Designated (e) lights and mechanical diffusers.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

WHITE CAP CONSTRUCTION SUPPLY
S.F. CA
(415) 821-5500

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provision of reinforcement for all concrete unless specifically noted otherwise.

B. Related Sections:
1. Section 03 10 00 - Concrete Forming and Accessories.
2. Section 03 30 00 - Cast-In-Place Concrete.
3. Section 31 63 29 - Cast-In-Place Drilled Piers.

1.2 REFERENCES

A. Requirements of the GENERAL CONDITIONS and DIVISION 01 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
1. California Code of Regulations. Title 24, 2007 edition, also known as California Building Code (CBC).
2. American Concrete Institute:
   a. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   b. ACI 318 - Building Code Requirements for Structural Concrete.
3. American Welding Society:
   a. AWS A5.1 - Mild Steel Covered Arc-Welding Electrodes.
   b. AWS D1.4 – Structural Welding Code - Reinforcing Steel.
4. ASTM International:
   a. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete.
   b. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
   c. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
5. Concrete Reinforcing Steel Institute:
   a. CRSI - Manual of Standard Practice.
   b. CRSI - Recommended Practice for Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

A. Welders' Qualifications: Welders shall be qualified in accordance with AWS D1.4

B. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete. The Contractor shall replace rust-stained concrete at his expense.

C. Allowable Tolerances: Reinforcing steel shall be placed within tolerances permitted by CBC, Section 1907A.5 unless otherwise approved by the Architect.

D. Owner's Testing Agency will provide tests in accordance with CBC Section 1929A.2.
1 Collect mill test reports for reinforcement.

2. Take samples from bundles at fabricators.
   a. When bundles are identified by heat number and accompanied by mill analysis, two specimens shall be taken from each ten (10) tons, or fraction thereof, of each size and grade.
   b. When reinforcement is not positively identified by heat numbers or when random sampling is intended, two specimens shall be taken from each 2-1/2 tons, or fraction thereof, of each size and grade.
3. Test for tensile and bending strengths.
4. Provide inspection of welding, including prior fit-up, welding equipment, weld quality and welder certification in accordance with AWS D1.4 and UBC Standard No.19-1. Chemical analysis sufficient to determine carbon equivalent and minimum preheat temperature shall be performed when reinforcement does not conform to low-alloy steel requirements of CBC Section 1903A.5.2.

1.4 SUBMITTALS

A. Shop Drawings: Show bending and placing details, size and location of reinforcing steel. Include diagrammatic wall elevations at 1/4-inch equals one foot scale to clearly show position and erection marks of bars including marginal bars around openings with dowels, splices, etc.

B. Certified mill test reports (tensile and bending) for each heat or melt of steel prior to delivery of material to the job site. Where reinforcing is to be welded, mill test reports shall verify the weldability of the steel.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement and accessories to site not more than 48-hours before placement.

B. Store in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.

C. Take precautions to maintain identification after bundles are broken.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bars: New billet steel, ASTM A615 Grade 60 or ASTM A706. Stirrups and ties #3 and smaller: Grade 40.

B. Tie Wires and Spirals: ASTM A82.

C. Welded Wire Fabric: ASTM A185.

D. Welding Electrodes: Mild steel covered arc-welding types conforming to AWS A5.1.

E. Bar Supports: As required for assembling and supporting reinforcement in place.
   1. CRSI Class 3: Where bar supports do not come in contact with exposed concrete surfaces.
   2. CRSI Class 1 plastic-protected; or Class 2 stainless steel wire: Interior and Exterior Soffits and Other Exposed Conditions:
   3. Precast Concrete Wired Block: At slabs-on-grade and as necessary at other locations.

F. Threaded coupler: Lenton Standard coupler by ERICO or equal product substituted per Section 01 62 00. Coupler shall develop the tensile strength of the spliced reinforcement.

G. Welded Deformed Bar Anchors: f_y = 70,000, flux filled deformed bar anchors. Same as Nelson D2L or equal product substituted per Section 01 62 00.

2.2 FABRICATION

A. Shop-fabricate to comply with drawings.

B. Conform to requirements of ACI 315 where specific details are not shown or where drawings and specifications are not more demanding.

PART 3 - EXECUTION

3.1 PLACEMENT

A. General:
1. Contractor shall coordinate the placement of the reinforcing indicated on the drawings to avoid interference while maintaining minimum cover requirements.
2. All reinforcement shall be continuous. See drawings for lap splice schedule. Stagger splices where possible. Contact lap splices shall be securely wired together to maintain alignment.
3. Ensure placement will permit concrete protection in conformance with CRSI or to extent shown.
4. Support and fasten bars securely with spacers, chairs or ties to permit their being walked upon without displacement or movement both before and during placement of concrete. Wire-tie bar intersections.
5. Do not bend bars around openings or sleeves. Wherever conduits, piping, inserts, sleeves, etc. interfere with placing of reinforcement, obtain the Architect's approval of placing before concreting.
6. Do not field bend bars unless expressly noted in the Contract Documents.

B. Welding:
1. Employ shielded metal-arc method and conform to AWS D1.4.
2. Ensure equipment supplies proper current and voltage and is adjustable to suit arrangement and thickness of items welded.

C. Prior to placing concrete, verify reinforcement has been bent, positioned, and secured in accordance with drawings; ensure removal of oil, grease, dirt, or other bond-weakening coatings; replace severely rust-pitted reinforcing bars.

D. Quality Assurance:
1. Project Inspector will inspect placement of reinforcement and mechanical splices and notify Structural Engineer of any discrepancies in placement.
2. Owner's Testing Agency will inspect shop and field welding of reinforcing bars in accordance with CBC Section 1929A.12.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

GRANITE ROCK
WATSONVILLE, CA
PH 831-768-2330
SUBMITTAL # 1.1

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of cast-in-place concrete.

B. Related Sections:
1. Section 03 10 00 - Concrete Forming and Accessories
2. Section 03 20 00 - Concrete Reinforcing.
3. Section 05 12 00 - Structural Steel Framing.
4. Section 31 63 29 - Cast-In-Place Drilled Piers.

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION 01 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
1. California Code of Regulations. Title 24, 2007 edition, also known as California Building Code (CBC).
2. ASTM International.
3. American Concrete Institute:
   a. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
   b. ACI 301 - Specification for Structural Concrete for Buildings.
   c. ACI 304 - Recommended Practice for Measuring, Mixing and Placing Concrete.
   d. ACI 305 - Recommended Practice for Hot Weather Concreting.
   e. ACI 306 - Recommended Practice for Cold Weather Concreting.
   f. ACI 318 - Building Code Requirements for Reinforced Concrete.
4. State of California, Business and Transportation Agency Division of Highways:
   a. CMM - Materials Manual.

1.3 QUALITY ASSURANCE

A. Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.

B. Requirements of ACI 301 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.

C. Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Tolerances shall meet the requirements of ACI 117 except as modified in the Construction Documents.

D. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:

1. Specified concrete strengths will be met
2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
3. Trial batches have been made

1.4 SUBMITTALS

A. Contractor's Testing Laboratory's certificate of compliance per ASTM E329.

B. Contractor shall submit:
1. Certified copies of mix designs for each concrete class specified including compressive strength test reports
2. Certification that materials meet the requirements specified
3. Samples only as requested by the Architect.
4. Certification from vendor that samples originate from and are representative of each lot proposed for use.

C. The Owner's Testing Agency will submit reports on tests and inspections performed to the Owner, the Architect, the Contractor, and the DSA.

D. Shop Drawings: Show construction and expansion and contraction joint locations and details.

E. Schedule of placing for the Architect's review before starting work.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Ensure storage facilities are weather tight and dry.

B. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

C. Store bulk cement in bins capable of preventing exposure to moisture.

D. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

PART 2 - PRODUCTS

2.1 CONCRETE

A. Table 2-1: Concrete Properties

Location	28 -Day Strength	Aggregate Size	Weight	Slump	Water / Cement	% Flyash	Comments
DRILLED PIERS	3000	1	145	6		15-25	
FOOTINGS	3000	1	145	4		15-25	

WORK SCOPE DELETED

GRANITE ROCK MIX DESIGN 67-0-422 SUBMITTAL 1.1

B. Strength refers to the compressive strength in psi after 28-days when tested in accordance with ASTM C39. All concrete shall develop compression strength specified in 28-days. To meet above requirements, mix shall be designed such that average compressive strength will exceed specified 28-day strength by an amount as specified by ACI 318.

C. Aggregate size refers to the maximum size in inches.

D. Weight refers to pounds per cubic foot, air dry.

E. Slump is measured in inches and tested in accordance with ASTM C143.

F. Water/Cement Ratio is the maximum ratio of water to cementitious material by weight.

2.2 MATERIALS

A. General Requirements:
1. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged through-out work unless the Architect approves request for change made at least 10-days prior to anticipated date of casting.
2. Ready-mixed concrete shall meet requirements of ASTM C94.
3. Deviations in properties of materials tested by the Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.
4. No frozen aggregates will be permitted.

B. Cements: ASTM C150, Type II. Use one brand of cement throughout project unless otherwise directed by the Architect.

C. Fly Ash: ASTM C618, Type F.

D. Aggregates:
1. Coarse: ASTM C33. Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. "Cleanness value shall not be less than 75 when tested per MM Test Method, 227 and conforming to CBC Section 1903A 3.2.
2. Fines: ASTM C33. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.
3. Light Weight Aggregates: ASTM C330; expanded shale type uniformly graded from 3/4-inch to No. 200 Mesh. Cleanliness value and sand equivalent not less than 75.
4. Provide aggregates from a single source for exposed concrete.

E. Water. Clean and potable, free from impurities detrimental to concrete.

F. Admixtures:
1. Water-Reducing Admixture: ASTM C494, Type A, non-lignini sulfonate. Same as:
   a. Grace Construction Materials: "WRDA with Hycol";
   b. Master Builders: "Pozzolith 322N";
   c. Sika Corp.: "Plastocrete 161";
   d. Equal product substituted per Section 01 60 00.
2. Air Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other products. Same as:
   a. W.R. Grace: "Daravair,"
   b. Master Builders: "Micro-Air,"
   c. Sika Corp.: "Sika Aer,"
   d. Equal product substituted per Section 01 60 00.
3. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G. Same as:

a. W R. Grace: "Daracem 19,"
b. Master Builders: "Rheobuild,"
c. Sika Corp : "Sikament,"
d. Equal product substituted per Section 01 60 00.

4. Water Reducing, Accelerator Admixture: ASTM C494, Type E. Same as:
a. W R. Grace: "Daracel,"
b. Master Builders: "Pozzutec 20,"
c. Sika Corp : "Sikaset NC,"
d. Equal product substituted per Section 01 60 00.

5. Water Reducing, Retarding Admixture: ASTM C494, Type D. Same as:
a. W R. Grace: "Daratard-17,"
b. Master Builders: "Pozzolith R,"
c. Sika Corp.: "Plastiment,"
d. Equal product substituted per Section 01 60 00.

6. Other Admixtures: Only as approved by the Architect.

G. Wax Sealer: Heavy penetrating type as manufactured by approved manufacturer of clear hardener.

H. Abrasive Grains: Aluminum oxide type. Same as Sonneborn-Contech's "Frictex NS"; General Abrasive Co., Inc.'s "Fut-Sure"; The Exolon Co.'s "Exolon Anti-Slip"; or equal product substituted per Section 01 60 00.

I. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as:
1. Master Builders: "Masterflow 928 Grout";
2. Burke: "Non-Ferrous, Non-Shrink Grout,"
3. Equal product substituted per Section 01 62 00.

J. Curing Materials:
1. Waterproof Paper: ASTM C171, Type 1, regular. Same as:
a. Sisalkraft Division of St. Regis Paper Co.: "Orange Label";
b. Equal product substituted per Section 01 62 00.
2. Sheet Plastic: Polyethylene, four mils thick, fungus-resistant.
3. Curing Compound: ASTM C309. Same as:
a. Curecrete Chemical Company: "Ashford Formula,"
b. Master Builders: "Masterkure N-Seal-W,"
c. Equal product substituted per Section 01 60 00.

K. Concrete Sealer: Clear water repellent treatment, blend of six resins containing no silicones or stearates, no darkening or change of color. Same as:
1. Sonneborn-Contech's "White Rox M-6-50-8";
2. Tamms Industries: "Chemstop"'
3. Equal product substituted per Section 01 60 00.

L. Hardener, Clear Liquid Type: Same as:
1. Grace Construction Materials: "Hornstone Crystal Chemical Hardener";
2. Master Builder's: "Mastercron";
3. Sonneborn-Contech: "Lapidolith";
4. Upco Co : "Vitrox 4701";
5. Equal product substituted per Section 01 60 00.

M. Epoxy Adhesive: Two component material suitable for anchoring rebar into dry or damp concrete. Same as:
1. Covert's "CIA-Gel 7000,"
2. Hilti: "HIT HY-150 MAX,"
3. Hilti: "RE 500,"

4. Simpson Strong-Tie: "Set"
5. Equal product substituted per Section 01 60 00

N. Sleeves through concrete: ASTM A53 galvanized per ASTM A153.

2.3 MIXES

A. General Requirements:
1. Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
2. For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of CBC Section 1905A.3, Method "B."
3. If sufficient test results for Method "B" are not available, contractor shall produce trial mixes in accordance with requirements of CBC Section 1905A.3, Method "C."
4. Contractor shall instruct Laboratory to base mix design on use of materials tested and approved by Owner's Testing Agency.
5. Mix design shall include compression strength test reports per CBC Section 1905A.3.1.
6. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Architect prior to using in project.
7. Ensure mix designs will produce concrete to strengths specified and of uniform density without segregation.
8. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.
9. Contractor's mix designs shall be subject to review by the Architect and by the Owner's Testing Agency.
10. Introduction of calcium chloride will not be permitted.
11. Unspecified admixtures will not be permitted unless the Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the Owner's Testing Agency.

B. Slab-on-Grade Mix requirements: Use of Water-Reducing admixture is required. High Range Water-Reducing admixture (super plasticizer) shall be used when required to maintain workability and pumpability.

C. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand

D. Non-Shrink Grout: Follow approved manufacturer's printed instructions and recommendations

2.4 MIXING

A. Batching Plant Conditions:
1. Batch plant shall be certified to comply with the requirements of the National Concrete Ready Mix Association.
2. Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the Owner's Testing Agency.
3. Replace at no additional expense equipment the Architect and the Owner's Testing Agency deem inadequate or unsuitable.
4. Use approved moisture meter capable of determining moisture content of sand.

B. General Requirements:

1. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
2. Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs. Method of mixing shall comply with CBC Section 1905A.8.
3. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
4. Adjust grading to improve workability; do not add water unless otherwise directed.
5. Maintain proportions, values, or factors of approved mixes throughout work.
6. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.

C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.5 SOURCE QUALITY CONTROL

A. Owner's Testing Agency will:
1. Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.
2. Test and inspect materials, as necessary, in accordance with ACI 318 and CBC Sections 1903A, 1905A and 1929A for compliance with requirements.
3. Take samples as required from the Contractor's designated sources.
4. Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pretested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Architect who may be so advised by DSA.
5. Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgment of the Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2- percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution. Test aggregates as required by CBC Section 1903A.3.
6. Test for sand equivalent of fine aggregate in accordance with California Test 217.
7. Test for cleanness value of coarse aggregate in accordance with California Test 227.
8. Inspect plant prior to any work to verify following:
   a. Plant is equipped with approved metering devices for determining moisture content of fine aggregate.
   b. Other plant quality controls are adequate.
9. Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location per CBC Section 1929A.4 where other materials are measured.

B. Waiver of Batch Plant Inspection:
1. Continuous batch plant inspection may be waived in accordance with CBC Section 1929A.5 if the plant complies with ASTM C94 and has been certified by an agency acceptable to DSA to comply with the requirements of the National Ready Mix Concrete Association.
2. When batch plant inspection is waived, the following requirements shall apply:
   a. Testing Agency shall check the first batching at the start of work and furnish mix proportions to the licensed Weighmaster.

b. Licensed Weighmaster shall identify material quantities and certify each load by a ticket.

c. Project Inspector shall collect truck mix tickets with load identification and maintain a daily record of placement. Trucks without a load ticket identifying the mix shall be rejected. Copies of daily placement record shall be submitted to DSA.

d. At the end of the project, the Weighmaster shall submit an affidavit to DSA certifying that all concrete supplied conforms to proportions established by mix designs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine units of work to be cast and verify that:
1. Construction of formwork is complete.
2. Required reinforcement, inserts, and embedded items are in place.
3. Form ties at construction joints are tight.
4. Concrete-receiving places are free of debris.
5. Dampen subgrade or sand course for slabs-on-grade. Do not saturate.
6. Depths of depressed slab conditions are correct for delayed finish noted and for its proper bonding to concrete.
7. Conveying equipment is clean and properly operating.
8. The Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.

B. Do not begin casting before unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting.

B. Protect finished surfaces adjacent to concrete-receiving places.

C. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.

3.3 PLACING

A. The Inspector of Record, Architect, Structural Engineer, Testing Laboratory and DSA shall be notified at least 48 hours before placing concrete.

B. Place concrete in accordance with CBC Section 1905A.

C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.

D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from rehandling and flowing; do not deposit concrete initially set. Complete placement of concrete within ninety (90) minutes after adding water unless otherwise noted. Retempering of concrete which has partially set will not be permitted.

E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.

F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.

G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.

H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.

I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.
   1. An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90°F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.
   2. Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the Owner's testing laboratory for review.
   3. Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.
   4. Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.
   5. When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.

J. Cold Weather Concreting:
   1. No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.
   2. No concrete placement will be allowed on frozen subgrade.
   3. Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.
      a. Reinforcement, forms or ground to receive concrete shall be completely free from frost.
      b. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.
      c. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect.
      d. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.
      e. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.

K. Consolidating.
1. Use vibrators for thorough consolidation of concrete (including, but not limited to, mat slabs and structural slabs).
2. Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.
3. Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.
4. Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.

L. Construction Joints:
1. Verify location and conformance with typical details; provide only where designated or approved by the Architect. Comply with CBC Section 1906A.4. Construction joints require keys and additional reinforcement unless otherwise noted; consult architect for details.
2. All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.
3. Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.

M. Contraction (Control) Joints in Slabs-on-Grade:
1. Construct contraction joints in slabs-on-ground to form panels of patterns indicated on Shop Drawings. Use saw cuts 1/8" x 1/4 slab depth, unless otherwise indicated.
2. Time saw cutting to allow sufficient curing of concrete to prevent raveled or broken edges.
3. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
4. If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

N. Walls and Other Formed Elements:
1. Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.
2. Level top surface upon stopping work.
3. Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.
4. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
5. Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.

O. Penetrations Through Concrete:
1. Penetrations through structural concrete for conduit, piping or other items must be approved by the Architect
2. Where such penetrations are approved, provide steel galvanized pipe sleeves as follows:
   a. Reinforcement must not be displaced. Provide minimum ¾" clearance between reinforcement and sleeve.

b Sleeves shall be Schedule 40, 60, 80, or 160 as follows based on pipe diameter "D" per Table 3-1.

c. Spacing and edge distances shall conform to Table 3-1.

P. Table 3-1: Pipe Sleeves at Penetrations

Pipe Diameter "D"	A53 Pipe Thickness	Minimum Center-to-Center Spacing	Minimum Edge Distance
≤ 2"	Schedule 40	6"	4"
>2" ≤ 4"	Schedule 60	3D	6"
>4" ≤ 8"	Schedule 80	3½ D	1½ D
>8" ≤ 12"	Schedule 120	4D	2D
> 12"	Not Permitted		

3.4 CURING

A. General Requirements:

1. Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC Section 1905A.11.
2. Avoid alternate wetting and drying and fluctuations of concrete temperature.
3. Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.
4. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.

B. Curing Method, Typical: Obtain the Architect's approval of alternate measures.

1. Keep forms and concrete surfaces moist during period forms are required to remain in place.
2. Apply curing compound per manufacturers' recommendations, except at slabs-on-grade apply curing compound at 150% of manufacturer's recommended application coverage rate.

3.5 CLEANING, PATCHING AND DEFECTIVE WORK

A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.

B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.

C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.

D. Rock Pockets:
1. Cut out to full solid surface and form key.
2. Thoroughly wet before casting mortar.
3. Where the Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.

E. Cleaning:
1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.
3. Remove all exposed, loose fibers from slabs to the satisfaction of the architect.

3.6 PROTECTION

A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.

B. Protect exposed corners of concrete from traffic or use which will damage them in any way.

C. Make provisions to keep all exposed concrete free from latence caused by spillage or leaking forms or other contaminants. Do not allow laitances to penetrate, stain, or harden on surfaces which have been textured.

3.7 FIELD QUALITY CONTROL

A. Owner's Testing Agency will:
1. Perform testing in accordance with ACI 318 and CBC Section 1903A and 1905A.
2. Review concrete mix designs.
3. Inspect concrete and grout placement continuously.
4. Test concrete to control slumps according to ASTM C143.
5. Continuously monitor concrete temperature as it arrives on the site.
6. Test concrete for required compressive strength in accordance with CBC Section 1905A.6:
   a. Make and cure four specimen cylinders according to ASTM C31 for not more than each 50 cubic yards, or 2000 square ft for of surface areas of slab or walls poured each day.
   b. Retain one cylinder for 7-day test, two for the 28-day test and hold one cylinder for additional testing as required.
   c. Number each cylinder 1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D etc; date each set; and keep accurate record of pour each set represents.
   d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.
   e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.
   f. Base strength value on average of two cylinders taken for 28-day test.
7. Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.

B. Contractor shall:

1. Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:
   a. Design mix number.
   b. Signature or initials of ready mix representative.
   c. Time of batching.
   d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.
   e. Total volume of concrete in each batch.
   f. Notation to indicate equipment was checked for contaminants prior to batching.
2. Pay the Owner's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.
3. Submit Concrete Weighmaster affidavit per section 2.05 (B) 2.d.

3.8 FINISH OF FORMED SURFACES

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish Work or by other construction. Concrete surface shall have texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 SLAB FINISHES

A Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.

1. After placing slabs, plane surface to tolerances for floor flatness FF of 20 and floor levelness FL of 15. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances for flatness FF of 25 and levelness FL of 20. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.

1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance. Check and level surface plane to tolerances flatness FF of 35 and levelness FL of 25. Grind smooth surface defects which would telegraph through applied floor covering system.
2. Floors to receive traffic topping shall have steel trowel finish.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application
2. Slopes ≤ 6 percent: Medium broom finish.
3. Slopes > 6 percent: Heavy broom finish.

3.10 CLEAN UP

A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

SUBMITTAL # 16 + 16.1
AHLBORN STRUCTURAL STEEL
SANTA ROSA, CA
PH 707-573-0742

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of structural steel as indicated on the Contract Drawings. Work includes but is not necessarily limited to the following:
1. Structural steel framing, including all structural steel shown on the structural drawings and all standard shapes, plates and rods shown on the Architectural, Mechanical and Electrical drawings that connect to the building structure.
2. Welded stud connectors for composite construction, concrete engagement, and attachment of building components.
3. Anchor rods.
4. Shop painting

1.2 REFERENCES

A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
1. California Code of Regulations, Title 24, Part 2, also known as the California Building Code (CBC), 2007 Edition.

2. ASTM International:
   a. ASTM A6 – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
   b. ASTM A36 –Standard Specification for Carbon Structural Steel.
   c. ASTM A108 – ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
   d. ASTM A153 - ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   e. ASTM A307 - ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
   f. ASTM A325 – ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   g. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
   h. ASMM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
   i. ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
   j. ASTM C1035 – Standard Specification for Lead and Cadmium Extracted from Glazed Ceramic Cookware.
   k. ASTM F436 - Standard Specification for Hardened Steel Washers.
   l. ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat) Unbonded for General Use.
   m. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
   n. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

o. ASTM F1852 – Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

3. American Institute of Steel Construction:
   a. ANSI/AISC 360-05 - Specification for Structural Steel Buildings (AISC1).
   b. AISC 303-05 - Code of Standard Practice for Steel Buildings and Bridges. (AISC2).
      1) No provision of AISC2 shall be effective to change the duties and responsibilities of the Owner, Contractor or Structural Engineer from those set forth in these Contract Documents.
      2) Where discrepancies exist between the requirements of the Contract Documents and AISC2, the requirements of the Contract Documents shall govern.
   c. ANSI/AISC 341-05 - Seismic Provisions for Structural Steel Buildings. (AISC3)

4. American Welding Society:
   a. AWS A5 - Filler Metal Specifications.
   b. AWS C4.1 -
   c. AWS D1.1 - Structural Welding Code – Steel.
   d. AWS 2.4 - Standard Symbols for Welding, Brazing and Nondestructive Examination.
   e. AWS QC1 - Standard for AWS Certification of Welding Inspectors.

5. SSPC – The Society for Protective Coatings:
   a. SSPC – Steel Structures Painting Manual.
   b. SSPC SP 1 - Solvent Cleaning.
   c. SSPC SP 2 - Hand Tool Cleaning
   d. SSPC SP 7 - Brush-Off Blast Cleaning

6. Research Council on Structural Connections:
   a. RCSC - Specifications for Structural Joints using ASTM A325 or A490 Bolts.

7. American Society of Non-Destructive Testing:
   a. ANSI/ASNT CP-189-2006 - Standard for Qualification and Certification of Nondestructive Testing Personnel.
   b. ASNT Recommended Practice No. SNT-TC-1A - Personnel Qualification and Certification in Nondestructive Testing, 2007.

8. Federal Emergency Management Association:
   1. FEMA-353 - Recommended Specifications and Quality Assurance Guidelines for Steel Moment-Frame Construction for Seismic Applications.

9. American Iron and Steel Institute (AISI).

1.3 DEFINITIONS

A. AESS – Architecturally Exposed Structural Steel. Items designated "AESS" on the drawings are subject to special requirements in this provision.

B. Demand-Critical Welds: Demand-Critical Welds are designated on the structural drawings. All Demand-Critical Welds are part of the Seismic-Load-Resisting System.

C. Extra Smooth: Surfaces noted herein as "Extra Smooth" require a finish with surface variation of 500 micro-inches or less (AWS C4.1-77, Sample #4).

D. Gouge: Any depression deeper than the overall surface roughness.

E. Nondestructive Testing: Nondestructive testing (NDT) includes magnetic particle testing (MT), penetrant testing (PT), radiographic testing (RT), and ultrasonic testing (UT). The terms nondestructive examination (NDE) and nondestructive testing (NDT) are synonymous.

F. Protected Zone: The Protected Zone is defined as structural members, or portions thereof, to which connections of structural and non-structural elements are limited. The Protected Zone is designated on the structural drawings.

G. Quality Assurance Plan: The Quality Assurance Plan is set of the written requirements containing the set of procedures that are to be followed by the Owner's Testing Laboratory to confirm compliance with these requirements.

H. Seismic-Load-Resisting System (SLRS): The Seismic-Load-Resisting System (SLRS) is defined as all items designated "SLRS" on the Structural Drawings, including columns, beams, and braces, and their connections along grid lines denoted "SLRS" on the framing plans.

1.4 QUALIFICATIONS

A. Steel Fabricator's Qualifications: Fabricator shall have had not less than 5 years' experience in fabrication of structural steel and be able to furnish evidence of his ability, facilities, proficiency of his personnel and completed projects.

B Steel Erector's Qualifications: Erector shall have had not less than 5 years' experience in erection of structural steel and be able to furnish evidence of his ability, facilities, proficiency of his personnel and completed projects.

C. Welder Qualifications: Welders, welding operators, and tackers shall be qualified in accordance with AWS D1.1 and CBC Section 2231A.5.

1. Welders shall have a valid Welding Performance Qualification Record (WPQR) for each welding procedure to be performed.
2. Welders whose work fails to pass inspection shall be requalified before performing further welding.
3. Supplemental Welding Personnel Testing: Welders and welding operators performing work on bottom-flange Demand-Critical Welds shall pass Supplemental Welder Qualification Testing, as prescribed in FEMA 353, Part I, Appendix B, using the process and highest deposition rate to be used in the work. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification. Tack welders need not perform such Supplemental Testing.
4. Qualification Period: Personnel who have not welded for a period of three or more months shall be requalified. Welding personnel required to be tested using the Supplemental Welding Personnel Testing shall be qualified by test within 12 months prior to beginning welding on the project.
5. The Contractor shall pay costs of certifying qualifications and requalifications.

1.5 QUALITY ASSURANCE

A. Welding Inspector Qualifications:

1. All Welding Inspectors shall be trained and thoroughly experienced in inspecting welding operations, and qualified as Certified Welding Inspectors (CWI) in accordance with AWS D1.1 and AWS QC1.
2. NDT Personnel Qualifications
   a. NDT personnel shall be qualified under one of the ASNT documents referenced in this specification. NDT performed by NDT Level I personnel shall be under the close, direct supervision of an NDT Level II.
   b. Demand-Critical Welds: UT may be performed only by UT technicians certified as Level II by their employer, or as ASNT Level III certified by examination by the ASNT. Ultrasonic testing technicians who perform flaw

detection or sizing shall be trained in applicable UT procedure and shall demonstrate their competence through testing as prescribed in FEMA 353, Part I, Appendix E.

B. Bolting Inspector Qualifications: Competency shall be demonstrated through the administration of a written examination and through the hands-on demonstration by the Inspector of the methods to be used for bolt installation and inspection.

C. Submittals: The Owner's Testing Laboratory will submit the following items:
1. Quality Assurance Plan: The Quality Assurance Plan shall contain the Quality Assurance and Inspection items contained in this Section.
2. Qualifications of Owner's Testing Laboratory management and personnel designated for the project.
3. Qualification records for Owner's Testing Laboratory's Inspectors and NDT technicians designated for the project.
4. Owner's Testing Laboratory's Quality Control Plan for the monitoring and control of the Agency's operations.
5. Written Practice for Owner's Testing Agencies: The Owner's Testing Laboratory shall maintain a Written Practice for the selection and administration of inspection personnel, describing the training, experience and examination requirements for qualification and certification of inspection personnel, including those of subcontracting agencies. The Written Practice shall also describe the Agency's procedures for determining the acceptability of the structure in accordance with the applicable codes, standards, and specifications. The Written Practice shall also describe the Agency's inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.
   a Bolting Inspection Procedures: Comply with RCSC Specification and the Quality Assurance Plan.
   b Welding Inspection Procedures: Meet the requirements of the AWS D1.1 and the Quality Assurance Plan.
   c Nondestructive Testing Procedures: The Written Practice shall describe the responsibility of each level of certification for determining the acceptability of material and welds in accordance with the applicable codes, standards, specifications and procedures.

1.6 SUBMITTALS

A. The following items shall be submitted to the Architect for review. One reproducible copy will be returned. Do not fabricate material prior to obtaining final review of submittals.
1. Manufacturer's test reports and literature describing products excluding those listed in Paragraph 1.6.B.
2. Shop and Erection Drawings. Prior to the start of fabrication and erection, submit detailed shop and erection drawings for all structural steel showing:
   a. Size and location of all structural members and connection material.
   b. Type, size and location of bolts and welds.
   c. Identification of high-strength bolted joints as snug-tight, pretensioned or slip-critical, as required by the Contract Documents.
   d. Locations where the Construction Documents require backing bars to be removed.
   e. Locations where the Construction Documents require supplemental fillet welds where backing is permitted to remain.
   f. Locations where the Construction Documents require weld tabs to be removed.
   g. Identification of members and connections of the Seismic-Load-Resisting System.
   h. Location and dimensions of the Protected Zone.
   i. Identification of welds in the Seismic-Load-Resisting System.
   j. Identification of Demand-Critical Welds

k. Identification of connections and members, or portions thereof, to be treated as AESS.

l. Shop and erection drawings shall clearly identify revisions and revision dates in accordance with AISC2.

m. Shop drawings shall include the following additional information:
   1) Complete information necessary for the fabrication of members including cuts, copes, holes, doubler plates, stiffeners, and camber.
   2) Surface preparation and finishes, including both painting and grinding.
   3) Material grades of all members, connection material, fasteners, and weld filler metal.
   4) Connection details drawn to scale for members of the Seismic-Load-Resisting System.
   5) With each set of shop drawings include corresponding erection drawings identifying pieces.

n. Erection drawings shall include the following additional information:
   1) Identification mark of members.
   2) Orientation and relation of members to appropriate grid lines.
   3) Setting elevations for column bases.
   4) Standard and special details for field connections
   5) Identification of joints or groups of joints in which a specific assembly order, welding sequence, welding technique, or other special precautions are required.

B The following items shall be submitted to the Architect and Owner's Testing Laboratory. Submittal to the Architect is for record purposes only. No copies will be returned by the Architect.

1. Manufacturer's test reports and literature describing products:
   a. Structural Steel: Material test reports (MTRs), also called mill test reports, for all structural steel. MTRs shall comply with the requirements of ASTM A6. MTRs shall be accompanied by a Certificate of Compliance from the fabricator. Structural steel shall be identified in accordance with CBC Section 2203A.
   b. Fastening Material: Manufacturer's Certifications for fastener components, including bolts, nuts, washers, and direct tension indicators (if used), accompanied by a Certificate of Compliance from the Contractor. Manufacturer certifications shall contain:
      1) Heat analysis, heat number, and a statement certifying that prohibited elements were not added to produce the bolts.
      2) Results of hardness, tensile, and proof load tests, as required and performed.
      3) If galvanized, measured zinc coating weight or thickness, and the results of rotational capacity tests, including test method used (solid plate or tension measuring device) and lubricant present.
      4) Results of visual inspection for bursts.
      5) Statement of compliance with dimensional and thread fit requirements.
      6) Lot number and purchase order number.
   c. Welding Consumables: Submit the following items:
      1) Manufacturer's Certifications for electrodes, fluxes and shielding gasses to be used. Certifications shall satisfy AWS A5 requirements. In addition submit a Certificate of Compliance from the Contractor supplying the materials. Submit certifications that the product meets any additional requirements of the project.
      2) Manufacturer's product data sheets for all welding material to be used. The data sheets shall describe the product, limitations of use, recommended welding parameters, and storage and exposure requirements, including baking and rebaking.

d. Welded Stud Connectors: Submit the following items:
   1) Manufacturer's Certification that the studs, as supplied, meet the requirements of AWS D1.1.
   2) Certified copies of the stud manufacturer's test reports covering the last completed set of in-plant quality control mechanical tests for the diameter supplied.
   3) Certified material test reports from the manufacturer. The Manufacturer's Certification shall be accompanied by a Certificate of Compliance from the Contractor.

2. Bolting and Welding Procedures: Procedures shall assign responsibility to a person or position and shall contain enough detail to be useful to the workforce without reference to governing specifications. The procedures need not act as work instructions. Procedures shall be dated and indicate the person or position that has the authority to maintain the procedure.
   a. Fastener Installation Procedures: Submit written procedures for the pre-installation testing, installation, snugging, pre-tensioning, and post-installation inspection of high strength fasteners.
   b. Welding Procedure Specifications (WPSs): Welding Procedure Specifications (WPSs) shall conform to the requirements of AWS D1.1. Submit Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQR) as required by AWS D1.1, to be used on the project to the Owner's Testing Laboratory.
   c. Use forms provided in Annex E of AWS D1.1 or equivalent.
   d. Weld Sequence Procedures: Submit written procedures indicating field welding sequences for each type of connection with multiple field-welded joints, and the sequence of such connections to be field-welded at each level.
   e. Weld Shrinkage and Distortion Control Plan: Where shrinkage is likely to cause distortion or other problems, submit a mitigation plan. The contractor is responsible for determining conditions requiring a Weld Shrinkage and Distortion Control Plan.
3. Welding Performance Qualification Records (WPQRs): Written Welding Performance Qualification Records (WPQRs), in accordance with AWS D1.1, for all welders on the project. Submit documentation that the welder has passed all designated supplemental welder qualification testing required for the types of welding to be performed. Submit documentation showing that the welder continued to use the applicable welding process on an ongoing basis since the WPQR test was conducted.
4. Samples: Material samples shall be provided as requested by the Structural Engineer or Owner's Testing Laboratory.

1.7 STRUCTURAL STEEL PRE-CONSTRUCTION CONFERENCE

A. Prior to performing any fabrication or erection work, the Owner's Representative, Architect, Structural Engineer, and Owner's Testing Laboratory, together with Steel Fabricator personnel and Steel Erector personnel supervising the shop, field and Quality Control work shall hold a Pre-construction Conference to review submittal requirements, welding procedures, bolting procedures, fabrication and erection issues, and inspection requirements for all structural steel operations.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle packaged materials in original containers with seals unbroken and labels intact until time of use.

B. Structural steel shall be stored and handled in a manner that prevents damage or distortion. Discharge materials carefully; do not dump onto ground.

C. Do not store materials on the structure in a manner that might cause distortion or damage to members of the supporting structure.

D Store structural steel members, whether on or off site, above ground on platforms, skids, or other support; store other materials in weather-tight, dry place until use.

E. Store materials to permit easy access for inspection and identification.

F. Electrode Requirements:

1. Packaging of weld filler metals shall conform to the requirements of AWS D 1.1. FCAW electrodes shall be received in undamaged moisture-resistant containers. They shall be protected against contamination and injury during shipment and storage. When removed from protective packaging and installed on machines, care shall be taken to protect the electrodes and coatings from deterioration or damage.
2. Modification or lubrication of an electrode after manufacture is not permitted, except that drying shall be permitted when recommended by the manufacturer.
3. Electrode Storage and Exposure Limits for Demand-Critical Welds: The exposure time limit for FCAW electrodes shall be based upon the results of tests as prescribed in FEMA 353 Part I, Appendix D. Spools shall be identified to facilitate monitoring of total atmospheric exposure time. FCAW electrodes that have been exposed for periods exceeding the allowable atmospheric exposure may be baked as per D1.1 if manufacturer's testing and recommendations show that baking is effective.

G. Fasteners shall be stored in a protected place. Except for ASTM F1852 "twist-off" type assemblies, clean and relubricate bolts, nuts and washers that become dry or rusty before use. F1852 fastener components may be relubricated following the manufacturer's written instructions, and must be retested after relubrication and prior to use to verify suitability for installation.

1.9 JOB CONDITIONS

A Provide the Owner's Testing Laboratory with free access to places on and off job site where materials are stored or fabricated, to places where equipment is stored or serviced, and to job site.

B. Sequencing, Scheduling:

1. Notify the Architect and Owner's Testing Laboratory in sufficient time prior to shop or field fabrication and erection to permit testing and inspection without delaying Work.
2. Ensure timely delivery of items to be embedded in work of other sections; furnish setting drawings and directions for installation
3. Provide templates for setting of anchor rods.

PART 2 - PRODUCTS

2.1 MATERIALS

A Steel Shapes, Plates, Tube, Pipe, and other sections: As noted on drawings

B. Standard Threaded Fasteners:

1. Machine Bolts and Nuts: ASTM A307, Grade A.
2. Plain Washers: ASTM F844
3 Beveled Washers: ANSI B18.23.1.

C. High Strength Bolts, Nuts, and Washers:

1. ASTM A325-N, snug-tight, unless otherwise noted.
2. Bolted joints in the Seismic-Load-Resisting System shall be Slip-Critical, with pretensioned high-strength bolts and a Class A faying surface or better.

3. Twist-off-Type Tension-Control Bolt Assemblies: ASTM F1852.
4. Direct Tension Indicators: Load Indicator Washers: ASTM F959
5. Nuts for High Strength Bolts: ASTM A563.
6. Washers for High Strength Bolts: ASTM F436.

D. Welding materials:
1. Comply with AWS D1.1 with a nominal 70 ksi tensile strength.
2. Supplemental Requirements for the Seismic-Load-Resisting System:
   a. Toughness and Elongation: Weld filler metals shall be capable of providing welds with the following minimum mechanical property requirements using AWS A5 classification test methods:
      1) CVN toughness of 20 ft-lb at -20 degrees Fahrenheit.
      2) Elongation: 22% minimum.
   b. Weld filler metals shall be low-hydrogen per AWS D1.1.
   c. Weld procedures shall conform to the Hydrogen Control Method in AWS D1.1 Annex XI.
3. Demand-Critical Welds: In addition to the requirements for Seismic-Load-Resisting System welds, employ weld filler metals capable of providing welds with a minimum CVN toughness of 40 ft-lb at 70 degrees Fahrenheit, using AISC3, Appendix X test conditions and specimens in lieu of those in AWS A5.

E. Welded Stud Connectors:
1. Headed Shear Studs: AWS D1.1 "Type B" automatic end-welded headed studs made from ASTM A108, Grade 1015 or 1020.
2. Threaded Studs: Automatic end-welded threaded studs made from ASTM A108, Grades 1010 through 1020.

F. Anchor Rods and Nuts: ASTM F1554; Grade as noted on drawings.
1. Grade 55 shall be weldable per supplement S1.
2. Grade 55 shall have a minimum CVN toughness of 15 ft-lbs at 40 degrees Fahrenheit per supplement S4.
3. Grade 105 shall have a minimum CVN toughness of 15 ft-lbs at -20 degrees Fahrenheit per supplement S4.

G. Threaded Rods: ASTM A36

H. Clevises and Turnbuckles: AISI C-1035; in addition clevises and turnbuckles shall have design strengths corresponding to the AISC Manual of Steel Construction (LRFD) with ultimate capacities at least 200% of the tabulated values.

I. Primer:
1. Interior steel: primer shall conform to SPC Paint Specification No. 13.
2. Exterior steel: primer shall conform to SPC Paint Specification No. 20 (Zinc-Rich Primer)
3. Primers shall contain no lead or chromates.
4. Contractor shall verify compatibility with finish paint.

J. Zinc-Rich Coating for Repair of Galvanized Surfaces: Zinc-rich coatings shall meet the requirements of ASTM A780.

K. Steel shall conform to the requirements of CBC Section 2202A.1.

2.2 FABRICATION

A. General Requirements:
1. Fabricate structural steel in accordance with AISC1 (Chapter M and the first paragraph of J2.), AISC2, and AWS D1.1 as applicable to Statically Loaded Structures, except as otherwise noted herein.

a. Assume all thermally cut edges are subject to tension stresses.
b. Delete paragraphs M4.6 and M5.1 from Chapter M of AISC1.

2. Fabricate and assemble work in shop to greatest extent possible.
3. Where possible, use procedures that do not require Architect's approval. Such approval may not be given in some circumstances.
4. Coordinate as required for attachment of other work to structural steel.
5. Where required for passage of reinforcing steel shapes, sections, plates, or bars, drill or punch holes as indicated on Contract Drawings. Notify Architect of conditions not shown or noted.
6. Allowable Tolerances: Comply with AISC1, Chapter M, and AISC2, Section 6. Where more restrictive tolerances are necessary to properly install other building systems and components then adopt the more restrictive tolerances.
7. Architecturally Exposed Structural Steel (AESS): All structural steel denoted "AESS" on the drawings shall be fabricated in accordance with the requirements of Section 10 of the AISC2.
8. Holes and attachments to structural steel in areas designated as the Protected Zone are not allowed except as explicitly shown or noted on structural drawings.

B. Connections:
1. Shop Connections: Bolted or welded as noted.
2. Field Connections: Locate splices only where noted or approved by Architect.
3. To the extent possible, assemble structural steel in the shop prior to galvanization.

C. Bolted Joints:
1. Punch or drill holes 1/16" larger than bolt size. Material having thickness in excess of connector diameter plus 1/8" shall be drilled rather than punched.
2. Ream unfair holes, but only up to next larger bolt size and install a bolt corresponding to the new hole size. Where unfairness exceeds maximum, weld hole in base material solid and drill hole of proper size.
3. Remove burrs that would prohibit solid seating of connected parts.
4. Mark completely tightened bolts with identifying symbol.
5. Provide hardened washers over slotted holes.
6. Draw up tight, check threads with chisel or provide approved lock washers where bolts are not pretensioned.
7. Assembly with Standard Threaded Fasteners: Provide beveled washers under bolt heads or nuts resting surfaces exceeding five percent slope with respect to head or nut
8. Assembly of High-Strength Structural Bolted Joints:
   a. Meet requirements of RCSC.
   b. Seismic-Load Resisting System joints shall be slip-critical (friction-type) as defined in RCSC with Class A or better faying surfaces.
   c. Provide hardened washers under provided under the element turned in the tightening procedure of high strength bolts.
   d. Direct tension indicator washers, where used, shall be provided under the head of slip-critical high strength bolts

D. Welded Construction: (shop and field)
1. Weld in accordance with AISC1, AWS D1.1, and CBC Chapter 22A.
2. Welding shall be performed in accordance with the WPS for the joint.
3. Welds that will be permanently exposed to view shall have burrs, flux, welding oxide air spots, and discolorations removed. Surfaces of such welds shall be reasonably smooth and uniform.
4. Exterior welds shall be watertight.
5. Exposed welds in AESS shall be ground, dressed smooth, and flush with adjacent surfaces
6. Each welder working on the project shall be assigned an identification symbol or mark. Each welder shall mark or stamp this identification symbol at each weld completed. Stamps, if used, shall be the low-stress type.

7. Before testing, all welds to be subjected to ultrasonic testing (UT) shall be given a visible mark, "for UT," accurately placed on the steel a distance of 4" away from the root of the edge preparation.
8. Groove welds shall be complete-joint-penetration welds, unless specifically designated otherwise.
9. WPSs shall be available to welders and inspectors prior to and during the welding process. Prior to welding, joint fit-up shall be verified by the welder for conformance with the WPS and AWS D1.1.
10. Supplemental Welding Requirements
    a. Maximum Preheat and Interpass Temperature: The maximum preheat and maximum interpass temperature permitted is 550° F, measured at a distance of 1" from the point of arc initiation. This maximum temperature may not be increased by the WPS, regardless of qualification testing.
    b. Nonfusible Backing: The use of nonfusible backing materials, including ceramic and copper, is permitted only with satisfactory welder qualification testing performed using the type of backing proposed for use and using the test plate shown in AWS D1.1, Figure 4.21, except that groove dimensions shall be as provided in the WPS and PQR. For nonfusible weld tabs and short segments of nonfusible backing bars used at the ends of welds between shear plates and column faces, or at the ends of continuity plate welds, special welding personnel and welding procedure qualification testing is not required.
    c. Peening, Controlled Cooling, and Post-Weld Heat Treatment (PWHT): If peening, controlled cooling, or PWHT are used, they shall be performed in accordance with AWS D1.1 and a written procedure for their performance shall be incorporated into the appropriate WPS.
        1) If insulating blankets are used to control cooling a written procedure and temperature measurements are not required.
        2) The application of heat immediately following completion of a joint to maintain a nominal temperature at or below 550° F is not considered PWHT.
    d. Intermix of Filler Metals: For Demand-Critical Welds in which different weld filler metals are used, supplemental toughness testing shall be conducted as prescribed in FEMA 353, Part I, Appendix C.
    e. Wind Velocity Limits: In the Seismic-Load-Resisting-System, in lieu of the wind speed limitations in AWS D1.1, welds using GMAW, FCAW-G, GTAW and EGW methods shall not be performed when the wind velocity in the immediate vicinity of the weld exceeds three miles per hour. Welding performed within an enclosed area, and not subject to drafts may be deemed to satisfy this requirement. For SMAW, FCAW-S, and SAW processes wind shall not affect the appearance of the molten weld puddle.
11. Welded Joint Details:
    a. Backing bars: The use of backing bars shall be in accordance with AWS D1.1, AISC3, and/or FEMA-353 as applicable. Backing bars shall be removed where required by the Contract Documents or AWS D1.1.
        1) Beam-Column Connection Joints Requiring Removal of Backing Bars: Following removal of backing, remove un-sound weld metal at the root area and any excessive weld discontinuities, and backweld. Minimize gouging and removal of base metal. A reinforcing fillet weld with a minimum leg size of 5/16" or the root opening plus 1/16", whichever is larger, shall be provided. Perform MT on the fillet weld and the immediately adjacent area.
        2) If groove weld backing is permitted to remain, the backing shall not exceed 3/8" thickness. For connections of the seismic-load-resisting system in which backing is not removed, backing shall be attached to the member or plate that does not have its surface prepared for the groove weld. Attachment shall be by either a 1/4" fillet or 1/8" groove weld along the complete bar length on the side

of the bar opposite the groove weld.

b. Weld dams are not allowed.

c. Weld Tabs:

1) Use of Weld Tabs: Welds shall be terminated at the end of a joint in a manner that will ensure sound welds. Whenever necessary, this shall be done by use of weld tabs.

a) Weld tabs shall extend beyond the edge of the joint a distance equal to a minimum of the part thickness, but not less than 1".

b) Weld tabs shall be oriented parallel to the joint preparation and to the weld direction.

c) Nonfusible weld tabs may be used in applications and locations where qualified in accordance with AWS D1.1, Section 4.

2) SLRS Beam-Column Connection Weld Tab Removal and Finish:

a) Weld tabs of SLRS connections shall be removed. Removal may be performed by air carbon arc cutting (CAC-A), grinding, chipping, or thermal cutting to within 1/8" of the base metal surface. For continuity plate weld tabs, removal within 1/4" of the plate edge is adequate. The process shall be controlled to minimize removal of base metal except for that material immediately adjacent to the weld. The edges where the weld tabs have been removed shall be finished Extra Smooth.

b) In SLRS connections, gouges deeper than 1/16" at locations of removal of weld tabs shall be repaired by welding according to the requirements of this Specification for Deep Gouges. Weld filler metal requirements for Demand-Critical Welds apply. The contour of the weld at the ends shall provide a smooth transition, free of gouges and sharp corners. A minimum radius at the corner need not be provided.

c) Following weld tab removal, finishing, and completion of any necessary repairs, the exposed ends of the weld shall be inspected using magnetic particle testing (MT) or Penetrant Testing (PT).

d. Weld toes: Weld toes, whether for groove welds or fillet welds, shall provide a smooth transition between the weld and base metal. The as-welded profile is adequate provided it satisfies the criteria of AWS D1.1, Section 5.24.

e. Weld access holes:

1) Weld access holes shall meet the dimensional, surface finish, and testing requirements of AISC1 Chapter J1.6 and AWS D1.1, except as otherwise required by the Contract Documents.

2) Where the height of the weld access hole exceeds the quantity k-tf+1½" or where the length of the weld access hole exceeds 4 tf (where k and tf are defined in AISC1), welded reinforcement is required. Notify the Architect for specific instruction.

3) At welded flange joints that are part of the Seismic Load Resisting System, the weld access hole detail shown in Figure 11-1 of the AISC3 shall be used.

4) The SLRS access hole shall be ground Extra Smooth. Gouges at SLRS access holes shall be repaired according to the requirements of this Specification. Weld filler metal requirements for the Demand-Critical Welds apply. Prior to acceptance,

5) SLRS weld access holes shall be inspected using magnetic particle testing (MT) or liquid penetrant testing (PT) and shall be free of cracks. If a welded gouge repair has been performed, magnetic particle testing (MT) shall be performed.

f. Web weld details: A minimum clear distance of 1/2" shall be provided between the weld access hole and fillet welds connecting the shear plate and beam web

g. Welding for Moment Connection of Bottom Beam Flange shall be sequenced so as to minimize residual stresses in the joint.

h. Weave Passes: Weave passes are not permitted in groove welds in the SLRS.

i. Column continuity plate details:

1) If backing bars are used and remain in place, they shall receive a reinforcing fillet weld between the backing bar and column flange. No fillet weld should be placed between backing bar and continuity plate.

2) Weld terminations near the end of the column flange tips may be completed using weld tabs. Weld tabs shall be removed to within 1/4" of the continuity plate edge and the surface finished Extra Smooth. Following finishing, the edge shall be inspected using MT. For continuity plate welds, terminations near the internal radius of the member need not be made using weld tabs. Fillet weld terminations between the continuity plate and column web shall be approximately 1/4" from each end of the joint

j. Tack Welds in the SLRS Protected Zones: Tack welds in the SLRS Protected Zones are permitted only if they are incorporated into a required weld.

E Camber: Provide camber as indicated on contract drawings in accordance with AISC1 Chapter M2.1.

F. Welded Connectors: Install in accordance with AWS D1.1 and manufacturer's recommendations. There shall be no porosity or evidence of lack of fusion between the end of the stud and the steel member.

G Repair of Discontinuities in Protected Zone of Seismic-Load-Resisting System.

1 Repair of Discontinuities: If erection aids within the Protected Zone cannot be avoided, the Structural Engineer's approval of the aid's placement, use, and the repair method is required. Air carbon arc gouging is permitted for the removal of welds to within 1/8" of the base metal surface. Any remaining weld deposits shall be removed by grinding to a depth 1/16" below the surface, faired to adjacent surfaces on a slope not to exceed 1:5.

2. Air Carbon Arc Cutting and Thermal Cutting: Air carbon arc cutting (CAC-A) and thermal cutting is permitted in the Protected Zone with the prior approval of the Structural Engineer for the removal of backing bars and weld tabs, as specified in these documents.

3. Gouges in members and connections in the Seismic-Load-Resisting System shall be repaired according to the requirements of this Specification. Weld filler metal requirements for the Seismic-Load-Resisting System apply, unless otherwise noted.

H. Surface Finish:

1. Flush Surfaces: Welds in butt joints required to be flush shall be finished so as to not reduce the thickness of the thinner base metal or weld metal by more than 1/16", or 5% of the material thickness, whichever is less. Remaining reinforcement shall not exceed 1/32" in height. However, all reinforcement shall be removed where the weld forms part of a faying or contact surface. All reinforcement shall blend smoothly into the plate surfaces with the transition areas free from undercut.

2. Finish Methods and Values: Chipping and gouging may be used, provided these methods are followed by grinding. Where surface finishing is required, surface shall be Extra Smooth, unless otherwise noted or specified in this document. Measurement of surface finish values by visual appearance or tactile comparison is acceptable.

l. Repair of Gouges: Gouges are not permitted in areas requiring an Extra Smooth finish surface, or where specifically prohibited by AWS D1.1 or this Specification. Repair of gouges meet the following requirements, unless otherwise noted:
   1. Shallow Gouges: Gouges up to 3/16" deep shall be removed by grinding as per D1.1, or to a radius of not less than 3/8".
   2. Deep Gouges: Gouges deeper than 3/16" shall be repaired by welding. Prior to welding, gouges shall be ground to provide an Extra Smooth contour with a radius not less than 3/8". The repair area shall be preheated to a temperature between 400° F and 550° F, measured at the point of welding approximately one minute after removal of the heating source, or shall be preheated in accordance with AWS D1.1 Annex XI for high restraint A written repair WPS for the application shall be followed. Following completion of welding, the area shall be ground Extra Smooth, with fairing of the welded surface to adjoining surfaces where applicable, and shall be inspected using magnetic particle testing (MT).
   3. The transitional slope after gouge removal shall not exceed 1:5.

2.3 FINISHES

A. Prime Painting:
   1 Surfaces to be painted:
      a. See SECTION 09 90 00 "PAINTING AND COATING" for structural steel surfaces permanently exposed to weather.
      b Apply one coat of primer to AESS members and members to be painted unless otherwise noted.
      c. Do not prime paint following surfaces:
         1) Surfaces to be encased in concrete except initial 2".
         2) Surface to be field welded.
         3) Surface to receive sprayed-on fireproofing.
         4) Contact surfaces joined by high-strength bolts.
   2. Preparation of Surfaces:
      a. Thoroughly clean mill scale, rust, dirt, grease, and other foreign matter from steel prior to painting.
      b. Where hand-cleaning methods are inadequate, clean in accordance with SPC-SP1, SPC-SP 2, or SPC-SP 7, as required.
   3. Painting:
      a. Apply primer in accordance with manufacturer's specifications to provide minimum dry film thickness of 1.0 mils per coat.
      b. Permit thorough drying before shipment.
      c. Do not prime in temperatures lower than 45 degrees Fahrenheit.

B. Galvanization
   1. Galvanize steel where required by the Drawings or by other sections of the Specification.
   2. Galvanize Shapes in accordance with ASTM A153.
   3. Galvanize Fasteners in accordance with ASTM B695, Class 40 minimum.

2.4 SOURCE QUALITY ASSURANCE

A. The Owner's Testing Laboratory will:
   1. Review ladle analysis and certificates of compliance. Where certification is questionable, test material to verify compliance per CBC Section 2231A.1.
   2. Inspect shop fabrication per CBC Section 2231A.2.
   3. Provide the management, personnel, equipment, and services required to perform the quality assurance functions required below.
   4. Verify that no improper attachments to the Protected Zone have been made.
   5 Forward copies of all product and procedure certificates, data sheets, and test and inspection reports to the Owner, Architect, Structural Engineer, Contractor, and DSA.

B. Welding Inspection: The Welding Inspector will perform the tasks indicated in the following list. This list shall not be considered exclusive of any additional inspection tasks that may be necessary to meet the requirements of AWS D1.1, CBC Section 2231A.5, and the Quality Assurance Plan

1. Review and understand the applicable portions of the specifications, the Contract Documents and the shop drawings for the project.
2. Verify that all applicable welder qualifications, welding operator qualifications and tack welder qualifications are available, current, accurate, and in compliance with these specifications.
3. Verify welder identification and qualification. Verify that any required supplemental welder qualification testing, if required for the joint, has been executed and that the welder has passed.
4. Verify that each welder has a unique identification mark or die stamp to identify welds
5. Verify that all applicable Welding Procedure Specifications (WPSs), with Procedure Qualification Records (PQRs) as needed, are available, current and accurate, and comply with AWS D1.1 and this specification.
6. Verify that an approved Welding Procedure Specification (WPS) has been provided and that each welder performing the weld has reviewed the WPS. A copy of the appropriate WPS shall be available for each joint, although need not be present at each joint location
7. Review mill test reports for all main member and designated connection base material for compliance with the project requirements.
8. Verify base material identification with the contract documents.
9. Verify the electrode, flux and shielding gas certifications for compliance with the Contract Documents.
10. Verify welding consumables with the approved WPSs.
11. Verify that electrodes are used only in the permitted positions and within the welding parameters specified in the WPS.
12. Verify that electrodes and fluxes are properly stored, and that exposure limits for the welding materials are satisfied.
13. At suitable intervals, observe joint preparation, assembly practice, preheat temperatures, interpass temperatures, welding techniques, welder performance and any post-weld controlled cooling and heat treatment to ensure that the requirements of the WPS and AWS D1 1 are satisfied
14. At suitable intervals, verify current and voltage of the welding equipment in application of the WPS, if needed, by a calibrated amp and voltmeter. Current and voltage shall be measured near the arc with this equipment.
15. Inspect the work to ensure compliance with AWS D1.1 and the specified weld acceptance criteria.
16. Schedule NDT technicians in a timely manner, after the visual inspection is complete and the assembly has cooled. The final NDT on a specific weld shall be performed at least 24 hours after the welding has been completed.
17. Mark the welds, parts, and joints that have been inspected, and accepted, with a distinguishing mark or die stamp, or maintain records indicating the specific welds inspected and accepted by each inspector.
18. Document the accepted and rejected items in a written report. Transmit the report to the designated recipients in a timely manner.

C. Nondestructive Testing of Welded Joints:

1. Magnetic Particle Testing: Magnetic Particle Testing (MT) shall be conducted by the Owner's Testing Laboratory at the frequency designated in Table 2-1. MT shall be performed in accordance with AWS D1.1, and FEMA 353, Part I Appendix F.
2. Ultrasonic Testing: Ultrasonic testing (UT) shall be conducted by the Owner's Testing Laboratory for the percentage of joints designated in Table 2-1. UT shall be performed in accordance with AWS D1.1.
3. Weld Acceptance Criteria shall be in accordance with AWS D1.1. Regions of welds that cannot be inspected shall be identified and recorded, and the Structural

Engineer shall be notified.

4. K-Area Welding Inspection: After welds of continuity plates and doubler plates have cooled to ambient temperature, test column webs for cracking using liquid penetrant (PT) or magnetic particle testing (MT) over a zone 3" above and below each weld

Table 2-1. Nondestructive Testing Requirements:

Weld Category	Nondestructive Testing Requirements	
	Complete-Joint-Penetration Welds[1]	Partial-Joint-Penetration Welds and Fillet Welds
Welds not described below	No NDT required unless otherwise noted	No NDT required unless otherwise noted
SLRS welds not described below	MT 25% of joints, full length[2] UT 25% of joints, full length[2]	MT 25% of joints, 6" spot at random[2]
Top-flange joints at cantilever beam connections[3]	MT 100% of joints, full length UT 100% of joints, full length	MT 100% of joints, full length
Demand-Critical Welds	MT 100% of joints, full length UT 100% of joints, full length[4]	MT 100% of joints, full length

Notes:

1. UT is required only when the weld thickness is 5/16" or greater.
2. If any joint fails testing, test 100% of joints until 40 consecutive welds pass. The testing rate may then be reduced to 25%.
3. Test joint on each side of cantilever beam support.
4. Reduce the rate of UT to 25% if after 40 welds have been inspected, an individual welder's reject rate is less than 5%

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine units of Work to be placed and verify that all anchor rods have been installed properly and have sufficient bolt and thread elevation.

B. Do not begin erection before unsatisfactory conditions have been corrected.

3.2 ERECTION

A. General Requirements:

1. Erect structural steel in accordance with AISC1 Chapter M, AISC2, and AWS D1.1 Structural Steel Welding Code as applicable to Statically Loaded Structures.
2. Requirements for bolted and welded joints specified in Part 2 of this Specification shall also apply to field connections unless otherwise noted.
3. Erection Tolerances: Do not exceed the erection tolerances specified in AISC2, Section 7. Where more restrictive tolerances are necessary to properly install other building systems and components then adopt the more restrictive tolerances.
4. Where erection requires performing work of fabrication on site, conform to applicable standards for fabrication.
5. Architecturally Exposed Structural Steel (AESS): All structural steel denoted "AESS" on the drawings shall be erected in accordance with the requirements of Section 10 of the AISC2.
6. Ensure steel is plumb, level, and aligned before making final connections.

B Anchor rods shall be set in conformance with Section 7.5 of AISC2

C. Field Cutting or Alteration: There shall be no field cutting, alteration, or repair of structural steel members or of connections without prior review and approval by the Architect. Structural elements with fabrication errors or that do not satisfy tolerance limits shall be repaired. Submit drawings showing reasons for, and details of, proposed corrective work

D Temporary Shoring and Bracing: Provide shoring and bracing as needed until permanent lateral-support is in place and complete with connections of sufficient strength to bear the imposed loads. Contractor is responsible for identifying the need for temporary shoring and bracing.

E. Erection Procedures: Control erection procedures and sequences to avoid problems caused by temperature differentials and weld shrinkage, and other sources of expansion and contraction.

F. Leveling of Column Base Plates: Contractor shall specify the means and methods for leveling the column base plates during erection. The leveling method shall have sufficient strength to support the imposed loads, including construction loading.

G. Field Assembly:
1. Clean bearing surfaces and surfaces to be in permanent contact before assembling members.
2. Do not fasten members with bearing joints designated on the drawings before abutting surfaces have been brought completely into contact.
3. Bolted Construction:
   a. Installation of high-strength bolts shall conform to ASTM A325 for slip-critical or snug-tightened type joints, as applicable, in accordance with RCSC. Provide washer under head or nut of high strength bolts. Washer shall be provided under the element being turned during tightening. Bolts in welded connections shall be tensioned after completion of welding.
   b. At bolted joints designated as Slip-Critical or that require pretension, use Twist-off-Type Tension-Control bolt assemblies or Direct Tension Indicators.
   c. Do not use flame cutting to align bolt holes except as permitted by RCSC specifications. Ream holes that must be enlarged to admit bolts. Do not enlarge holes to a diameter greater than 1." When reaming beyond 1/32", drill or ream to the next larger hole size and use the next larger size bolt.
4. Mill scale shall be removed from the column in the area where the beam flanges will be welded to the column.

H. Gas Cutting: Use of flame cutting torch will be permitted only after the Architect's prior written approval and only where metal cut will not carry stress during cutting, and cut surfaces will not be visible. When thermal cutting is permitted, cutting shall be done with a mechanically guided torch or a torch controlled using a guide bar.

I. Field Touch-Up Painting: After erection, touch-up paint field connections and abrasions resulting from the Work of this Section with same paint used for shop prime painting.

J. Remove and repair galvanized surface as required for field welding in accordance with ASTM-A780, A2; required thickness is 100 micro-inches. Touch up with zinc-rich coating. Repair material shall extend at least three inches beyond edges of damaged areas.

K. Protected Zone: Attachments to structural steel in the Protected Zone, other than spot welding of metal deck to beams and welding of metal studs to braces as shown on structural drawings, are not allowed

3.3 CLEANING

A After erection, thoroughly clean surfaces of foreign or deleterious matter such as dirt, mud, oil, or grease that would impair bonding of fireproofing, concrete, or other finishes as

applicable.

B. Architecturally Exposed Structural Steel (AESS).
1. If temporary braces or erection clips are used, remove braces and clips in a manner which prevents unsightly surfaces.
2. Tack welds shall be ground smooth.
3. Holes shall be filled with weld filler metal or body solder and ground smooth.
4. All operations shall be performed such that the close fit and neat appearance of the structure will not be impaired.

3.4 FIELD QUALITY ASSURANCE

A. Owner's Testing Laboratory will:
1. Verify proper anchor rod group location, elevation, and orientation prior to placement of concrete foundations, and again subsequent to placement of concrete foundations prior to arrival of structural steel.
2. Perform field welding inspection and testing in accordance with the requirements in Part 2 of this Specification for shop fabrication, unless otherwise noted.
3. Inspect and test high strength bolted joints in accordance with RCSC and CBC Sections 2231A.2 and 2231A.6.
4. Sample and test bolt assemblies that include direct tension indicators, on a daily basis to verify proper indication of deformation with required bolt tension for each size and lot. The Inspector shall have a torque wrench, calibrated daily, to verify correlation with proper tension as installation proceeds. Test at least 10 percent of the bolts with a minimum of two per connection from the start of bolting and until waived by the DSA Field Engineer upon demonstration of continued good workmanship.
5. Inspect erected structural steel as required to establish conformity of Work with reviewed shop drawings and Contract Drawings.
6. Perform testing and inspection of welded stud connectors in accordance with requirements of AWS D1.1 and CBC Section 2231A.3, except that the test studs shall be subjected to a 90 degree bend test by striking them with a heavy hammer. After the bend test, the weld section shall not exhibit any tearing or cracking.
7. Inspect structural steel to verify that the Protected Zones of members of the Seismic-Load-Resisting System are free of damage and attachments not approved by the Structural Engineer.
8. Forward copies of all test and inspection reports to the Owner, Architect, Structural Engineer, Contractor, and DSA.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

SUBMITTAL #13 + 13.1
HARRISON DRYWALL, INC
SF, CA
PH 415 821-9584

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes: Provision of lightgauge steel stud and joist framing. Work includes, but is not necessarily limited to the following:
1. Non-load bearing steel stud framing at exterior walls.
2. Interior stud wall and ceiling framing with studs.
3. Framing accessories.

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing.
2. Section 05 50 00 - Metal Fabrications.
3. Section 09 20 00 - Gypsum Board Assemblies.
4. Section 09 22 16 - Non-Structural Metal Framing.

1.2 REFERENCES

A Requirements of the GENERAL CONDITIONS and DIVISION 01 apply to all Work in this Section.

B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
1. California Code of Regulations, Title 24, 2001 edition, also known as California Building Code (CBC).
2. American Society for Testing and Materials (ASTM).
3. Federal Specifications (FS).
4. American Welding Society (AWS) D1.3: "Structural Welding Code - Sheet Steel."
5. American Iron and Steel Institute (AISI): "Specifications for the Design of Cold-Formed Steel Structural Members."
6. Steel Stud Manufacturer's Association (SSMA).
7. Metal Lath Association (MLA): "Specifications for Metal Lath and Furring."
8. Society of Protective Coatings (SSPC).

1.3 QUALITY ASSURANCE

A Regulatory Requirements:
1. Comply with fire-resistance ratings as indicated and as required by governing authorities and codes
2. Provide materials, accessories, and application procedures which have been listed by an approved testing agency or tested according to ASTM E119 for the type of construction shown.
3 Comply with CBC Section 2203A.3 and AISI requirements for design and identification of cold-formed steel.

B. Steel stud system shall conform to referenced AISI documents.

C. Installer: Company specializing in performing the work of this Section with minimum 3 years' documented experience.

D. Welders: Qualified in accordance with AWS D1 3 for welding process, position, type of weld and type of steel.

1.4 SUBMITTALS

A. Submit in accordance with provisions of Section 01 32 19, "Submittal Procedures."

B. Product Data: Manufacturer's ICBO report, specifications and installation instructions for steel studs, fasteners, and accessories.

C. Experience of installer if requested by Architect.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Procedures: In accordance with Section 01 60 00, "Product Requirements."

B. Protect framing from rusting and damage.

C. Deliver in manufacturer's unopened containers or bundles fully identified with name, brand, type and grade.

D. Store inside a dry, ventilated space, and protect framing from rust and damage.

1.6 JOB CONDITIONS

A. Coordinate stud sizes and layouts with the work of the various trades. Where ductwork, conduit, piping, casework, and other such items exceed indicated available space, increase stud sizes or make other minor modifications as necessary to accommodate the work at no change in cost of the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Any member of Steel Stud Manufacturer's Association (ICBO #ER-4943P).

2.2 MATERIALS

A. Sheet Steel: ASTM A653, A1008 or A1011.

B. Studs and tracks:
1. See drawings for size and gauge.
2. Galvanization per ASTM A653 with G60 minimum.

C. Cold-Rolled Furring Channels: As specified in Section 09 22 16, "Non-Structural Metal Framing."

D. Vertical Deflection Clips (non-load-bearing framing): (If so required by project requirements and as indicated on approval shop drawings.) Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners. Acceptable Manufacturer: The Steel Network, Inc. (ICC criteria AC261 for metal to metal connections and ICC ESR-1903) or engineer approved equal.

1. VertiClip® series or equal to Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement.

E. Drift Clips (non-load-bearing framing): (If so required by project requirements and as indicated on approval shop drawings.) Manufacturer's standard bypass and head of wall clips (as required), capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure using mechanical fasteners. Acceptable Manufacturer: The Steel Network, Inc. (ICBO criteria AC261 for metal to metal connections and ICBO# ER-5623) or engineer approved equal
1. Drift Clip series or equal. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical and lateral movement.

F. Sliptrack: as indicated on approved drawings. Acceptable Manufacturers: Sliptrack Systems (ICBO #ER-5344) or engineer approved equal.
SLIPTRACK SYSTEMS PER SUBMITTAL 18.1

G. Partition Stiffeners or Bridging: Unpunched channel shape, formed of 16-gauge steel to required dimensions.

H. Powder-Driven Fasteners:
1. Tempered-steel pins with special corrosive-resistant plating or coating.
2. Pins shall have guide washers to accurately control penetration.
3. Fastening shall be accomplished by low-velocity, piston-driven, powder-accentuated tool.
4. Pins and tool shall be Hilti Fastening Systems DN-32-P8 (ICBO #2388) or equal product substituted per Section 01 60 00.

I. Expansion Bolts: Hilti Fastening Systems "Kwik Bolt 3 Concrete Anchors" (ICC ESR-1385), or equal product substituted per Section 01 60 00.

J. Welding Electrodes: AWS low hydrogen, rod number and diameter as approved by the Owner's Testing Agency.

K. Bracing: Provide cross diagonal straps, attached as indicated on the Drawings and per stud manufacturer's specifications for frame stability.

L. Touch-up Primer for Galvanized Surfaces: SSPC Paint 20 zinc rich.

M. Metal Screws: Self-drilling and self-tapping; No. 8 and larger as noted on Drawings. Screws shall penetrate substrate by a minimum of three full threads exposed. Use low profile heads as required by architectural finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all parts of the supporting structure and the conditions under which studs will be installed.

B. Notify the Architect, in writing, of any conditions detrimental to the proper and timely completion of the Work.

C. Do not proceed with the installation of steel studs until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate details and requirements of other Work which adjoins or fastens to studs and requires backing or special support framing included in this Section.
   1. Items requiring backing or support include, but are not necessarily limited to casework, wall-specialties, and similar items.
   2. Obtain Architect's approval of backing method proposed to satisfy requirements of this Section which differs from methods noted or shown.

3.3 INSTALLATION

A. Tracks shall be securely anchored to supporting structure, with fasteners specified at not more than 24-inches on center.

B. Complete, uniform, and level bearing support shall be provided for the bottom track at each bearing-stud location. Install full metal shims below bottom track at stud locations as needed, or set bottom track in high-strength grout.

C. Abutting or intersecting pieces or track shall be securely anchored to a common structural element or spliced together.
   1. Do not splice studs.

D. Bearing wall studs shall sit in top and bottom track with 1/16" maximum gap between wall stud and track web.
   1. Studs shall be aligned or plumbed and securely fastened to the flanges of both top and bottom track.
   2. Space studs 16-inches on center maximum unless otherwise noted on Drawings.

E. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Connect vertical (and/or drift) deflection clips to studs and anchor to primary building structure in accordance with manufacturer's recommendations.

F. Framed wall openings shall include a header and multiple studs at each edge of opening as indicated on Drawings.

G. Diagonal bracing shall be installed at locations indicated for frame stability.

H. Install bridging as indicated on Drawings.

I. Form corners and intersections of partitions with three studs. Provide additional studs as indicated or required.

J. Wire tying of framing members shall not be permitted.

K. Welded connections shall be made by resistance spot fusion welding, fillet welding, or plug welding and shall be done in accordance with the latest recommended procedures and practices of the American Welding Society.

L. Do not cut or notch stud flanges or cut additional opening in stud web.

M. Field abrasions and welds shall be touched up with zinc rich primer.

N. Erection Tolerances: Install cold formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8-inch in 10 feet as follows:

1. Space individual framing members no more than plus or minus 1/8-inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

O. Provide all angles, clips and other miscellaneous pieces necessary to attach light gauge framing to building structure or to attach other materials to light gauge framing.

P. Do not bridge building expansion and control joints with cold formed metal framing. Independently frame both sides of joints.

Q. Install in built-up exterior framing members, such as headers, sills, boxed joists and double studs, inaccessible upon completion of framing work.

3.4 INSTALLATION OF FIRE-RATED ASSEMBLIES

A. Install studs which are components of fire-rated wall assemblies as indicated.

3.5 BACKING IN STUD PARTITIONS

A. Securely weld or screw cut sections of unpunched stud to at least three stud or furring supports, leaving flat surface of backing stud web to receive attachment of object to be secured.

B. Verify that any pre-drilling of backing and attachment of spacers to prevent crushing of collateral material is done prior to application of collateral material.

C. If it is determined by the Architect that backing was not provided for any items as required, the Contractor shall remove the finish material and install backing. The Contractor shall patch and refinish surface to match adjacent area and finish.

3.6 FIELD QUALITY CONTROL

A. Owner's Testing Agency will:
1. Provide continuous inspection of welding, including prior fit-up, welding equipment, weld quality, and welder certification in accordance with AWS and CBC Section 1701A.5.5.1.
2. Provide continuous inspection during installation as required to establish conformity of Work requirements.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

SCHEMBRI CONSTRUCTION
S.F. CA
(415) 656-0300

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes roof curbs, cants, and perimeter nailers; blocking in wall openings; wood furring and grounds; telephone and electrical panel back boards; and preservative treatment of wood.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:
   1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
   2. AWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
   3. AWPA C27 – Plywood – Fire-Retardant Treatment by Pressure Process.

C. ASTM International:
   1. ASTM A36 - Standard Specification for Carbon Structural Steel.
   2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

D. California Building Code, California Code of Regulations, Title 24, 2001 Edition (noted herein as CBC) Chapter 23A.

E. National Institute of Standards and Technology:
   1. NIST PS 20 - American Softwood Lumber Standard.

F. The Redwood Inspection Service:
   1. RIS - Standard Specifications for Grades of California Redwood Lumber.

G. West Coast Lumber Inspection Bureau:
   1. WCLIB - Standard Grading Rules for West Coast Lumber.

H. Western Wood Products Association:
   1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

A. Section 01 32 19 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and application instructions.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. Lumber Grading Agency: California Building Code Standard No. 23-1, Classification, Definition and Methods of Grading for all Species of Lumber.
   2. Plywood: California Building Code Standard No. 23-2.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber Grading Rules: RIS; WCLIB.

B. Structural Lumber and Plywood:
1. Lumber and plywood graded and grade-marked per standards specified.
2. Lumber:
   a. Size per industry standards for nominal sizes shown; S4S.
   b. Moisture content of framing: Maximum 19 percent when installed and 15 percent maximum at time of close-in. In areas with dry hot summer months, maximum at close-in to be 12 percent.
   c. Sills on concrete or masonry: Redwood foundation grade, or pressure treated No. 1 Douglas Fir.
   d. Structural framing: Douglas Fir with grades as noted below unless otherwise specified on drawings. All grades per WCLIB STD grading rules #17.
      1) Permanently exposed framing: Select structural grade with no box heart.
      2) Except per Paragraph 2.1.B.2.d.1) above, minimum grades are: 1x, 2x4, 2x6, and 2x8 studs and plates D.F. No. 1; 4x and larger D.F. No. 1; Blocking DF No. 2.
      3) Miscellaneous framing - D.F. No. 2
   e. Applicable WCLIB paragraphs for framing:

1x, 2 x 4 to 4 x 4	par. 124
2 x 6 to 4 x 16 Structural joists and planks	par. 123
Beams (6x), beams and stringers	par. 130
Posts (6x)	par. 131

   f. Splits and checks: Limited to 1x the depth of the member.
   g. Do not use warped/twisted and checked members regardless of grade marks.
3. Plywood:
   a. Structural plywood: Grade marked for conformance with CBC and Uniform Building Code Standard 23-2. "Product Standard PS-1-95" and fabricated with exterior glue. Grades shall be as required on drawings.

2.2 ACCESSORIES

A. Fasteners and Anchors:
1. General requirements for fasteners:
   a. Fastenings shall be of adequate size, spacing and number to resist design loads under intended use, and types shall be appropriate for the materials or conditions for which used.
   b. Include washers, pre-drilling, etc. required for proper installation.
   c. For exterior work, fastenings shall be hot dip galvanized, non-ferrous, or made rust-resistant by approved methods.
   d. Fasteners at Treated Wood: Hot dip galvanized.
2. Nails and nailing not otherwise shown or specified:
   a. Comply with requirements of CBC.
   b. For securing materials to hardened concrete or masonry: Hardened steel masonry nails or Tapcon screws.
   c. For Framing, Plywood and General Structural Wood Work.

1. All nails for structural use shall be of bright common wire with full round heads and shall be of sufficient length to exceed required penetration into the supporting member by 1/8 inch.
2. Framing nails shall be hand driven and shall meet the dimensional requirements for common wire nails Table 23A-III-C-2 of CBC.
3. Plywood Nails: Hand driven nails shall conform to requirements above.
4. Pneumatically (machine) driven nails shall not be used without a valid ICBO Report. Contractor shall provide for submittal to DSA and the Architect/Engineer a current ICBO Report, nail sample with nail dimensions (head and shank diameter and nail length) and specifications for the nailing device. Nailing device must be adjustable regarding the depth of driving the nail. Use of pneumatic (machine) nailing is subject to a satisfactory sample jobsite demonstration for each project. The approval is subject to continued satisfactory performance. If nail heads penetrate the outer ply more than would be normal for a hand hammer or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory. Nails and nailing shall also conform to 1 above.
5. Nails into PTDF material to be galvanized.

3. Bolts:
   a. ASTM A-307, standard semi-finished machine bolts as shown or required; with malleable iron washers or steel plate washers, unless otherwise shown, shall be provided under all bolt heads and nuts.
   b. Bolts in concrete: Wedge or expansion anchors set after casting: Simpson Wedge – All and Powers Wedge Bolt.
   c. Anchor bolts: ASTM A307 with standard head or ASTM A36 with plate washer. No upset threads allowed. No L or J bolts allowed. Other grades of steel are as required on drawings and/or the Structural Steel Section.
   d. Bolts at Treated Wood: Hot dip galvanized.
4. Powder-actuated fastenings: Use only as approved by the Architect/Engineer and DSA; operators shall be qualified.
5. Framing hardware: Fabricated sheet metal timber framing connectors: Manufactured from hot-dipped galvanized steel by "Simpson Company", Dublin, CA; "USP Lumber Connectors", Livermore, CA, or approved equivalent. Connectors shall be at least 16 gauge material, (1/8 inch plate materials where welded), unless otherwise noted, punched for nailing. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Fabricate heavy hardware from A-36 steel per Division 5, Metals. Hardware intended for exterior use shall be galvanized.

2.3 FACTORY WOOD TREATMENT

A. Preservative Treatments:
   1. Field-applied treatment to light framing: For all lumber and plywood contacting or within 6-inches of soils and contacting concrete or masonry, except pressure treated materials. Use pressure treated materials for all items embedded in concrete, or in contact with soil.
      a. F.S. TT-W-570a(1), non-creosote type.
      b. Apply two brush coats, or fill-immersion dip not less than 15 minutes, or as required to thoroughly saturate all surfaces after cutting. Air dry 2-hours minimum before installation.
      c. Acceptable Products: Cuprinol #10, Darworth Co , Avon, CT, Termin-8, Jasco.
   2. Framing lumber and plywood that is directly exposed to weather or soil:

a. Pressure-treated materials shall be in accordance with CBC 2303.3 with preservative retention levels as follows: (16/F+^{3})
   1) Alkaline/Copper/Quaternary (ACQ), 0.25 lbs. Preservative per foot^3 above ground, 0.40 lbs. Preservative per foot^3 in contact with ground
b. Preservative types:
   1) Alkaline/ Copper/ Quaternary (ACQ).
c. Treated lumber shall bear an AWPA treatment stamp on each piece.
d. Field treatment of end cuts and holes in pressure treated materials F.S. TT-W-472B and per Paragraph 2.3.A.2.a.1) above.

B. Fire Resistant Treatment for all Interior Wood and Plywood:
1. All wood used inside the building envelope and roof curbs at openings is to be fire treated as follows:
   a. Pressure treatment, AWPA C20 for lumber and AWPA C27 for plywood, Interior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread/smoke development rating of 25/450. Product and application process must be recommended by manufacturer of treatment as being suitable for painting. Fire retardant to be applied by a California State Fire Marshal approved licensed Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate conditions are ready to receive blocking, curbing and framing.

3.2 PREPARATION

A. Coordinate placement of blocking, curbing and framing items.

3.3 INSTALLATION

A. Set members level and plumb, in correct position.

B. Place horizontal members, crown side up.

C. Construct curb members of solid wood sections.

D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

E. Coordinate curb installation with installation of decking and support of deck openings, and parapet construction.

F. Space framing and furring 16 inches on center.

G Secure sheathing to framing members with ends over firm bearing and staggered.

H. Install pre-painted telephone and electrical panel back boards with plywood sheathing material where required. Size back boards 12 inches beyond size of electrical and telephone panel.

3.4 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment

B. Brush apply one coat of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.5 SCHEDULES

A. Roof Blocking and Curbs; Wood Blocking; Nailers; Shims: Douglas Fir species, 19 percent maximum moisture content, pressure preservative treatment.

B. Telephone and Electrical Panel Boards: 3/4 inch thick, square edges, site brush applied preservative treated.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Interior trim and millwork. - FURNISHED UNDER SPEC. SECTION 06 41 00
2. Hardware and attachment accessories.

B. Related Sections:
1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.
2. Section 06 41 00 - Custom Cabinets: Shop fabricated custom cabinet work.
3. Section 07 90 00 - Joint Protection.
4. Section 08 21 00 - Flush Wood Doors.
5. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A135.4 - Basic Hardboard.
2. ANSI A156.9 - Cabinet Hardware.

B. APA-The Engineered Wood Association:
1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

C. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. American Wood-Preservers' Association:
1. AWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.

E. Federal Specification Unit:
1. FS A-A-1936 - Adhesive, Contact, Neoprene Rubber.

F. Hardwood Plywood and Veneer Association:
1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

G. National Institute of Standards and Technology:
1. NIST PS 20 - American Softwood Lumber Standard.

H. U. S Department of Commerce National Institute of Standards and Technology:
1. DOC PS 1 - Construction and Industrial Plywood.
2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
3. DOC PS 20 - American Softwood Lumber Standard.

I. Woodwork Institute:
1. WI - Manual of Millwork.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, finishes, and accessories to a minimum scale of 1-1/2 inch to one foot.
1. Furnish a WI - Certified Compliance label on first page of shop drawings.

C. Product Data:
1. Submit technical data on plastic lumber.
2. Submit data on fire retardant treatment materials and application instructions.

D. Samples:
1. Submit two samples of wood trim 6 inch long.

E. Certification: Submit copy of fabricators WI certified compliance certificate.

F. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered lumber, and locally-sourced wood, as specified in Section 01 35 15 – LEED Requirements.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with WI (Woodwork Institute) Manual of Millwork, Custom Grade.

B. Issue WI Certified Compliance Certificate to Architect prior to delivery of millwork and provide WI Certified Compliance Labels on all items of millwork.

C. All millwork and the installation of millwork shall be monitored for compliance under the scope of the WI Certified Compliance Program (CCP).

D. Provide WI Reinspection Service at the job site prior to installation. Provide to Architect a written report showing results of the reinspection.

E. Upon completion of the installation, provide a WI Certified Compliance Certificate.

F. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.

G. Sustainable Project Goals:
1. LEED Credit EQ4.4: Composite wood products shall contain no added urea formaldehyde resins, or be exterior grade.

1.5 QUALIFICATIONS

A. Fabricator: Authorized to provide WI Certified Compliance Certificate.

1.6 REGULATORY REQUIREMENTS

A. Conform to UBC and UL requirements for fire ratings.

B. Conform to Flame Spread Classifications of Interior Millwork contained within the Appendix of the WI Manual of Millwork for flame spread ratings.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Conform to Section 1 of WI – Manual of Millwork.

C. Store materials in ventilated, interior locations under constant minimum temperatures of 70 degrees F and maximum relative humidity of 50 to 55 percent.

D. Protect work from moisture damage.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 SEQUENCING

A. Sequence work to ensure utility connections are achieved in orderly and expeditious manner.

1.10 COORDINATION

A. Coordinate work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.1 FABRICATORS

A. Active member of the Woodwork Institute, licensed by WI to provide WI certified Compliance Certificates and Labels for the products and materials specified in this Section. Woodwork Institute Phone: (916) 372-9943.

B. Substitutions: Under provisions of Section 01 60 00.

2.2 WOOD-BASED COMPONENTS - GENERAL

A. Materials specified under Millwork Manual Section Numbers refer to the following lumber grades:
1. Section 3, Lumber Grades – Hardwood/Softwood.
2. Section 4, Plywood Grades – Hardwood/Softwood.
3. Section 6, Exterior Trim, Frames & Millwork.
4. Section 7, Exterior Sash and Windows.
5. Section 9, Interior Trim, Jambs & Millwork.
6. Section 11, Architectural Wall Surfacing.
7. Section 12, Doors, Flush.
8. Section 14, Casework.

B. Wood fabricated from old growth timer is not permitted.

C. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00.

D. Provide wood harvested within a 500 mile radius of the project site.

E. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

2.3 LUMBER MATERIALS

A. Softwood Lumber: NIST PS 20; Custom grade in accordance with WI; minimum moisture content of 6 percent and maximum of 12 percent Douglas Fir species, with vertical grain, of quality capable of opaque finish.

B. Hardwood Lumber: Custom grade in accordance with WI; minimum moisture content of 6 percent and maximum of 12 percent.

2.4 INTERIOR TRIM - PAINT GRADE

A. Finger jointed kiln-dried pine is acceptable for all areas except high moisture areas.

B. Trim profiles: Mill standard shapes as indicated.

C. Paint-grade trim: Pre-prime at mill.

2.5 ADHESIVE

A. Adhesives: Type 1 adhesive recommended by WI to accommodate application in accordance with the Appendix to the Millwork Manual.

B. Formulation: Exterior type per AWPA C20, consisting of organic-resin solution, insoluble in water, thermally set in wood by kiln drying.

C. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.6 ACCESSORIES

A. Nails: Size and type to suit application, galvanized finish for interior use, stainless steel for exterior use.

B. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; galvanized finish for interior use, stainless steel for exterior use.

C. Lumber for Shimming and Blocking: Softwood lumber of Douglas Fir species.

D. Primer: Alkyd primer sealer.

E. Wood Filler: Solvent base, tinted to match surface finish color.

2.7 FABRICATION

A. Fabricate to WI Custom standards.

B. Shop assemble work for delivery to site, permitting passage through building openings.

C. Fit exposed sheet material edges with matching hardwood edging. Use one piece for full length only.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

E. Interior Finish Trim: Mill reverse side of material ("back-out") when lumber is over 5/8 inch thick and more than 1-5/8 inch wide.

F. Saw-Kerfing Flat Trim: To prevent cupping and warping, saw cut the backs of flat trim 1" x 8" and wider, or 2" x 6" and wider.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and openings are ready to receive work and field measurements are as instructed by the fabricator.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

C. Verify adequacy of backing and support framing.

D Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A. Install work in accordance with WI Manual of Millwork, Custom quality standard.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install components and trim with nails at 6 to 8 inches on center.

E. Countersink mechanical fasteners at exposed and semi-exposed surfaces.

F. Method of attachment, including the type, size, frequency, and/or spacing of anchoring devices and fasteners shall comply to WI Manual of Millwork minimum requirements or be as indicated on the drawings.

3.3 PREPARATION FOR SITE FINISHING:

A. Set exposed fasteners. Sand work smooth.

B. Site Finishing: Refer to Section 09 90 00.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials or that will be permanently concealed from view.

3.4 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 41 00

CUSTOM CABINETS

SUBMITTAL # 22
FREMONT MILLWORK
KLAMATH FALLS, OR
PH 541-884-5554

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes custom-fabricated cabinet units; counter tops; cabinet hardware; preparation for installing utilities in cabinets; and shop finishing.

B. Related Sections:
1. Section 06 10 53 - Miscellaneous Rough Carpentry: Grounds and support framing.
2. Section 06 20 00 - Finish Carpentry: Related trim not specified in this section.
3. Section 22 01 00 - Plumbing Materials and Methods: Plumbing utilities and fixtures.
4. Section 26 01 00 - Basic Materials and Methods: Power, signal, and data wiring.

1.2 REFERENCES

A. Air Quality Management District.

B. American National Standards Institute:
1. ANSI A156.9 - Cabinet Hardware.
2. ANSI A208.1 - Mat-Formed Wood Particleboard.

C. California Building Code:
1. CBC - Chapter 16.

D. Federal Specification Unit:
1. FS A-A-1936 - Adhesive, Contact, Neoprene Rubber.

E. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates.

F. South Coast Air Quality Management District.
1. SCAQMD Rule 1168 – Adhesive and Sealant Applications.

G. Woodwork Institute:
1. WI - Manual of Millwork.

1.3 DEFINITIONS

A. Exposed Portions - All Grades: Surfaces visible when doors and drawers are closed; underside of bottoms of cabinets over 4 feet above finished floor; cabinet tops under 6 feet above finished floor or if over 6 feet and visible from upper building level or floor; visible front edges of web frames, ends, divisions, tops, shelves, and hanging stiles; visible sloping tops of cabinets; visible portions of bottoms, tops, and ends in front of sliding doors.
1. Additional Exposed Portions - Premium Grade Only
   a. Visible surfaces in open cabinets or behind glass.
   b. Interior faces of hinged doors

B. Semi-Exposed Portions: Shelves; divisions; interior face of ends, backs, and bottoms; drawer sides, subfronts, backs, and bottoms; underside of bottoms of cabinets between

2-1/2 and 4 feet above finished floor; interior faces of hinged doors, except Premium Grade; visible surfaces in open cabinets or behind glass for Custom Grade and all rooms designated as storage, janitor, closet, or utility.

C. Concealed Portions: Toe space; sleepers, web frames, stretchers, and solid sub-tops; security panels; underside of bottoms of cabinets less than 2-1/2 feet above finished floor; flat tops of cabinets 6 feet or more above finished floor except if visible from upper building level; 3 non-visible edges of adjustable shelves; underside of countertops, knee spaces, and drawer aprons; faces of cabinet ends of adjoining units that butt together.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
1. Apply WI Certified Compliance Label to first page of shop drawings.

C. Product Data: Submit data for hardware accessories.

D. Samples:
1. Submit two 8 by 10 inch size samples, illustrating cabinet finish and edge treatment.
2. Submit two 8 by 10 inch size samples, illustrating counter top finish and edge treatment.
3. Submit two samples of drawer pulls and hinges, illustrating hardware finish.

E. Certification: Submit copy of fabricator's WI certified compliance certificate.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with WI (Woodwork Institute of California) Manual of Millwork, Custom Grade.
1. Mark each unit of architectural woodwork with WI Certified Compliance Label indicating quality grade required.

B. Sustainable Project Goals:
1. LEED Credit EQ4.1: Comply with SCAQMD Rule 1168 for casework adhesives.

1.6 QUALIFICATIONS

A. Fabricator: Authorized to provide WI Certified Compliance Certificate.

1.7 MOCKUP

A. Section 01400 - Quality Requirements: Mockup requirements.

B. Construct mockup of full size base cabinet and upper cabinet including hardware, and accessories.

C. Locate where directed by Architect.

D. Approved mockup may be accepted as part of Work.

1.8 PRE-INSTALLATION MEETINGS

A. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect units from moisture damage

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.

1.11 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. General:
   1. Material Grade. WI Custom Grade unless otherwise noted.
   2. Lumber and Plywood: Kiln-dry to equilibrium moisture content suitable for fabrication in shop and use intended. Particleboard not permitted.

B. Lumber, Solid Stock:
   1. Concealed Portions: Paint grade Birch.

C. Plywood: Marine plywood, surfaced 1 side.

D. Hardboard: ANSI A135.4, tempered, smooth surface both faces.

E. Medium Density Fiberboard: ANSI A208.2.

F. High Pressure Decorative Laminate: NEMA LD 3, GP50 for horizontal surfaces, GP28 for vertical surfaces, CL20 for cabinet liner surfaces, BK20 for undecorated backing sheets, PF42 for post forming, FR50 for fire-retardant surfaces;
   1. Manufacturer: Nevamar Corp.; Wilsonart, or equal.
   2. Colors and textures: Nevamar ARP textured finish; Wilsonart; multiple colors as selected by Architect. NEVAMAR, HONEY TONE ESSENCE

G. Melamine Laminate: Low pressure decorative, ALA approved.

H. Sheet Metal Components: Stainless steel, Type 304 with #4 satin finish, 16 gauge.

2.2 ACCESSORIES

A. Adhesive for High Pressure Decorative Laminates: Urea formaldehyde cold setting or phenol resin with catalytic agent.

B. Plastic Edge Banding: 3mm PVC, black, at plastic laminate finished cabinets.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; US26D finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Hardware:

1. General Requirements:
   a. General: Furnish necessary screws, staples, bolts or other fastenings of proper size and type to secure items in position and, where exposed, to match finish of hardware item fastened.
   b. Finish: Exposed hardware; US26D (satin chromium plated).
   c. Keying: Key groups of locks the same in accordance with the Owner's directions.

2. Typical hardware except where specifically noted otherwise.
   a. Pulls at Drawers and Doors:
      1) General: Provide U-shaped wire pulls or equally accessible pull hardware at all accessible casework.
      2) 1 per drawer unless otherwise shown; solid stainless steel wire pull, 3-1/2 inches center-to-center.
      3) Manufacturer: Trimco 562-3.

3. Hinges at 3/4-inch Thick Doors:
   a. Self closing concealed hinge, stainless steel, heavy duty.
   b. 1 pair typically; 1-1/2 pair where more than 3 feet high, 120-degree swing, self-closing.
   c. Manufacturer: ~~Blum, #75M5580~~, or equal; with minimum 120 degree opening. SALICE #C2R9A99

4. Drawer Slides:
   a. Full Extension: 100 pounds load capacity.
   b. Finish: Stainless steel.
   c. Manufacturer: Accuride, model 3832, or equal.

5. Locks for Cabinets:
   d. Pin tumbler cylinder, with 90-degree bolt throw, key removable in locked and unlocked positions with 3/4-inch diameter bore hole, brass construction. Dull chrome finish.
   e. Manufacturer: ~~MacMurray~~ Pacific, C8102, or equal. NATIONAL LOCK #CB188

6. Shelf Hardware:
   a. Standards:
      1) Steel, zinc plated.
      2) Finish: US32, satin finish.
      3) Manufacturer: ~~Knape and Vogt Mfg. Co., "No. 255ZC"~~; or equal. HETTICH INTER. #079707
   b. Supports:
      1) Steel, zinc plated.
      2) Finish: US32, satin finish.
      3) Manufacturer: ~~Knape and Vogt Mfg. Co., "No. 239ZC"~~; or equal. SEKURA #6

7. Door and Drawer Silencers:
   a. Gray rubber.
   b. Manufacturer: Builders Brass Works, Model W06, or equal.

8. Seismic Restraints at all shelving.

9. Coat Hooks:
   a. Base: 1-3/4 inches H x 1-1/4 inches W.
   b. Projection: 3 inches.
   c. Conforms to ANSI/BHMA L33113.
   d. Material: Cast aluminum.
   e. Finish: Polished aluminum.
   f. Manufacturer: Ives #571 Coat Hook.

2.3 FABRICATION

A. General: Manufacture to Custom Grade standards, except where specifically noted otherwise, per Section 15 of WI Manual of Millwork. Provide WI Certified Compliance Label for grade specified, to each elevation of casework.

B. Construction:
   1. General: Style A; Type I, frameless construction with doweled joints. Multiple self-supporting units fastened together to form a larger unit. Completely face exposed and semi-exposed surfaces with plastic laminate. Interior faces of hinged doors: Faced with same laminate as exposed surface. As far as practical, fabricate casework complete as a unit in the shop; backs required.
   2. Door and Drawer Fronts: 3/4 inch flush overlay; Type A.
   3. Shelving: One of the following:
      a. Douglas Fir, solid-stock, Custom Grade for opaque finish.
      b. Douglas Fir plywood, Custom Grade for opaque finish; with 3/8 inch minimum edge-banding or Architect approved machine-applied-type edge banding.
      c. Plastic laminate faced plywood.
      d. Thicknesses: Per WI Standards; 3/4 inch minimum thickness, 1 inch thickness for spans between 2'-9" and 4'-0". Any facings shall be in addition to these thicknesses.
      e. Shelf spans greater than 4'-0" not permitted.
   4. Filler Panels: As required, to match cabinets as shown.

C. Countertops:
   1. General: Fabricate as shown, in longest practical length; minimum number of joints. Make joints neat and watertight; abutting ends splined and adjoining surfaces flush; ease exposed edges.
   2. Core Material: Medium density fiberboard, or close grain hardwood plywood. Thickness: As shown; not less than 3/4 inch.
   3. Backsplash: Height, type, and edge: As shown on drawings.

D. Casework Hardware:
   1. General: Prefit; remove for application of finish. Keep hardware with casework to which it has been prefit; reinstall after casework is anchored in place, as shown.
   2. Hinges: Four (4) No. 8 screws into end panel and door panel; 1-1/2 pair on 7'-0" high cabinet doors; tall cabinet doors must swing 180 degrees when adjacent to low cabinets without interference from counter top.
   3. Magnetic Catches: One catch on cabinet doors up to 48 inches high; two catches (top and bottom) on cabinet doors over 48 inches high.

E. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

F. Fit shelves, doors, and exposed edges with matching veneer for wood cabinets and plastic edge binding for plastic laminate cabinets. Use one piece for full length only.

G. Cap exposed high pressure decorative laminate finish edges with plastic edge binding.

H. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

I. Apply high pressure decorative laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

J. Fabricate metal counter top surfaces pressure glued to plywood core without visible joints.

K. Mechanically fasten back splash to counter tops with steel brackets at 16 inches on center.

L. Fabricate cabinets and counter tops with cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

A. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Provide WI Certified Compliance Certificate for installation.

B. Casework:
1. General: Install level, with tight joints between units; scribe edges tofit adjacent structure. Secure to blocking or plates in wall or to casework carriers with flathead screws to permit removal; screw penetration of not less than 1 inch into 2 inch nominal blocking or framing is required.
2. Filler Panels: Scribe to cabinets and abutting structure.

C. Countertops:
1. General: Install level, using concealed fasteners, with tight joints; scribe to fit wall surfaces.
2. Countertop Supports: Install as shown.

D. Hardware:
1. General: Check hardware upon delivery to site; store in an orderly manner. Fit and install in place without marring or injuring either hardware or casework.

E. Set and secure casework in place; rigid, plumb, and level.

F. Use fixture attachments in concealed locations for wall mounted components. Attach to blocking in walls per DSA requirements.

G. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

H. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch Do not use additional overlay trim for this purpose.

I. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

J. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Immediately following installation, clean casework (including counters, shelves, hardware, fittings, and fixtures) to remove dirt, stains, scratches, and abrasions. Protect casework against damage by other trades; repair or replace damaged and defaced material at no cost to Owner.

3.5 JOBBING

A General: Six (6) months after final acceptance of the building, and at any time within a year after acceptance when so directed, examine casework doors, drawers, fittings, etc., and perform such fitting and adjustments as necessary to put items in good condition and working order.

END OF SECTION

1.3 SYSTEM DESCRIPTION

A. Materials of This Section: Provide thermal protection to air seal materials at building enclosure elements in conjunction with air barrier materials in Section 07 27 00.

B. Performance Requirements: Provide products that have been manufactured, fabricated and installed to the following criteria:
1. Surface Burning Characteristics, Unfaced (ASTM E84): Flamespread index 25, smoke developed 50.
2. Recycled Glass Content: 25 percent.
3. Combustibility (ASTM E136): Noncombustible.
4. Formaldehyde Content: Free of formaldehyde.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on manufacturer's specifications, product characteristics, performance criteria, limitations, and installation instructions.

C. Manufacturer's Certificate: Submit manufacturer's certification that insulating materials comply with California Quality Standards for insulation materials; CBC, Section 5311.

D. LEED Submittals: Provide documentation indicating how the requirements of Credit MR 4.1/4.2 will be met.
1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E84.
2. Fire-Resistance Ratings: ASTM E119.
3. Combustion Characteristics: ASTM E136.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.7 COORDINATION

A. Coordinate the Work with Section 07 27 00 for air seal materials.

PART 2 - PRODUCTS

2.1 BLANKET INSULATION

A. General: Refer to Section 01 60 00 – Product Requirements.

B. Manufacturers:
1. General: Products are manufactured by Johns Manville International, Inc (JM), PO Box 5108, Denver, CO 80217. (800) 654-3103. Fax: (303) 978-2318.
2. Alternate Manufacturers: Comparable products manufactured by CertainTeed Insulation; Owens Corning Fiberglas; USG; Thermafiber; or accepted equal
3. Substitutions: Section 01 60 00 - Product Requirements: Product Options and Substitutions.
4. Thickness: As shown; where not shown, as required to meet CBC ratings.

2.2 INSULATING MATERIALS - GENERAL

A. General: Provide insulating materials that comply with requirements and with referenced standards.
1. Preformed Units. Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Recycled Content: To meet the requirements of LEED Credit MR 4.1 and MR 4.2 provide insulating materials complying with the following:
1. Credit 4.1: Provide insulating materials with post-consumer recycled content constituting a minimum of five (5) percent of cost of materials used for project or post-consumer recycled content plus one-half of pre-consumer recycled content constituting a minimum of 10 percent of cost of materials used for project.
2. Credit 4.2: Provide insulating materials with post-consumer recycled content constituting a minimum of ten (10) percent of cost of materials used for project or post-consumer recycled content plus one-half of pre-consumer recycled content constituting a minimum of 20 percent of cost of materials used for project.

2.3 FORMALDEHYDE-FREE INSULATING MATERIALS

A. Formaldehyde-Free Unfaced Glass-Fiber Batt Insulation: JM Formaldehyde-Free Unfaced Batts; ASTM C665, Type I; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
1. Thermal Resistance (R-Value): R-11 and R-19.
2. Combustion Characteristics: Passes ASTM E136.
3. Critical Radiant Flux. ASTM E970, greater than 0.11 Btu/sq ft s (0.12 W/cm sq)
4. Water Vapor Sorption: ASTM C1104, 5 percent or less.
5. Odor Emission: Passes ASTM C1304.
6. Corrosiveness: Passes ASTM C665.
7. Fungi Resistance: Passes ASTM C1338.
8. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20 percent post-consumer and 5 percent pre-consumer recycled glass product, on average of manufacturer's products.\
9. Prove through documentation that product complies with CIWMB Section 01350 for indoor air quality.
10. Thickness: 3-5/8 inches for R11; and 6-1/2 inches for R-19.

B. Formaldehyde-Free FSK-25 Faced Glass-Fiber Batt Insulation: JM Formaldehyde-Free FSK-25 Faced Batts; ASTM C665, Type III, Class A, Category 1 with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
1. Thermal Resistance (R-Value): R-11 and R-19.

2. Combustion Characteristics: Passes ASTM E136.
3. Critical Radiant Flux: ASTM E970, greater than 0.11 Btu/sq ft s (0.12 W/cm sq).
4. Water Vapor Permeance: ASTM E96, 0.05 Perms (3 ng/Pa-s m^2).
5. Water Vapor Sorption: ASTM C1104, 5 percent or less.
6. Odor Emission: Passes ASTM C1304.
7. Corrosiveness: Passes ASTM C665, 13.8.
8. Fungi Resistance: Passes ASTM C1338.
9. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20 percent post-consumer and 5 percent pre-consumer recycled glass product, on average of manufacturer's products.
10. Prove through documentation that product complies with CIWMB Section 01350 for indoor air quality.
11. Thickness: 3-5/8 inches for R11; and 6-1/2 inches for R-19.

2.4 ACCESSORIES

A. Safing: USG (800-874-4968) SAFB mineral wool.

B. Nails: 11 gage, barbed, galvanized; 5/8 inch diameter heads.

C. Staples: 7/16 inch steel wire staples.

D. Tape: Self-adhesive vapor retarder tape with flame spread index of 25 or less, smoke developed index of 50 or less.

E. Adhesive: Gemco Tuff Bond Hanger Adhesive.

F. Insulation Fasteners: Steel impale spindle and clip on flat metal base, self adhering backing, length to suit insulation thickness, capable of securely and rigidly fastening insulation in place. Cemco Insul-Anchors.

G. Wire Mesh: Galvanized steel, hexagonal wire mesh.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Verify substrate, adjacent materials, and insulation are dry and ready to receive insulation.

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

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

A. Seal joints between closed-cell (non-breathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

B. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
1. Tape ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

C. Install glass-fiber blankets in cavities formed by framing members according to the following requirements:
1 Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.6 SCHEDULE

A. Interior Wall (Sound) Insulation: R-11 batt, 3-5/8 inch thick, unfaced; and R-19 batt, 6-1/2 inch thick, unfaced. See drawings for location.

B Exterior Wall (Thermal) Insulation: R19 batt, 6-1/2 inch thick, FSK-25 faced. See drawings for location.

END OF SECTION

SECTION 07 26 00

CONCETE VAPOR CONTROL BARRIER

SUBMITTAL #9
RENO'S FLOOR COVERING
SAN RAFAEL, CA
PH 949-748-6463

PART 1 – GENERAL

1.1 SUMMARY

A. Application of a vapor control barrier in areas scheduled to receive floor coverings.

B. Related Sections:
1. Section 03 30 00 – Cast-in-Place Concrete.
2. Section 09 65 00 – Resilient Flooring.
3. Section 09 68 00 – Carpeting.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 318 – Building Code Requirements for Structural Concrete.

B. ASTM International:
1. ASTM D1308 – Standard Test Method for Effort of Household Chemicals on Clear and Pigmented Organic Finishes.
2. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
3. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
4. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
5. ASTM F1869 – Standard Test method for Measuring Moisture Vapor Emission Rate of Concrete Subflooring Using Anhydrous Calcium Chloride.

C. Bay Area Air Quality Management District. www.baaqmd.gov

1.3 SYSTEM DESCRIPTION

A. Clear penetrating-film forming polymer based, moisture-alkaline barrier for suppressing water vapor emission rates, alkalinity, salt migration and water absorption. Final surface shall maintain a water vapor emission rate of 2.5 (±0.50) and alkaline resistance of 14pH for a period of 15 years.
1. Option 1: Apply as a curing, sealing, moisture barrier to freshly poured concrete.
2. Option 2: Application is required to suppress moisture vapor emission rates where testing results exceed flooring tolerances at no cost to Owner.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product Data: Physical properties, technical limitations and application requirements.

C. Material Samples. Submit three (3) concrete samples coated one surface and uncoated on opposite surface.

D. Installer: Approved, certified installer certificates.

E. Provide verification of the following:
1. ASTM E 96 Water Vapor Transmission Reduction.
2. ASTM D 4541 Concrete Adhesion.
3. ASTM D 1308 Alkaline, 14pH resistance.
4. VOC content per EPA Method 24.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section (polymer based moisture-alkaline control barriers) with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum two years experience, approved by manufacturer prior to project start.

1.6 PRE-INSTALLATION MEETING

A. Section 01 31 19 – Project Meetings: Pre-Installation Meetings.

B. Convene pre-installation meeting a minimum of three weeks prior to commencing work of this section. Testing Agency to participate in the meeting.
1. Review ASTM F1869, ASTM F710 testing results, building temperature, interior humidity and site conditions. Installer will provide specified vapor-alkalinity control barrier installation procedures and application details.

C. Safety Meeting: Installer shall report ventilation requirements, site protection and material data safety information to disclose product limitations and precautions prior to application. Information is to prevent site contamination and safety issues with other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver Material Safety Data Sheets to site prior to application.

1.8 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties. B. Performance: Application of product shall yield a water vapor emission rate of 2.5 pounds (±0.50) per ASTM F 1869 prior to flooring application. Repair areas above specified requirements at no cost to Owner.
1. Issuance of warranty shall NOT remove specified performance requirements.

B. Flooring Warranty: In the event moisture vapor emission rates exceed 2.5 pounds (±0.50) and floor covering adhesion is damaged during a period of 15 year period, manufacturer and installer shall repair or replace damaged flooring at no cost to Owner. Repair shall include new barrier materials, floor coverings, adhesives and patching materials.

PART 2 - PRODUCTS

2.1 CONCRETE VAPOR CONTROL BARRIER

A. Manufacturers:

1. Synthetics Intl; www.SyntheticsIntl.com (866) 646-0356
   a. Product: Synthetic10
2. Diamond Stone Products; www.DiamondStoneProducts.com
   a. Project: Vapor Remediation System – VRS
3. Dex-o-Tex; www.CrossfieldProducts.com
   a. Primer 100
4. Substitutions: Not permitted.

2.2 PHYSICAL PROPERTIES

A. The below methods are to be reported by independent laboratory testing:
   1. ASTM E 96 Water Vapor Transmission, wet method ..... 75-95% vapor reduction
   2. ASTM D 4541 Concrete Adhesion. ..... 400-600psi (100% concrete cohesive failure)
   3. ASTM D 1308 Alkaline, 14pH Resistant ..... 100% Resistant to long term 30 day exposure
   4. VOC Content Testing per EPA Method 24. ..... 50 g/liter or less

B. Site Performance:
   1. ASTM F 1869 Moisture Reduction. ..... 2.5 lbs. (±0.50)
   2. ASTM F 710 Alkalinity Resistance. ..... Resistant to 12.5 -14pH
   3. ASTM D 4541 Concrete Adhesion ..... 100% concrete surface failure

C. Environmental
   1. Clean Up: Water cleanable, no solvents
   2. Odor: Low odor

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions are acceptable for a warranted application.

B. Report unacceptable conditions prior to application.

3.2 PREPARATION

A. Clean concrete surfaces to allow maximum material penetration in the presence of manufacturer's technical personnel.

B. Vacuum and remove surfaces contamination.

3.3 INSTALLATION

A. Pour barrier on concrete and drag with a 3/8 inch nap roller to saturate surface.

B. Re-apply barrier in the opposite direction until saturation in accordance with manufacturer requirements.

C. Allow to cure 1 hour prior to light foot traffic
   1. Cement patching materials may be installed after 24 hours of cure with the use of a primer for non-porous surfaces.
   2. Apply flooring adhesives after 24 hours of cure.

3.4 FIELD QUALITY CONTROL

A. Section 01 45 23 – Testing and Inspection: Inspections and Tests by Manufacturer's Representatives.

B. Perform a minimum of ten (10) concrete moisture vapor emission tests (ASTM F 1869) over barrier surface to verify vapor reduction.
   1. Re-apply barrier in areas where emission rates exceed 2.5 lbs. (±0.50).
   2. Apply at a rate to suppress emission rates to compliance.

C. Report field testing to Architect, Owner and Inspector for approval.

END OF SECTION

SECTION 07 27 00

AIR BARRIERS

SCHEMARI CONSTRUCTION
S.F., CA
PH 415 656-0300

PART 1 GENERAL

1.1 SUMMARY

A. Section includes air leakage criteria for primary air seal building enclosure materials and assemblies; materials and installation methods supplementing primary air seal materials and assemblies; and air seal materials to connect and seal openings, joints, and junctions between other air seal materials and assemblies.
   1. Provide air barrier/weather resistant barrier over exterior of wall sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing and interior walls.

B. Related Sections:
   2. Section 05 40 00 – Cold Formed Metal Framing.
   4. Section 07 62 00 – Sheet Metal Flashing and Trim.
   5. Section 07 65 00 – Flexible Flashing.
   6. Section 09 24 00 – Portland Cement Plaster.
   3. Section 09 26 00 – Gypsum Board Assemblies: Exterior Gypsum Sheathing.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E1677 - Type I, Specification for Air Retarder (AR) Material or System for Framed Building Walls.
   2. ASTM E96 - Method B, Test Methods for Water Vapor Transmission of Materials.
   3. ASTM D882 - Method A, Test Methods for Tensile Properties of Thin Plastic Sheeting.
   4. ASTM D1117 - Test Methods for Nonwoven Fabrics.
   5. ASTM E84 -Test Method for Surface Burning Characteristics of Building Materials

B. American Association of Textile Chemists & Colorists:
   1. AATCC Test Method 127 Water Resistance: Hydrostatic Pressure Test.

C. Technical Association of the Pulp and Paper Industry:
   1. TAPPI Test Method T-41D - Grams of Paper and Paperboard (Weight per Unit Area).
   2. TAPPI Test Method T-460 - Air Resistance of Paper (Gurley Hill Method).

D. Sealant, Waterproofing and Restoration Institute:
   1. SWRI - Sealant Specification.

1.3 DEFINITIONS

A. Air Barrier: Continuous network of materials and joints providing air tightness, with adequate strength and stiffness to not deflect excessively under air pressure differences, to which it will be subjected in service. It can be comprised of single material or combination of materials to achieve performance requirements

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal Procedures.

B. Product Data: Submit manufacturer's most current technical product data and installation instructions and product testing results equaling or exceeding those specified.

C. Samples: Submit two of manufacturer's 8.5 inch x 11 inch standard sample of commercial air-moisture barrier sheet membrane for Architect's approval.

D. Quality Control Submittals:
   a. Pre-Installation Conference: Submit report verifying project site and substrate conditions, acceptance of mock-up panels prior to installation, including any special manufacturer field instructions or requirements. Review of access, safety, and protection plan to be included with report.
   b. Manufacturer's field service reports: Site reports on periodic visits indicating air-barrier system observation installation by an authorized field service representative.

E. Contract Closeout Submittals: Refer to Section 01700 for contract closeout submittal Information.
   1. Air-Barrier Warranty: Manufacturer's executed standard warranty form with authorized signatures and endorsements indicating date of completion.

1.5 QUALITY ASSURANCE

A. Source Limitations: Provide weather resistant barrier and accessory materials produced by one manufacturer.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section, with proven compliance with performance requirements listed in Paragraph 2.2.B and five (5) years experience with high quality manufacturing of non-woven, spun-bonded olefin sheet membrane air-barrier materials:

B. Installer: Company specializing in installation of commercial sheet membrane weather-resistant, air-moisture barrier systems on new construction projects of similar type, with minimum three years documented experience.

1.7 MOCK-UP

A. Install mock-up section using approved weather-resistant, air-moisture barrier system including approved fasteners, flashings, tape and related accessories per manufacturer's latest printed instructions and recommendations. Obtain Architect's approval of weather-resistant, air-moisture barrier system for appearance and workmanship standard. Contact manufacturer's designated commercial specialist or representative to perform required mock-up visual inspection and analysis, prior to air-moisture barrier system installation.
   1. Mock-up size: 10 feet by 10 feet (minimum size) to demonstrate weather resistant air-moisture barrier/secondary weather resistant barriers.
   2. Mock-Up Substrate: Exterior gypsum sheathing vertical, above-grade surfaces.
   3. Maintain mock-up during construction for workmanship standard.
   4. Mock-up to be incorporated into final construction upon written approval by Architect.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 - Project Meetings: Pre-installation meeting.

B. Convene a pre-installation meeting a minimum of two weeks prior to start of weather-resistant, air-moisture barrier installation. Meeting will be scheduled by General Contractor with Architect, General Contractor, Installing Contractor, Owner or Owner's Representative, and Manufacturer's designated Representative or Commercial Specialist at the project site.

C. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of air-moisture barrier system materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection of the work on secondary weather-barrier system.

1.9 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing and protecting products.

B. Deliver weather-resistant, air-moisture barrier system materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store and protect weather-resistant, air-moisture barrier system materials at temperatures and conditions as recommended by system manufacturer. Protect from damage during construction and while stored onsite.

1.10 SEQUENCING

A. Review requirements for sequencing of installation of weather resistant air-moisture barrier system and components with installation of windows, doors, louvers and flashings to provide a weather-tight barrier system.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction scheduling conflicts and delays.

C. Schedule installation of weather resistant, air-moisture barrier materials and covering of finish exterior cladding within four months of barrier system installation.

1.11 COORDINATION

A. Coordinate work with installation of flexible flashings specified in Section 07 65 00.

PART 2 – PRODUCTS

2.1 AIR BARRIERS

A. Manufacturers:
1. DuPont Building Innovations, 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805. 800-448-9835; www.tyvek.com.
2. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

B. Basis-of-Design Products: The design intent for secondary weather resistant, air and moisture barrier system is based on DuPont™ Tyvek® StuccoWrap® and related system components.

2.2 MATERIALS

A. DuPont™ Tyvek® StuccoWrap®: A flash spunbonded olefin, non-woven, non-perforated secondary weather resistant barrier.

B. Performance Characteristics:
1. Air Penetration: 0.004 cfm/ft2 @ 75Pa.
2. Air Penetration: 300 seconds, per TAPPI T–460, Gurley Hill (sec/100cc).
3. Air Retarder Standard Specification: Type I Air Barrier, per ASTM E1677.
4. Water Vapor Transmission: 350 g/m2-24 hours, per ASTM E 96 Method B (g/m2–24hr.).
5. Water Vapor Transmission: 50 perms, per ASTM E96 Method B.
6. Water Penetration Resistance: Exceeded at 210, per AATCC–127.
7. Basis Weight: 2.1 oz/yd^2, per TAPPI T-41D.
8. Breaking Strength: 30/30 lbs/in; per ASTM D-882, Method A.
9. Tear Resistance: 7/9 lbs, per ASTM D-1117.
10. Surface Burning Characteristics: Flame Spread: Class A, per ASTM E-84; Smoke Developed: Class A, per ASTM E-84.

B. Sealing Tape/Fasteners:
1. DuPont™ Tyvek® Tape, DuPont Weatherization Systems.
2. For steel frame construction: DuPont™ Tyvek® Wrap Cap Screws, DuPont Weatherization Systems. 1-5/8 inch rust resistant screws with 2-inch diameter plastic cap
3. Caulks and Sealants: Polyurethane or elastomeric sealants.
   a. Available Products:
      1) OSI® Quad Pro-Series®, solvent release butyl rubber sealant.
      2) DAP® Dynaflex 230™.
      3) Other products as approved and recommended by air barrier/weather resistant barrier manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are acceptable for installation of air-barrier system in accordance with manufacturer's instruction.
1. General: Do not proceed with weather resistant air-moisture barrier system installation work until unsatisfactory conditions have been corrected.

B. Commencement of installation constitutes acceptance of existing conditions and responsibility of satisfactory performance.

3.2 INSTALLATION – AIR BARRIER

A. Install Air Barrier over exterior face of exteriror wall substrate in accordance with manufacturer recommendations.

B. Install Air Barrier after sheathing is installed and before windows and doors are installed.

C. Start Air Barrier installation at a building corner, leaving 12 inches of air barrier extended beyond corner to over lap.

D. Apply wrap with grooved surface pattern in vertical direction.

E. Shingle air barrier over back edge of weep screed. Seal air barrier with sealant or tape to weep screed. Ensure weeps are not blocked.

F. Overlap subsequent layers a minimum of 6 inches horizontally in a shingling manner.

G. Window and Door Openings: Extend air barrier completely over openings.

H. Air Barrier Attachment: Attach Air Barrier to steel studs through exterior gypsum sheathing. Secure using air barier manufacterer recommended fasteners, space 6 -18 inches vertically on center along studline, and 24 inches on center, maximum horizontally.

I. Install flashing tape at perimeter of window and door openings according to manufacturer's installation instructions.

J. Install air barrier to maintain continuity across different substrates.

3.3 OPENING PREPARATION (FOR USE WITH NON-FLANGED WINDOWS)

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.4 OPENING PREPARATION (FOR USE WITH FLANGED WINDOWS)

A. Cut weather barrier membrane in a modified "I-cut" pattern.
1. Cut weather barrier horizontally along the bottom of the header.
2 Cut weather barrier vertically 2/3 of the way down from top center of window opening.
3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
4. Fold side and bottom weather barrier flaps into window opening and fasten.

B. Cut a head flap at 45-degree angle in the weather barrier membrane at window head to expose 8 inches of sheathing. Temporarily secure weather barrier membrane flap away from sheathing with tape.

3.5 SEAMING:

A. Seal overlapping horizontal and vertical seams of Air Barrier with DuPont™ Tyvek® Tape.

B. Seal tears and cuts in Air Barrier with DuPont™ Tyvek® Tape.

3.6 FIELD QUALITY CONTROL

A. Where required in Paragraph 1.4.D above, provide manufacturer's field service consisting of periodic visits by manufacturer's designated Commercial Field Specialist or representative for periodic observation of weather restistant, air-moisture barrier system installation and application.

B. The Owner or their representative reserves the right to complete recommended testing as required by the manufacturer at completion of work to assure warranty requirements and contract document compliance are met.

3.7 CLEANING AND PROTECTION

A. Protect finished surfaces from damage and protect installed weather resistant, air-moisture barrier system from damage during construction.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

SUBMITTAL #37
SCHEIBAR CONSTRUCTION
SF CA
PH 415 656-0300

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes flashings and counterflashings and fabricated sheet metal items.
   1. Provide reglets and accessories

B. Related Sections:
   1. Section 05 50 00 – Metal Fabrications: Steel pipe downspouts
   2. Section 06 10 53 – Miscellaneous Rough Carpentry: Wood blocking for metal roofing substrate profiles.
   3. Section 07 55 00 – Modified Bituminous Membrane Roofing.
   4. Section 07 71 23 – Gutters and Downspouts.
   6. Section 07 90 00 – Joint Protection.
   7. Section 08 45 00 – Translucent Skylight Assemblies: Metal curbs.

1.2 REFERENCES

A. American Architectural Manufacturers Association:
   1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

B. ASTM International:
   1. ASTM B32 – Standard Specification for Solder Metal
   2. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   3. ASTM B749 – Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate.
   4. ASTM D4586 – Standard Specification for Asphalt Roof Cement, Asbestos Free.
   5. ASTM D4601 – Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.

C. National Roofing Contractor's Association:
   1. NRCA – Roofing Manual.

D. Sheet Metal and Air Conditioning Contractors National Association:
   1. SMACNA - Architectural Sheet Metal Manual.

E. SSPC – Structural Steel Painting Council.

1.3 SYSTEM DESCRIPTION

A. Work of this section is to provide flashing and sheet metal not specifically described in other sections of these specifications but required to prevent penetration of water through exterior shell of the building.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for Submittals.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Setting Drawings or Templates: Submit setting drawings or templates and setting instructions for exact locations of items to be embedded in work of other sections.

D. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with NRCA and SMACNA standard details and requirements.

1.6 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal work with minimum of five years documented experience.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Deliver products to site, store, handle and protect in accordance with manufacturer's instructions and recommendations.

C. Deliver, store and handle packaged materials in original containers with seals unbroken and labels intact until time of use.

D. Discharge materials carefully and store on clean concrete or raised platform in secure dry area. Do not dump on ground.

E. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

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

G. Do not store materials with strippable film in areas exposed to sunlight.

1.9 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

1.10 COORDINATION

A. Ensure timely delivery of items to be embedded in work of other sections furnish with setting drawings and templates.

B. Coordinate installation of reglets with installation of sheet metal roofing.

C. Coordinate installation of sheet metal work in contact, but not incorporated into, membrane roofing with installation of roofing; install under supervision of roofing system applicators.

1.11 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties

B Provide two-year installer's warranty covering damage to work resulting from failure of work of this section to resist penetration of moisture.

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

A. Aluminum Sheet: ASTM B209; 5005 alloy, 0 032 inch thick, Class I clear anodized finish.

B. Lead: ASTM B749, Grade B; minimum 4 lbs /sq. ft.

2.2 MANUFACTURED ASSEMBLIES

A Reglets with Counterflashing: 24- gauge galvanized steel reglet with 2 inch factory formed end lap and prefabricated factory mitered and sealed corner pieces; 24 gauge galvanized steel counterflashing with 3 inch end lap; Fry Reglet Corporation Type ST Stucco Reglet with Springlock Flashing or equal product substituted under the provisions of Section 01 60 00

2.3 ACCESSORIES

A. Fasteners: Aluminum or stainless steel, with soft neoprene washers at exposed fasteners; finish exposed fasteners to match flashing metal.

B. Drawbands: Stainless steel hose clamps; worm drive.

C. Protective Backing Paint: SSPC Paint 12; cold-applied asphalt mastic; inert type; non-corrosive; compounded for 15 mil dry film thickness.

D. Sealant: Type H butyl sealant as specified in Section 07 90 00.

E. Plastic Cement: ASTM D4856; asphalt type with mineral fiber components; capable of setting within 24 hours at temperature of 75 degrees F and 50 percent humidity.

F. Flashing Compound: Polyisobutylene type non-skinning non-drying sealant, bulk or tape form as applicable to installation requirements.

G. Downspout Boots: Cast-iron.
   1. Manufacturer: Zurn.
   2. Model: Z192; 4 inch x 3 inch x 24 inch downspout boot, Dura-Coated cast iron body and strap with 1/4 inch diameter cast holes for flat head bolts.

H Solder: ASTM B32; 50/50 type.

2.4 FABRICATION

A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet metal, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. As far as practicable, form and fabricate sheet metal in shop. Where on-site fabrication is required, provide work equal to shop quality.

E. Fabricate required connection pieces.

F. Allow for expansion and contraction at joints.
1. Provide loose locking slip joints:
   a. At maximum 8 feet from internal and external corners.
   b. At maximum 24 foot intervals on straight runs.
   c. At centers of runs, less than 20 feet but more than 20 feet
2. Fill loose locked seams with flashing compound prior to assembly.

G. Reinforce for strength and appearance.

H. Cut, fit and drill sheet metal to accommodate related, adjacent of adjoining work

I. Hem exposed edges of metal on underside 1/2 inch; miter and seam corners.

J. Provide standing seam joints in copings and caps. Provide lock joints in other components where practical; where impractical, lap, rivet and solder joints.
1. Turn lock joints on exposed surfaces in direction of flow.
2. Provide seams that follow direction of water flow.

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

L. Fabricate corners from one piece with minimum 18-inch long legs; solder for rigidity, seal with sealant.

M. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

N. Fabricate splash pans of same metal type as downspouts, formed to recommended dimensions as shown on SMACNA Figure 1-36. Provide corrugations in bottom of splash pan to break the flow of water.

P. Fabricate lead flashing for roof scuppers as shown on drawings.

2.5 FACTORY FINISHING

A. Class I Natural Anodized Finish: AAMA 611, AA-M12C22A41; clear anodic coating not less than 0 7 mils thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

C. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets to lines and levels indicated in Drawings. Seal top of reglets with sealant.

C Paint concealed metal surfaces with protective backing paint to minimum dry film thickness of 15 mil

3.3 INSTALLATION

A. Conform to details indicated on Drawings and included in NRCA and SMACNA Manuals.

B. Install shop fabricated sheet metal work in accordance with final reviewed shop drawings. Install manufactured assemblies in accordance with manufacturer's installation instructions.

C. Perform required site fabrication in accordance with Article 2 4 above.

D. Install work watertight with components in true and accurate alignment with other components and related work, with joints accurately fitted, with corners reinforced and with surfaces free from dents.

E. Install flashings to ensure diversion of moisture to exterior

F. Coordinate sheet metal installation with work of other trades to ensure proper sequencing.

G. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations indicated or authorized by Architect.
1. Fasten in accordance with SMACNA.
2. Fasten sheet metal runs to underlying material by nailing through slotted holes in flange at 3 inches on center maximum, unless indicated otherwise.
3. Provide waterproof washers where fasteners penetrate flashings.
4. Where sheet metal occurs over other sheet metal, use nails with minimum 1-inch metal disks.

H. Apply plastic cement compound between metal flashings and felt flashings

I. Fit flashings tight in place Make corners square faces true and straight in planes, and lines accurate to profiles

J. Seal metal joints watertight.

K. Install sheet metal work so as to adequately provide for expansion and contraction in the finished work.

L. Secure gutters and downspouts in place using concealed fasteners.

M. Slope gutters minimum 1/4 inch per foot

N Connect downspouts to downspout boots. Seal connection watertight.

P. Set splash pans under downspouts.

Q. Seal metal joints watertight

R. Apply joint compound at slip joints or wherever metal-to-metal contact occurs and movement may occur.

S. Install sealant and sealant accessories in accordance with Section 07 90 00.

3.4 ADJUSTING

A. Replace damaged material with new undamaged material prior to final acceptance.

3.5 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for final cleaning.

B. Clean sheet metal work; leave free from grease, finger marks and stains.

C. Remove scrap and debris from surrounding areas and grounds.

3.6 PROTECTION

A. Protect installed work of this section from defacement or damage until final acceptance.

END OF SECTION

SECTION 07 65 00

FLEXIBLE FLASHING

SCHERMER CONSTRUCTION
S.F. CA
PH 415 656-0300

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes self-adhering flexible flashing, primers, and fasteners.

B. Related Sections:
1. Section 07 27 00 – Air Barriers.

1.2 REFERENCES

A. ASTM International:
1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
2. ASTM C1193 - Standard Guide for Use of Joint Sealants.
3. ASTM E96 - Test Method for Water Vapor Transmission of Materials.
4. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each type of product.

C. Samples: Each type of product specified. Size: 4 inches by 4 inches.

D. Quality Assurance Submittals:
1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Installer shall have documented successful experience with installation of DuPont ™ flashing system under similar conditions.
2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

1.5 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver flexible flashing materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store flexible flashing materials as recommended by manufacturer.

1.6 PROJECT CONDITIONS

A. Refer to Section 01 60 00 - Product Requirements.

B. Do not apply flexible flashing on wet or damp surfaces.

C. Apply to surfaces free of dirt, oils, lubricants and other debris.

D. Install flexible flashing materials at temperatures above 40 degrees F. At temperatures below 40 degrees F, apply primer in accordance with flashing manufacturer recommendations, prior to installation of flashing.

1.7 COORDINATION

A. Coordinate work with installation of air barrier specified in Section 07 27 00

PART 2 - PRODUCTS

2.1 FLEXIBLE FLASING

A. Manufacturers:
1. DuPont™ Building Innovations™; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://construction.tyvek.com.
2. W.R. Grace Construction Products.
3. Fortifiber Building Systems Group.
4. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 MATERIALS

A. Self-Adhering - Straight Flashing:
1. Basis of Design: Self-adhering straight flashing membrane materials for flashing windows and doors and sealing penetration; is based on DuPont™ Straight Flash™
2. Description:
   a. Face Material Composition: Textured polyethylene laminate barrier.
   b. Face color: White.
   c. Adhesive composition: Butyl adhesive.
   d. Thickness: 30 mil.
   e. Release Liner: 1 piece siliconized paper.
   f. Dimension: 9 inches wide by 125 feet.

B. Self-Adhering - Flexible Flashing:
1. Basis of Design: Self-adhering flexible flashing membrane for window openings and penetrations; is based on DuPont™ FlexWrap™.
2. Description:
   a. Face Material Composition: Conformable textured polyethylene laminate barrier.
   b. Face color: White.
   c. Adhesive composition: Butyl adhesive.
   d. Thickness: 70 mil.
   e. Release liner: 2-part siliconized paper.
   f. Elastic Elongation: >230 percent at 70 deg F.
   g. Dimension: 9 inches wide by 75 feet.

C. Performance Characteristics:
1. Water intrusion: No leakage at 75 Pa, when tested in accordance with ASTM E 331.

2. Water Vapor Permeability: < 1 perm, when tested in accordance with ASTM E 96.

2.3 ACCESSORIES

A. Seam Tape: DuPont™ Tyvek® Tape as manufactured by DuPont™ Building Innovations™.
1. Description: Pressure sensitive, polypropylene substrate with acrylic based adhesive.

B. Fasteners:
1. Steel Frame Construction: Tyvek® Wrap Cap Screws, as manufactured by DuPont™ Building Innovations™. 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.

C. Sealants:
1. Provide sealant that complies with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
2. Products suitable for flanged windows:
   a. OSI® Quad Pro-Series®, solvent release butyl rubber sealant
   b. DAP® Dynaflex 230™.
   c. Other products as approved and recommended by air barrier/weather resistant barrier manufacturer.
3. Products suitable for non-flanged windows:
   a. Dow Corning® 756
   b. Tremco 830
   c. Tremco Butyl
   d. Sealants recommended by the flashing manufacturer

D. Adhesive:
1. Provide adhesive recommended by weather barrier manufacturer.
2. Products:
   a. SIA 655
   b. Liquid Nails® LN-109.
   c. Polyglaze® SM 5700.
   d. Denso Butyl Liquid.
   e. 3M High Strength 90.
   f. Adhesives recommend by the weather barrier manufacturer

E. Primer:
1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing
2. Products:
   a. SIA 655.
   b. 3M High Strength 90.
   c. Denso Butyl Spray
   d. Permagrip 105.
   e. Primers recommended by the flashing manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate and surface conditions are in accordance with flexible flashing manufacturer recommended tolerances prior to installation.

C. Review requirements for sequencing of installation of flexible flashing assembly with installation of windows, doors, louvers and wall penetrations to provide a weather-tight flashing assembly.

3.2 FLASHING (FOR USE WITH NON-FLANGED WINDOWS INSTALLED AFTER WEATHER BARRIER)

A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flexible flashing with window installation.

H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.

I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.3 FLASHING (FOR USE WITH FLANGED WINDOWS INSTALLED AFTER WEATHER BARRIER)

A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

E. Install window according to manufacturer's instructions.

F. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.

G. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

H. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.

I. Tape head flap in accordance with manufacturer recommendations

J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.4 MANUFACTURER'S FIELD SERVICES

A. Section 01 45 23 – Testing and Inspection: Requirements for manufacturer's field services.

B. Notify manufacturer's designated representative to obtain periodic observations of flexible flashing assembly installation.

3.5 PROTECTION OF FINISHED WORK

A. Protect installed flexible flashing from damage during construction.

END OF SECTION

SECTION 07 81 23

INTUMESCENT FIREPROOFING

KOREEN BROS. INC
PETALUMA, CA
PH 707-762-0533
SUBMITTAL # 23

PART 1 - GENERAL

1.1 SUMMARY

A. This section Includes:
1 Thin-film Intumescent fire resistive coating.
2 Protective decorative top coat

B. Related Sections:
1 Section 01 51 00 – Temporary Facilities and Controls: Temporary heat, ventilation, hoisting and power, utilities, and protection.
2. Section 05 12 00 - Structural Steel: Steel substrates.
3. Section 05 50 00 - Metal Fabrications: Metal fabrications with reference to primer receiving fire protection materials.
4. Section 07 84 00 - Firestopping: Firestopping and smoke seals.
5. Section 09 90 00 - Painting and Coating.

1.2 REFERENCES

A. Association of the Wall and Ceiling Industries - International (AWCI):
1. AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.

B. ASTM International:
1. ASTM E 119, Standard Methods for Fire Tests of Building Construction and Materials.
2. ASTM D2240, Standard Test Method for Rubber Property - Durometer Hardness.
3. ASTM D2794, Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
4 ASTM D3960, Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
5. ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrader.
6. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
7. ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E761, Standard test method for Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members.

C. Factory Mutual Research (FM):
1 Approved Products Guide, current edition.

D. Intertek Testing Services / Warnock Hersey International, Inc. (ITS/WH):
1. Directory of Listed Products, current edition.

E. SSPC: The Society for Protective Coatings: Surface Preparation Standards:
1 SP-6 Commercial Blast Cleaning (NACE 3).
2. SSPC-PA 2 - Measurement of Dry Coating Thickness with Magnetic Gages; 2004

F. Underwriters' Laboratories Inc.:

1. Fire Resistance Directory – Volume 1, current edition

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Thin-film intumescent fire-resistive coating system shall provide required fire resistance ratings for beams as follows specific to this project:
   1. Beams: (Floor/Ceiling Design with unprotected deck): 1 hour for beams and/or floor assembly in accordance with the following:
      a. ITS/WH Design No.: AD/FCA 120-01
      b. UL: D941.

B. Physical Properties and Characteristics:
   1. Durometer Hardness (Shore "D") 72.
   2. Surface Burning Characteristics, ASTM E84: Flame Spread: 15; Smoke Developed: 25.
   3. VOC, ASTM D3960 0.17 lbs /gallon (20 g/L).
   4. Adhesion / Cohesion, ASTM D4541 18,000 psf at 65 mil DFT.
   5. Compressive Strength, ASTM E761 109,008 psf at 10 percent deformation.
   6. Dry Density: 11.9 lb/gallon.
   7. Dry Weight: 0.38 lbs/sq.ft. at 42 mil dry.
   8. Latex water based
   9. Asbestos-free.
   10. Non-corrosive.
   11. Fiber free.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Manufacturer's Data: Submit manufacturer's specifications, including certification as may be required to show material compliance with contract documents.
   1. Include product data indicating product characteristics, performance and limitation criteria.

C. Shop Drawings: Submit shop drawings or schedule indicating location and type of each intumescent fireproofing to be installed.

D. Quality Control Submittals:
   1. Design Data: Indicate thickness and coverage rates for each member to be fireproofed.
   2. Test Reports: Test Data: Submit UL and/or ITS/WH published test designs for fire resistive coating application to substrate materials required and test reports showing compliance with specified physical performance characteristics and physical properties.

E. Application Instructions: Submit manufacturer's application instructions.

F. Samples: Submit manufacturer's standard color and finish palette, for selection.
   1. When selection has been made, submit samples of finish on steel substrate, illustrating finished appearance, for final review and acceptance.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with local code requirements.

B. Certifications: Product proposed for use shall:
   1. Bear UL label on each container or package

2 Meet VOC requirements of local air quality control agency

C Product Qualifications: Manufactured under ULI, ITS/WH follow-up Programs Each container or package shall bear ULI, ITS/WH label.

D Field Samples: Provide a mock-up or test area of intumescent coating and finish in semi-concealed location designated by Architect Upon approval of finish, area may serve as standard of quality for exposed work.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products of this Section for a minimum of 10 years.

B. Installer:
1. Approved or otherwise authorized by manufacturer of fireproofing materials to perform work of this Section with a minimum of 3 years of experience. Provide a certificate from manufacturer.
2. Successfully completed not less than three comparable scale projects using this system – provide list.

C. Field Inspection:
1. An independent testing laboratory/company shall be selected by the owner to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with *AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials, an Annotated Guide*. Inspection shall be carried out immediately following final thickness of intumescent fireproofing and just before application of manufacturer approved topcoat.

1.7 PRE-INSTALLATION CONFERENCE

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

C. Attendees:
1. Project Superintendent; presides over meeting and is responsible for minutes.
2. Subcontractor (fireproofing).
3. Manufacturer's technical representative.
4. Others directly affecting, or affected by work.
5. Testing agency
6. Owner representative.

D. Agenda:
1. Access to work and conditions of proper installation.
2. Conditions of installation, such as substrates, existing and surrounding conditions, and environmental conditions.
3. Conditions detrimental to installation
4. Preparation procedures, including protection of adjacent work.
5. Verify installer's receipt and understanding of installation instructions
6. Review submittals, installation procedures, and sequence
7. Review coordination with other work.
8. Evaluate delivery schedule and Construction Progress Schedule.
9. Observe sample installation.
10. Required protection procedures.
11. Observe actual installation areas.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type, and other identifying data. Packaging shall bear the ULI labels and seals for fire resistance ratings. Ship, store and deliver at temperatures not less than 50 degrees F; protect from freezing.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1. Store materials at a temperature not less than 50 degrees F in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer' s labels and seals intact.
2. Protect from freezing.
3. Do not store in direct sunlight.
4. Check freeze-watch indicators before accepting delivery of A/D FIREFILM®III and/or A/D BASECOAT.
5. Discard any materials that have come into contact with contaminants prior to actual use.
6. Check "Freeze-Watch" indicators before accepting delivery of A/D FIREFILM®III.
7. Discard any materials which have come into contact with contaminants prior to actual use.

D. Damaged packages found unsuitable for use and any materials which have come into contact with contaminants prior to use shall be rejected and removed from the project.

1.9 PROJECT CONDITIONS

A. Environmental Requirements: Substrate and ambient air temperature shall be in accordance with manufacturer's requirements.

1. Do not apply water-based thin-film intumescent fire-resistive coating when temperature of substrate and/or surrounding air is below 50 degrees F. 40 degrees F minimum is required when applying solvent-based intumescent fireproofing. Use electric heat if supplemental heat is required.
2. General Contractor shall provide normal and or mechanical ventilation to allow proper drying of the intumescent and to ensure that a safe working area is achieved, during and after application.
3. Relative humidity of 40 percent to 60percent is recommended in the work area. Relative humidity shall not exceed 75 percent throughout the total period of application and drying for the intumescent coating, and must not exceed 65 percent throughout the application and drying for the protective decorative finish coat.
4. Manufacturer's recommended temperature and humidity conditions must be maintained throughout the entire application and drying period until intumescent coating are fully dried and top coated, including any interim period prior to application of the top coat.

1.10 SEQUENCING AND SCHEDULING

A. Sequence work in conjunction with ceiling acoustical panels and HVAC ductwork.

B. Do not apply thin-film intumescent fire-resistive coating until concrete toppings and/or roofing applications have been installed.

C. The installation of piping, ducts, conduit, or other suspended equipment shall not commence until the application of the sprayed fire protection is complete in that area.

D. Steel surfaces with less than 3 feet clear working access may necessitate the application of materials to inaccessible surfaces prior to erection of the finished steel members, either at the point of fabrication or on-site

1.11 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Warrant installed fireproofing to be free from defects in material and workmanship for 1 year

C. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering

D. Include coverage for replacement and repair of failures.

PART 2 - PRODUCTS

2.1 THIN-FILM INTUMESCENT FIRE-RESISTIVE COATING

A. Manufacturers:
   1. A/D Fire Protection Systems Inc, (a division of the Carboline Company), Scarborough, Ontario, Canada; (800) 263-4087, Local Representative contact: (888) 323-3473 or (949) 458-2853, www.adfire.com;
   2. Albi Manufacturing Division of StanChem Inc.; www.albi.com
   3. No-Fire Technologies, Inc.
   4. Substitutions: Section 01630 – Product Options and Substitutions.

B. Product Description:
   1. A/D Firefilm III: A decorative thin-film intumescent fire-resistive coating system for structural steel at exposed interior locations of buildings.

2.2 COMPONENTS

A. Primer: Select primer from manufacturer's list of approved primers, or other only as approved by manufacturer of proposed intumescent product.

B. Topcoat: A/D Colorcoat, low VOC siliconized Alkyd coating; or other approved topcoat Topcoat required for color-coding, aesthetics and additional surface protection.
   1. Color: As selected by Architect from manufacturer's standard colors.

C. Product Systems Testing: Listed by ULI and bearing the UL label; Listed by ITS/WH and bearing the ITS/WH label.

2.3 MIXING

A. A/D Firefilm III and A/D Basecoat are shipped pre-mixed from the factory. Mix gently in order to minimize introduction of air to the product. Do not add water or solvent.

B. Mix A/D Colorcoat by boxing and stirring. Do not add water or solvent.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Beginning of installation means acceptance of existing surfaces and substrates.

C. Examine surfaces to receive work of this Section and report any defects which may affect the work of this section. Identification marking of steel components must be by wax crayon to facilitate ease of removal prior to application of this intumescent fireproofing.

D. Verify that substrate surfaces are ready to receive work. Commercial Blast Cleaning (SSPC-SP6/NACE No.3) is recommended for minimum surface preparation. Weld flashes should be ground smooth prior to commencement of application.

E. Verify that all clips, hangers, sleeves and similar devices have been attached. Confirm compatibility of surfaces to receive fireproofing materials. Prime steel surfaces with a compatible primer, see paragraph 2.2A and 2.3A.

F. Verify substrate and work space temperature and humidity conditions are in accordance with manufacturer's recommendations.

3.2 PREPARATION

A. Adjacent Surfaces Protection: Protect adjacent surfaces, work areas, finish surfaces and equipment from over-spray/damage during product application.

B. Surface Preparation: Clean substrate free of dust, dirt, grease or other foreign matter which would impair bond of fire resistance material. Remove minor projections and fill voids that could telegraph through the finished work.

C. Comply with Commercial Blast Cleaning (NACE No. 3 / SSPC SP6) for minimum surface preparation.

D. Weld flashes shall be ground smooth prior to commencement of application.

3.3 APPLICATION

A. General: Comply with manufacturer's recommendations.

B. Apply intumescent fireproofing only to surfaces that have been primed with fireproofing manufacturer approved primer. Follow primer manufacturer's instructions.

C. Equipment and application shall conform to the manufacturer's written application instructions

D. The fire protection material shall be applied in sufficient thickness to achieve the required fire resistance rating in accordance with UL or ITS design requirements and manufacturer recommendations with as many passes as necessary and not exceeding the maximum mils recommended per pass, to achieve uniform coverage and complete sealing of the intumescent fireproofing.
   1. Application Rate for A/D Firefilm III: 45 mils wet per coat maximum.
   2. Application Rate for A/D Colorcoat: 4 mils DFT per coat

E. Allow each coat to dry in between coats

F. Final dry film thicknesses must be measured with a dry-film thickness gauge. For method of thickness determination refer to *AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials, an Annotated Guide*

G. Do not apply topcoat until it has been determined that the required dry film thickness of intumescent fireproofing product has been achieved.

H. Achieve uniform finished appearance complying with approved samples.

3.4 FIELD QUALITY CONTROL

A. Section 01 45 23 – Testing and Inspection: Field Testing and Inspection Services

B. In addition to continuous wet film thickness checks performed by the applicator during application, the installed intumescent shall be inspected by a qualified independent testing laboratory for thickness in accordance with *AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide*

C. The results of the above tests shall be made available to all parties at the completion of each area and approved prior to the application of topcoat.

D. Testing Laboratory: Owner will employ and pay for field quality control testing of intumescent fireproofing by an independent testing laboratory.

3.5 ADJUSTING

A. Repair and replace fireproofing within areas where test results indicate fireproofing does not comply with requirements.

B. Patch damage to fireproofing caused by other trades before final inspection of this work and prior to enclosure by other building components

C. Areas where average thickness of material is less than minimum required by indicated designs, bring to required thickness

3.6 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Maintain work area in an orderly condition.

C. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products.

D. Upon completion of installation, clear and remove excess material, over spray, dropping and debris from job site.

3.7 PROTECTION OF FINISHED WORK

A. Protect installed product and finish surfaces from damage during construction.

B. Repair and replace work which has not been successfully protected.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

SCHEMBER CONSTRUCTION
SF, CA
PH 415 656-0300
SUBMITTAL # 35

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes firestopping and through-penetration protection system materials and accessories; and firestopping tops of fire-rated walls.

B. Related Sections
1. Section 07 27 00 – Air Barriers: Air barrier materials to adjacent insulation.
2. Section 09 21 16 – Gypsum Board Assemblies: Gypsum board fireproofing.
4. Section 23 05 00 – Heating, Ventilating and Air-conditioning: HVAC work requiring firestopping.
5. Division 26 – Electrical: Electrical work requiring firestopping.

C. Only tested firestop systems shall be used in specific locations as follows:
1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
2. Openings between structurally separate sections of wall or floors.
3. Gaps between the top of walls and ceilings or roof assemblies.
4. Expansion joints in walls and floors.
5. Openings and penetrations in fire-rated partitions or walls containing fire doors.
6. Openings around structural members which penetrate floors or walls.

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 – Standard Test Method for Fire Resistive Joint Systems.
5. ASTM E2174 – Standard Practice for On-Site Inspection of Installed Fire Stops.

B. California Building Code: CBC, Chapter 7.

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

D. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

E. National Fire Protection Association:
1. NFPA 101 - Life Safety Code.
2. NFPA 70 - National Electric Code.

F. South Coast Air Quality Management District:
1. SCAQMD Rule 1168 – Adhesive and Sealant Applications.

G. Underwriters Laboratories Inc.:
2. UL 263 - Fire Tests of Building Construction and Materials.

3. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
4. UL 1479 - Fire Tests of Through-Penetration Firestops.
5. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
6. UL - Fire Resistance Directory.
   a. Firestop Devices (XHJI).
   b. Fire Resistance Ratings (BXUV).
   c. Through-Penetration Firestop Systems (XHEZ).
   d. Fill, Voids, or Cavity Material (XHHW).
   e. Forming Materials (XHKU).
6. Alternate "Omega Point Laboratories Directory" (updated annually).

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittals: Submittal procedures.

B. Product Data: Submit data on product characteristics, performance and limitation criteria.

C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements and applicable code requirements.

F. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.

G. Submit material safety data sheets provided with product delivered to job-site.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to CBC for fire resistance ratings and surface burning characteristics.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

C. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through penetration firestop systems are installed per specified requirements.

D. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

E. Through Penetration Firestopping of Fire Rated Assemblies: Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

F. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

G. Fire Resistant Joint Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage (24.0 Pa) minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

H. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

I. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

J. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

K. Sustainable Project Goals:
1. LEED Credit EQ4.1: Comply with SCAQMD Rule 1168 for joint sealants.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience, certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

C. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

D. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

E. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

F. Do not use damaged or expired materials.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements: Environmental conditions affecting products on site.

B. Do not use materials that contain flammable solvents.

C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

D. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

E. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

F. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 FIRESTOPPING

A. Manufacturers:
1. Hilti, Inc., Tulsa, Oklahoma; 800-879-8000.
2. A/D Fire Protection Systems, Inc.
3. Dow Corning Corp.
4. 3M Fire Protection Products.
5. General Electric.
6. Specified Technologies.
7. United States Gypsum Company.
8. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

B. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

C. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

D. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

E. Provide products subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory. provide products of the following manufacturers as identified below:

F. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single or Multiple component foam compound.

3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
5 Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6 Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7 Firestop Pillows: Formed mineral fiber pillows

G. Color: As selected from manufacturer's full range of colors.

2.2 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:
1. Hilti CP 680 Cast-In Place Firestop Device:
   a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
2. Hilti CP 681 Tub Box Kit for use with tub installations.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant.
2. Hilti CP 604 Self-leveling Firestop Sealant.
3. Hilti CP 620 Fire Foam.
4. Hilti CP 606 Flexible Firestop Sealant.
5. Hilti CP 601s Elastomeric Firestop Sealant.

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti CP 601s Elastomeric Firestop Sealant.
2. Hilti CP 606 Flexible Firestop Sealant.
3. Hilti FS-ONE Intumescent Firestop Sealant.

E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CP 672 Speed Spray.
2. Hilti CP 601s Elastomeric Firestop Sealant.
3. Hilti CP 606 Flexible Firestop Sealant.
4. Hilti CP 604 Self-leveling Firestop Sealant.

F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti CP 777 Speed Plugs.
2. Hilti CP 767 Speed Strips.

G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant.

H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant.
2. Hilti CP 618 Firestop Putty Stick.
3. Hilti CP 620 Fire Foam.
4. Hilti CP 601s Elastomeric Firestop Sealant.
5. Hilti CP 606 Flexible Firestop Sealant.

I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick.

J. Wall opening protective materials for use with U L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Firestop Putty Pad.

K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 642 Firestop Collar.
2. Hilti CP 643 Firestop Collar.
3. Hilti CP 645 Wrap Strips.

L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CP 637 Trowelable Firestop Compound.
2. Hilti FS 657 FIRE BLOCK.
3. Hilti CP 620 Fire Foam.

M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK.

N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CP 672 Speed Spray.
2. Hilti CP 601s Elastomeric Firestop Sealant.
3. Hilti CP 606 Flexible Firestop Sealant.
4. Hilti CP 604 Self-Leveling Firestop Sealant.

O. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

P. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

Q. Acoustical Firestopping: As manufactured by General Electric, "GERTV6428". No known equal.

2.3 ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

B. Verify openings are properly sized and in suitable condition for application of firestopping materials.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, rust, laitance, release agents, water repellents, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C Install backing and damming materials to arrest liquid material leakage.

D. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

E. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

F. Do not proceed until unsatisfactory conditions have been corrected.

3.3 COORDINATION

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.4 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.5 FIELD QUALITY CONTROL

A. Section 01 45 23 – Testing and Inspection: Testing and Inspection Services.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

C. All areas of work must be accessible until inspected by the Architect and the Owner's applicable fire protection representative. Correct unacceptable firestops and provide additional inspection to verify compliance with this Specification at no additional cost.

D. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174.

E. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.6 CLEANING

A. Section 01 74 00 - Cleaning: Final cleaning.

B. Clean surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 00

JOINT PROTECTION

SCHEIBER CONSTRUCTION
SF, CA
PH 415 656-0300
SUBMITTAL #36

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sealants and joint backing, and accessories.

B. Related Sections:
1. Section 07 27 00 – Air Barriers: Sealants required in conjunction with air barriers.
2. Section 07 55 00 – Modified Bituminous Roofing: Sealants required in conjunction with roofing.
3. Section 07 84 00 – Firestopping: Firestopping sealants.
4. Section 08 80 00 – Glazing: Glazing sealants and accessories.
5. Section 09 26 00 - Gypsum Board Assemblies: Acoustic sealant.

1.2 REFERENCES

A. ASTM International:
1. ASTM C719 - Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.
2. ASTM C834 - Standard Specification for Solvent Release Type Sealants.
3. ASTM C834 - Standard Specification for Latex Sealing Compounds.
4. ASTM C919 - Practice for Use of Sealants in Acoustical Applications.
5. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
6. ASTM C1083 - Test Method for Water Absorption of Cellular Elastomeric Gaskets and Sealing Materials.
7. ASTM C1193 - Guide for Use of Joint Sealants.
8. ASTM D1056 - Standard Specification for Flexible Cellular materials - Sponge or Expanded Rubber.
9. ASTM D1623 - Test Method for Tensile and Tensile Adhesive Properties of Rigid Cellular Plastics.
10. E84 - Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Product Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Samples: Submit two samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.

F. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.
1. Furnish 20 year weatherseal warranty.
2. Furnish 20 year non-stain warranty for use with sensitive substrates.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

C. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements.

B. Acceptance at Site: Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

C. Storage and Protection: Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements.

B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

C. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

D. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.7 COORDINATION

A. Section 01 60 00 – Product Requirements: Coordination and project conditions.

B. Coordinate Work with sections referencing this section.

C. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.8 WARRANTIES

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal; watertight seal; exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers:
1. Tremco Incorporated (800) 852-8173.
2. Dow Corning Corp. (800) 248-2481.
3. Henry's Company.
4. Hevi-duty/Nelson (800-331-7325).
5. Lowry (800-772-2521).
6. Macklanburg Duncan (800-348-3571).
7. Mameco International Inc.
8. Pecora Corp. (800-233-9754).
9. Sika Corp.
10. Specified Technologies, Inc. (800-922-1180).
11. United States Gypsum Co.
12. W.R. Meadows.
13. Substitutions: Section 01630 – Product Options and Substitutions.

B. Compatibility:
1. Provide joint sealants, joint fillers and accessory joint materials that are compatible with one another and with joint substrates under project conditions.
2. Install joint sealants, joint fillers and related joint materials that are nonstaining to visible joint surfaces and surrounding substrate surfaces.

C. Provide colors selected by Architect from manufacturer's standard color range.

2.2 ELASTOMERIC SEALANTS

A. Sealant Type A:
1. For exterior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
   a. Control and expansion joints in cast-in-place concrete.
   b. Joints between architectural precast concrete units.
   c. Control and expansion joints in unit masonry.
   d. Butt joints between metal panel.
   e. Joints between marble or granite.
   f. Joints between different materials listed above.
   g. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
   h. Control and expansion joints in ceiling and overhead surfaces.
2. Provide single-component or multi-component, low-modulus, non-sag sealant; comply with ASTM C920, Type S or M, Grade NS, Class 50.
3. Acceptable sealants:
   a. Urethanes:
      1) Single Component:
         a) Dymonic FC.
         b) Vulkem 116.
      2. Multi Component:
         a) Dymeric 240 FC.
         b) Vulkem 227.
   b. Silicones:
      1) Single Component:
         a) Dow Corning 790.

b) Dow Corning 795.
c) Dow Corning 756SMS.
d) Dow Corning 791.
e) Dow Corning CWS and CCS.
f) Spectrem 1.
g) Spectrem 2.
h) Spectrem 3.

B. Sealant Type B:
1. For interior joints in vertical surfaces and non-traffic horizontal surfaces such as, but not limited to:
a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints on exposed interior surfaces of exterior openings.
c. Joints on precast beams and planks.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
e. Trim or finish joints subject to movement.
2. Acceptable sealants:
a. Single Component Urethane:
1) Dymonic FC.
2) Vulkem 116.
b. Multi Component Urethane:
1) Dymeric 240 FC.
2) Vulkem 227.
c. Single Component Silicone:
1) Dow Corning 790.
2) Dow Corning 795.
3) Dow Corning CWS, and CCS.
4) Spectrem 1.
5) Spectrem 2.
d. Acrylic Latex:
1) Tremflex 834.

C. Sealant Type C:
1. For exterior and interior joints in horizontal and sloped traffic surfaces such as, but not limited to:
a. Control, expansion and isolation joints in cast-in-place concrete.
b. Control, expansion and isolation joints in structural precast concrete units.
c. Joints between architectural precast concrete paving units.
d. Tile control and expansion joints.
e. Joints between different materials listed above.
2. Provide single-component or multi-component polyurethane sealant having a Shore A hardness of not less than 25 or more than 50 and plus-or-minus 25 percent joint movement capability; comply with ASTM C920, Type S or M, Grade P or NS, Class 25.
3. Acceptable sealants:
a. THC-900/901.
b. Vulkem 45 SSL.

D. Sealant Type D:
1. For interior joints in vertical and horizontal surfaces requiring pick-resistant security sealant such as, but not limited to:
a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints on exposed interior surfaces of exterior openings.

c. Perimeter joints between concrete surfaces and frames of interior doors, windows and elevator entrances.
d. Trim or finish joints subject to minimal movement.

2. Provide a single-component or multi-component, non-sag polyurethane sealant having a Shore A hardness of 55.
3. Acceptable sealants:
   a. Vulkem 617.

E. Sealant Type E:
1. For interior joints in vertical and horizontal surfaces where incidental food contact may occur.
2. Provide single component or multi-component sealant complying United States Department of Agriculture (USDA) guidelines for incidental food contact with the cured sealant; comply with ASTM C920, Type S or M, Grade P or NS, Class 25; select color from listing of those approved.
3. Acceptable Sealants:
   a. Polyurethanes:
      1) Vulkem 116.
      2) Dymonic FC.
   b. Silicones:
      1) Proglaze.
      2) Spectrem 1.
      3) Spectrem 2.
      4) Spectrem 3.

F. Sealant Type F: Not used.

G. Sealant Type G: Not used.

H. Sealant Type H:
1. For interior or exterior joints in vertical surfaces between laps in fabrications of sheet metal.
2. Acceptable products:
   a) Tremco Butyl Sealant.
   b) Tremco Acoustical Sealant.

I. Sealant Type I:
1. For exterior vertical joints under metal thresholds and saddles or as a bedding sealant for sheet metal flashing and frames of metal or wood.
2. Acceptable products:
   a. Polyurethanes:
      1) Vulkem 116.
      2) Dymonic FC.
   b. Silicones:
      1) Dow Corning 790.
      2) Dow Corning 795.
      3) Spectrem 2.
      4) Proglaze.
      5) Spectrem 3.
   c. Other:
      1) Tremco Butyl Sealant.
      2) Tremco Acoustical.

2.3 ACOUSTICAL SEALANT

A. General: For use at Sound-Rated Constructions.

B. Acoustical sealant: Non-skinning, non-hardening, flexible sealant specifically designed for sealing gypsum wallboard. Sealant shall be capable of spanning 1/2-inch wide by 3/8-inch deep gaps. Synthetic rubber based products comply with ASTM Standard D-217 and acrylic latex based products comply with ASTM Standard C-834.
   1. Acceptable Products: Tremco (800-321-7906), USG acoustical sealant, Pecora AC-20 FTR (800-233-9754), or approved equivalent.

C. Sheet caulking for junction boxes: "Lowry's Electrical Box Sealer" (800-772-2521), or Tremco sheet caulking (800-321-7906). Sheet caulking for junction boxes at fire-rated assemblies: "Firestop Putty Pads" by Hevi-duty/Nelson (800-331-7325), or Specified Technologies, Inc. (800-992-1180).

D. Backing Rod: Closed-cell, neoprene rod or polyethylene foam.

E. Expanding Foam Sealant: Class 1 fire retardant polycell expanding foam by Macklanburg Duncan (800-348-3571).

F. Cementitious sealant: Spray-applied (40 pcf) Monokote Z-146.

2.4 ACCESSORIES

A. Joint cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer for substrates indicated, compatible with joint forming materials.

B. Joint primer: Non-staining type, recommended by sealant manufacturer for substrates, conditions and exposures indicated.

C. Bond breaker: Polyethylene tape or other adhesive faced tape as recommended by sealant manufacturer to prevent sealant contact where it would be detrimental to sealant performance.

D. Joint backer: Polyethylene foam rod or other compatible non-waxing, non-extruding, non-staining resilient material in dimension 25 percent to 50 percent wider than joint width as recommended by sealant manufacturer for conditions and exposures indicated.

E. Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces that is suitable for masking.

2.5 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the sealant manufacturer as compatible, subject to review of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces and joint openings ready to receive work.

B. Verify joint backing and release tapes are compatible with sealant.

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

3.2 PREPARATION

A. Perform preparation in accordance with ASTM C1193.

B. Protect elements surrounding Work of this section from damage or disfiguration.

C. Prepare surfaces to receive sealants in accord with sealant manufacturer's instructions and recommendations except where more stringent requirements are indicated.

D. Thoroughly clean joint surfaces using cleaners approved by sealant manufacturer whether primers are required or not.
1. Remove all traces of previous sealant and joint backer by mechanical methods, such as by cutting, grinding and wire brushing, in manner not damaging to surrounding surfaces.
2. Remove paints from joint surfaces except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.
3. Remove wax, oil, grease, dirt film residues, temporary protective coatings and other residues by wiping with cleaner recommended for that purpose. Use clean, white, lint-free cloths and change cloths frequently.
4. Remove dust by blowing clean with oil-free, compressed air.

E. Provide joint backer material uniformly to depth required by sealant manufacturer for proper joint design using a blunt instrument.
1. Fit securely by compressing backer material 25 percent to 50 percent so no displacement occurs during tooling.
2. Avoid stretching or twisting joint backer.

F. Provide bond-breaker where indicated or recommended by sealant manufacturer, adhering strictly to the manufacturers installation requirements.

G. Prime joint substrates where required.
1. Use and apply primer according to sealant manufacturers recommendations.
2. Confine primers to sealant bond surfaces; do not allow spillage or migration onto adjoining surfaces.

H. Taping:
1. Use masking tape where required to prevent sealant or primer contact with adjoining surfaces that would be permanently stained or otherwise damaged by such contact or the cleaning methods required for removal.
2. Apply tape so as not to shift readily and remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.

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

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   a) Do not leave gaps between ends of joint fillers.
   b) Do not stretch, twist, puncture or tear joint fillers.
   c) Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

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

1. Use acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with Section 09260 – Gypsum Board Assemblies and ASTM C919. Use backer-rod where gaps to be sealed exceed 3/8-inch.
2. Use sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in sound-rated partitions.
3. Apply acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
4. Apply expanding foam sealant where detailed and where multiple pipes or conduits penetrate sound-rated construction.

F. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

A. Section 01 77 00 – Contract Closeout: Final cleaning.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08 12 14

STANDARD STEEL FRAMES

TRISPEC ARCHITECTURAL HARDWARE, INC
SANTA CLARA, CA
PH 408-472-9242
SUBMITTAL # 27 + 27.1

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire-rated and non-rated steel frames.

B. Related Sections:
1. Section 08 21 00 - Flush Wood Doors.
2. Section 08 71 00 - Door Hardware: Hardware, silencers, and weatherstripping.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.
3. ANSI A250.11 - Recommended Erection Instructions for Steel Frames.

B. ASTM International:
1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A924/A924M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

C. Door and Hardware Institute (DHI):
1. RL – Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames.
2. ANSI/DHI A115 Series – Specifications for Steel Doors and Frame Preparation for Hardware

D. National Fire Protection Association:
1. NFPA 80 - Standard for Fire Doors, Fire Windows.
2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

E. Steel Door Institute (SDI):
1. SDI 100 - Recommended Specifications Standard for Steel Doors and Frames
2. SDI 105 - Recommended Installation Instructions for Steel Frames
3. SDI 112 - Galvanized Standard for Steel Doors and Frames.
4. SDI 117 - Manufacturing Tolerances Standard for Steel Doors and Frames
5. SDI 118 - Basic Fire Door Requirements.

F. Underwriters Laboratories Inc.:
1. UL 10B - Fire Tests of Door Assemblies.
2. UL 10C - Positive Pressure Tests of Door Assemblies

G. Uniform Building Code
1. UBC Standard 7-2 - Fire Tests of Door Assemblies.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.

C. Product Data: Submit frame configuration and finishes.

D. Samples: If specifically requested for specified products; required for alternate products.

E. Manufacturer's Installation Instructions: Submit manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Conform to requirements of ANSI A250.8.

B. Fire Rated Frame Construction at neutral pressure fire tested door frames: Conform to ASTM E152 and UL-10B.

C. Fire Rated Frame Construction at positive pressure fire tested doors: Conform to UBC 7-2 and UL-10C.

D. Fire Rated Frame Construction: Conform to UBC Standard 7-2.

E. Installed Fire Rated Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.

F. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.
   1 Attach smoke label to smoke and draft control door frames.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Accept frames on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.7 FIELD MEASUREMENTS

A. When verification of field measurements are necessary, verify field measurements prior to fabrication.

1.8 COORDINATION

A. Coordinate Work with frame opening construction, door, and hardware installation.

PART 2 - PRODUCTS

2.1 STANDARD STEEL FRAMES

A. Manufacturers:
1. Steelcraft; www.steelcraft.com; Model: MU16 Series Multi-Use Flush Frames.
2. Assa Abloy; Ceco Door Products; Curries; www.assaabloydss.com.
3. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

STILES CUSTOM METAL, CERES, CA

B. Product Description: Standard shop fabricated steel frames, fire-rated and non-rated types.
1. Interior Frames:
   a. Level 2 for Door Model 1, nominal 16 gauge/0.053 inch thick material, base metal thickness.

2.2 ACCESSORIES

A. Removable Stops: Rolled steel channel shape, butted corners; prepared for countersink style tamper proof screws.

B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.

C. Primer: ANSI A250.10 rust inhibitive type.

D. Silencers: Specified in Section 08 71 00. Resilient rubber fitted into drilled hole.

E. Plaster Guards: 26 gauge steel plaster guards or mortar boxes.

F. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling, thinner pumpable grout is prohibited.

G. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.3 FABRICATION

A. Fabricate frames as welded unit, for gypsum board slip on type.

B. Construction of MU-Series Flush Frames:
1. Manufacture flush frames from 16 or 14 gauge cold-rolled or galvannealed steel.
2. Fabricate frames with 2 inch faces and double return backbends.
3. Corner Connections: SUA (Set-up and welded), in accordance with ANSI A250.8 (SDI-100). Backweld frames.
4. Reinforce mitered corners with corner clips to provide a firm interlocking of jamb to head. Mitered joints shall be drawn up and secured by screws.
5. Supply frames with factory installed rubber silencers, 3 per strike jamb and 2 per head for pair of doors.
6. Frames for 1-3/4 inch doors shall have 7 gage universal steel hinge reinforcements and prepared for 4-1/2" x 4-1/2" standard or heavy weight template hinges.
7. Strike reinforcements: 16 gage and prepared for an ANSI-A115 1-2 strike.
8. Strike jambs: 14 gage reinforcement and prepared for cylindrical ANSI-AI 15.3 strikes.
9. Provide metal plaster guards for mortised cutouts.
10. Reinforcements for surface closer: 14 gage steel.
11. Galvannealed frames shall have galvannealed hardware reinforcements.
12. Provide adequate reinforcements for other hardware when required.

13. Furnish frames with a minimum of six wall anchors and two base anchors of manufacturer's standard design.

C. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.

D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.

E. Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.

F. Attach fire rated label to each fire rated frame.

G. Weld plaster guards to back of finish hardware cutouts where mortar or other materials might obstruct hardware operation.

2.4 SHOP FINISHING

A. Steel Sheet:
1. Interior Locations: CRS (Cold rolled steel) conforming to ASTM A653; ~~or galvannealed steel~~ per Paragraph 2.4.A.1.

B. Surface Preparation (Factory Pretreatment): Thoroughly wash, de-grease, clean and treat with phosphatized process.

C. Primer: One coat of baked-on, rust-inhibiting primer in accordance with ANSI A250.10.

D. Coat inside of frame profile with bituminous coating to minimum thickness of 1/16 inch for protection of steel frame from corrosion when in contact with masonry.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify opening sizes and tolerances are acceptable.

3.2 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

B. Coat inside of frames with bituminous coating to a thickness of 1/16 inch.

3.3 INSTALLATION

A. Install frames in accordance with ANSI A250.8, SDI 105, and ANSI/DHI A115-IG.
1. Install fire rated frames in accordance with NFPA Pamphlet 80.

B. Anchors:
1. Jambs:

a. General: Position one (1) anchor above top butt reinforcement and one (1) anchor below bottom butt reinforcement; minimum of four (4) anchors per door jamb, 24 inches on center maximum.

b. Frames set in Metal Stud Partitions: Lock-in 18 gauge steel jamb anchors, designed to be attached to webbing of the closed steel studs which are built around the frame. Adjustable base anchors are attached directly to the floor and adjusted.

2. Head: Provide minimum of two (2) anchors at frames over 2'-6" wide; 24 inches on center, maximum.

C. Coordinate frame anchor placement with wall construction type (cement plaster, masonry, gypsum board, concrete, etc.)

D. Metal Frames:

1. General: Set frames plumb, straight and square; align and securely brace until permanent anchors are set; use shims where required. Remove temporary braces after wall construction is completed.
2. Door Frames: Where shown, provide overhead frame bracing; securely anchor to structure. Install roll-formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
3. Grouted Frames: In sound rated partitions, grout entire door frames solid with plaster or appropriate grouting material.
4. Sealant: Seal perimeter of frames and adjoining material per Section 07 90 00 – Joint Protection.

E. Coordinate installation of frames with glazing specified in Section 08 80 00.

F. Coordinate installation of frames with hardware specified in Section 08 71 00.

G. Coordinate installation of frames with wood doors specified in Section 08 14 16.

H. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

I. Touch up damaged factory finishes.

3.4 ERECTION TOLERANCES

A. Clearance Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/8 inch measured with straight edges, crossed corner to corner.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

TRISTEC ARCHITECTURAL HARDWARE, INC
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PH (408) 472-9242
SUBMITTAL # 2.6, 2.6.1, 2.6.2

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes flush wood doors, flush configuration, fire rated and non-rated.

B. Related Sections:
1. Section 08 12 14 - Standard Steel Frames.
2. Section 08 71 00 - Door Hardware.
3. Section 09 90 00 - Painting and Coating: Site finishing of wood doors.
4. RFI #101 - DOOR VISION FRAME AND GLAZING SPECIFICATION

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A135.4 - Basic Hardboard.
2. ANSI A115. W Series – Wood Door Hardware Standards.
3. ANSI A208.1 – Particleboard.
4. ANSI / WDMA I.S. 1-A-04 Industry Standard for Flush Wood Doors.

B. ASTM International:
1. ASTM E-90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2. ASTM E152 – Methods of Fire Tests for Wood Doors.
3. ASTM E336 – Standard Test Method for Measurement of Airborne Sound Insulation at Buildings.
4. ASTM E413 - Standard Classification for Rating Sound Insulation.

C. Architectural Woodwork Institute:
1. AWI - Quality Standards Illustrated, Section 1300

D. Hardwood Plywood and Veneer Association:
1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.

E. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

F. National Electrical Manufacturers Association:
1. NEMA LD 3 - High Pressure Decorative Laminates.

G. National Fire Protection Association:
1. NFPA 80 - Standard for Fire Doors, Fire Windows.
2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

H. Underwriters Laboratories Inc.:
1. UL - Building Materials Directory.
2. UL 10B - Fire Tests of Door Assemblies. – Neutral Pressure.
3. UL 10C – Fire Tests of Door Assemblies – Positive Pressure.
4. UL - Building Materials Directory.

I. Uniform Building Code:
1. UBC Standard 7-2 - Fire Tests of Door Assemblies.

J. Window and Door Manufacturers Association:
1. WDMA Finish System TR-6, Transparent or OP-6, Ppaque – Catalized Polyurethane.
2. WDMA I.S. 1-A – Architectural Wood Flush Doors.

K. Woodwork Institute:
1. WI – Manual of Millwork, Section 12 – Architectural Flush Wood Doors.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special blocking for hardware, factory machining criteria, identify cutouts for glazing.
1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate doors to be factory finished and finish requirements where scheduled.
4. Indicate fire ratings for doors.

C. Indicate compliance with Positive Pressure.

D. Product Data: Submit information on door core materials and construction, and on veneer species type and characteristics, including WDMA I.s.10A and AWI classsifications. See WDMA "A Specifier's Guide to Door Face Veneers" for cut and matching requirements, factory machining and factory finishing criteria.

E. Samples:
1. Submit two samples of door construction, 8 inch by 8 inch in size cut from bottom corner of door.
2. Submit two samples of door veneer 8 inch by 8 inch in size, illustrating wood grain, stain color, and sheen.

F. Manufacturer's Installation Instructions: Submit special installation instructions.

G. Manufacturer's Certification: Submit manufacturer's certification that doors comply with specified requirements and are suitable for intended application.

H. Manufacturer's full lifetime warranty.

I. All information relative to LEED certification.

1.4 QUALITY ASSURANCE

A. Source limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Flush wood doors shall conform to the latest edition of the WDMA I.S. 1-A requirements for "Premium Grade" and/or AWI Version 7 Custom Grade and WI Custom Grade.

C. Finish doors in accordance with AWI Quality Standard Section 1500, Custom Grade.

D. Perform Work in accordance with AWI Quality Standard Section 1300, Custom Grade.

E. Tolerances for Warp, Telegraphing, Squareness, and Prefitting Dimensions: WDMA I.S. 1-A.

F. Identifying Label:
1. Door manufacturer.
2. Order number.
3. Door number.
4. Fire rating, if applicable.

G. Fire Rated Door Construction: Labeled by Intertek Testing Services/Warnock Hersey (ITS-WH):
1. Construction Details and Hardware Application: Approved by labeling agency.

H. Positive Pressure Opening Assemblies: UBC 7-2-1997/UL 10C.

I. Fire-rated Door Construction: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC 7-2-1997 (Positive Pressure).

J. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.

K. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
1. Attach smoke label to smoke and draft control doors.

L. Environmental Responsibility: Provide doors manufactured with the following environmentally responsible core materials:
1. Particleboard Core: ~~Scientific Certification Systems (SCS) certified~~ WITHOUT FORMALDEHYDE RFI # 084

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Deliver, store, protect and handle products under provisions of WDMA, AWI, WI and manufacturer's care and handling instructions.
1. Deliver doors to site in manufacturer's original, unopened containers and packaging , with labels clearly identifying product name and manufacturer.
2. Package doors individually in polybags.

C. Storage:
1. Store doors in accordance with manufacturer's instructions.
2. Store doors in clean, dry area indoors, protected from damage and direct sunlight.
3. Store doors flat on level surface.
4. Do not store doors directly on concrete.
5. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
6. Store doors between 50 and 90 degrees F and 25 to 55 percent relative humidity.

D. Handling:
1. Handle doors in accordance with manufacturer's instructions.
2. Protect doors and finish during handling and installation to prevent damage.
3. Handle doors with clean hands or clean gloves.
4. Lift and carry doors. Do not drag doors across other doors or surfaces.

E. Certain wood species are light sensitive. Protect doors from exposure to natural and artificial light after delivery.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not subject doors to extreme conditions or changes in heat, dryness, or humidity in accordance with the latest edition of WDMA I.S. 1-A.

1.8 COORDINATION

A. Coordinate Work with door opening construction, door frame and door hardware installation with a pre-installation conference.

1.9 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Warrant solid core, interior doors for life of installation against warpage, delamination, and defects in materials and workmanship.

C. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS

A. Manufacturers:
1. VT Industries, Inc., www.vtindustries.com
2. Marshfield Door Systems™; www.marshfielddoors.com.
3. Algoma Hardwoods Inc.; www.algomahardwoods.com
4. Eggers Industries; www.eggersindustries.com
5. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

WESTERN OREGON DOOR (PC-5)

B. Product Description: Solid core flush wood doors, wood veneer facing material, fire rated and non-rated types; flush design, factory pre-fit, shop finished wood doors.
1. Flush Interior Doors: 1-3/4 inches thick; solid core 5-ply hot press construction; fire-rated, and non-fire rated, where indicated on Drawings.

2.2 5-PLY FLUSH BONDED PARTICLE-CORE DOORS

A. 5-Ply Flush Bonded Particle-Core Doors:
1. Model: 5502-2, particleboard core, non-rated and 20-minute rated.
2. Compliance: WDMA I.S.1-A.
   a. Quality Grade: Premium grade, extra heavy duty.
   b. Type: PC-5ME.
3. 7-Ply and Non-Bonded Core Construction: Not acceptable.
4. Door Thickness: 1-3/4 inches.
5. Stiles:
   a. Inner Stiles: 1-3/8 inches wide, before prefitting.
   b. Structural Composite Lumber (SCL) With Outer Stile: Same species as face veneer.
   c. Outer Stile: Apply after beveling and before face application.
6. Rails:

a. Structural composite lumber (SCL)
b. Minimum Width Before Prefitting: 1-3/8 inches.

7. Core:
a. Material: Particleboard.
b. Particleboard Compliance: ANSI A208.1, Grade 1-LD-2.

8. Door Assembly:
a. Glue stiles and rails to core.
b. Sand entire assembly flat as a unit to ensure minimal telegraphing of core components through face veneers.

9. Composite Crossbands:
a. Apply to core before application of matching hardware stiles.
b. Exposed Crossbanding: Not allowed along stile edges.

10. Veneers:
a. Apply to crossbanded core in hot press using Type I, exterior, water-resistant adhesive.
b. 5-ply construction.

11. Face Veneers:
a. Veneer Species: "Select White" BIRCH As selected by Architect.
b. Veneer Cut: Plain sliced.
c. Veneer Match: Slip match running.
d. Veneer Grade: Custom.
e. Minimum Thickness Before Sanding: 1/42 inch.

2.3 FLUSH FIRE-RATED WOOD DOORS

A. Flush Fire-Rated Wood Doors:
1. Model: 5P45-2, 60-minute rated.
2. Compliance: WDMA I.S 1-A.
a. Quality Grade: Premium.
b. Type: FD-5.
3. Door Thickness: 1-3/4 inches.
4. Outer Stiles: Same species as face veneer.
5. Inner Stiles:
a. Noncombustible material, 60-minute rated.
b. Warranted for use with standard-weight mortise butt hinges and No. 12, 1-1/4-inch steel threaded-to-head screws.
6. Rails:
a. Noncombustible material, 60-minute rated.
b. Width: Manufacturer's standard width.
7. Core:
a. Non-combustible mineral board.
b. Weight: 30.8 pcf to 34.7 pcf.
c. Does not contain asbestos or added urea formaldehyde.
8. Composite Crossbands:
a. Apply to core before application of matching hardware stiles.
b. Exposed Crossbanding: Not allowed along stile edges.
9. Face Veneers:
a. Veneer Species: "Select White" _____ As selected by Architect.
b. Veneer Cut: Plain sliced.
c. Veneer Match: Slip match running.
d. Veneer Grade: Custom.
e. Minimum Thickness Before Sanding: 1/42 inch.
10. Positive Pressure:

a. Where UBC 7-2-1997/UL 10C standards for positive pressure apply, doors shall be constructed in accordance with Category A guidelines as published by Intertek/Warnock Hersey.
b Smoke Gasketing: Apply smoke gasketing around frame perimeter to meet S-rating.
c. Intertek/Warnock Hersey Category B Guidelines: Edge sealing systems not allowed on frames.

2.4 FABRICATION

A. Fabricate doors in accordance with WDMA I.S 1-A and AWI Section 1300 Quality Standards requirements.

B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
1. WDMA prefit clearances for factory fit doors.
2. NFPA 80 for fire rated doors.
3. Manufacturer's hardware templates

C. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, and hardware templates.
1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Fabricate fire rated doors in accordance with WDMA I.S.1 and to Warnock Hersey requirements. Attach fire rating label to door edge.

E. Furnish lock blocks at lock edge and top of door for closer for hardware reinforcement, if required by manufacturer for warranty coverage. Supply innerblocking for all surface applied hardware for 45, 60 and 90 minute mineral-core fire rated doors. Through bolts not accepted.

F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Factory-machine doors for mortised hardware, including pilot holes for hinge screws and lock fronts.

G. Factory seal top and bottom rails of doors before shipping, if required by manufacturer for warranty coverage.

H. Provide edge clearances in accordance with AWI 1300.

I. Factory fit doors for frame opening dimensions identified on shop drawings.

J. Prefit tolerances shall be in accordance with the requirements of WDMA I.S. 1-A and AWI Section 1300, latest editions.

K. Apply appropriate labels.

2.5 FACTORY FINISH

A. Doors shall receive factory finishing.

B. Factory Finishing: WDMA System TR-6, catalyzed polyurethane, premium grade. WDMA finish Types 2 and 3 are not acceptable.
1. Stain coat.
2. Sealer: 3 coats
3. Sanding: 320-grit sandpaper.

4. Topcoat. 2 coats.

C. Stain Color: As selected by Architect from manufacturer's standard colors [Clear] [Alpine] [Grassland] [Oasis] [Ravine] [Savanna] [Timber] [Wheat].

D. Top and Bottom Rails: Factory sealed with wood sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.

B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.

C. Ensure frames are plumb, level, square, and within tolerance.

3.2 PREPARATION

A. Allow doors to become acclimated to building temperature and humidity before installation.

3.3 INSTALLATION

A. General: Install doors to comply with manufacturer's written instructions, referenced quality standards, and as indicated.

B. Install fire rated and non-rated doors in accordance with AWI Quality Standard, NFPA 80, and to requirements for fire rating label by UL or Intertek Testing Services (Warnock Hersey Listed).

C. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

D. Do not trim Positive Pressure Rated Doors for width.

E. Machine cut doors for hardware installation.

F. Coordinate installation of doors with installation of frames specified in Section 08 12 14 and hardware specified in Section 08 71 00.

G. Pilot drill screw and bolt holes using templates provided by hardware manufacturer.

H. Exercise caution when drilling pilot holes and installing hinges so that pilot holes are not over-drilled and screws are not over-torqued. Follow manufacturer's installation instructions for positive pressure doors.

3.4 INSTALLATION TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for maximum diagonal distortion.

C. Conform to WDMA standards and testing methods for warp, cup, bow and telegraphing.

3.5 ADJUSTING

A. Adjust doors to swing freely, without binding in frame.

B. Adjust hardware to operate properly.

C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

3.6 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for cleaning.

B. Clean doors promptly after installation in accordance with manufacturer's instructions.

C. Do not use harsh cleaning materials or methods that could damage finish.

3.7 PROTECTION

A. Protect installed doors from damage during construction.

B. Place polybags over doors after adjusting and cleaning.

END OF SECTION

SAN MATEO COUNTY COMMUNITY COLLEGE DISTRICT

CAN B8 Admin Renovation - RFI - 101

RFI

DSA #:	
RFI #:	000357RFI00109
Contractor Ref. #:	101
Rev.No:	
Scheduled Task Name:	Glass and Window frame
Start Date of Scheduled Task:	2/6/2009
Response Criticality:	Critical
Spec Section Name:	09 Finishes
Sheet Detail:	
Date Required:	2/9/2009
Subject:	Door D3 window/frame
Created By:	Richard Giannini, Schembri Construction Company 2/6/2009 7:49:39 AM Pacific Time (US)
Last Modified By:	Tony Gupta, Swinerton Management & Consulting 2/6/2009 9:17:21 AM Pacific Time (US)
Information Requested:	Door type D3 shows glazing to be installed in the door. The contract documents are absent of a window frame specification/details and glazing specifications. Please provide. Thank you.
Contractor's Suggested Solution:	
Cost Impact:	

AIR LOUVERS VLF-EZ 8X40 BRONZE

02-10-09
Sandrine Hitchcock / BCA
Schembri's submittal states "vision frame by ~~Air Louvers Inc~~"; ~~use Slimline type frames~~.
Tempered glass is indicated on door types in the contract documents. Please find the following requirements specific to tempered glass products for clarification purposes:
A. Tempered glass only where laminated glass is not approved, such as interior borrowed lights or side lights.
B. Manufacturing Process: Horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.
C. Clear Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type 1 (transparent glass, flat) Class 1 (clear), Quality q3 (glazing select); conforming to ANSI Z97.1.
D. Provide thicknesses as recommended by glass manufacturer for application indicated.

AE Response

Response Date:	
Response By:	
Official Response:	

Discussion

From	To	Message with File(s)	Date Responded	Reply
Richard Giannini	Linda Rizzoli cc: Tony Gupta		2/6/2009 7:49:40 AM Pacific Time (US)	
Tony Gupta	Sandrine Hitchcock cc: Rashelle Jones, Linda Rizzoli		2/6/2009 9:17:22 AM Pacific Time (US)	

Actions

Status

SECTION 08 31 13

ACCESS DOORS AND FRAMES

SCHMIDT CONSTRUCTION
S.F., CA
PH (415) 656-0300

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire resistive rated and non-rated access doors and panels with frames.
1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
2. Coordinate exact locations with various trades to assure proper placement of access doors and panels.

B. Related Sections:
1. Section 09 90 00 - Painting and Coating: Field paint finish.
2. Section 09 26 00 - Gypsum Board Assemblies.
3. Section 23 05 00 – Heating, Ventilating and Air Conditioning: Access doors in ductwork.

1.2 REFERENCES

A. ASTM International:
1. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Intertek Testing Services (Warnock Hersey Listed):.
1. WH – Certification Listings.

C. National Fire Protection Association:
1. NFPA 80 – Standard for Fire Doors, Fire Windows.

D. UL - Underwriters' Laboratories, Inc :
1. UL – Building Materials Directory.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate exact position of access door units. Refer to Divisions 23 and 26 regarding requirements for showing locations of access doors provided under those Divisions.

C. Product Data: Submit literature indicating sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

D. Samples: Submit two 12 x 12 inch in size illustrating frame configuration and anchors.

E. Manufacturer's Installation Instructions: Submit installation requirements and rough-in dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Closeout procedures.

B. Project Record Documents: Record actual locations of access units.

1.5 QUALITY ASSURANCE

A. Fire Resistance Ratings: Where indicated as fire rated provide assemblies from manufacturers listed in UL Directory or Intertek Testing Services (Warnock Hersey Listed) Directory.

B. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified with minimum three years documented experience.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Packaging and Shipping: Identify type and size of each door.

C. Storage and Protection:
1. Deliver and store packaged products in original containers with seals unbroken and labels intact until time of use.
2. Deliver products only after proper facilities are available; handle carefully to prevent damage and store on clean concrete surface or raised platform in safe, dry area.

1.8 COORDINATION

A. Coordinate Work with work requiring controls, valves, traps, dampers, cleanouts, and similar items requiring operation being located behind finished surfaces.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Manufacturers:
1. J.L. Industries.; www.jlindustries.com
2. Milcor LTD, Partnership.; www.milcorinc.com
3. Nystrom Products Co.; www.nystrom.com
4. Karp Associates, Inc.; www.karp.com
5. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 MATERIALS

A. Non-Fire Rated:
1. Type 1: Flush steel door and flanged frame for gypsum board walls and ceiling installations
   a. Manufacturer: Milcor, Inc., "Model DW"; Karp Associates, Inc., "DSC-214M", or equal.

B. Fire Rated:
1. Type A: Fire resistive steel door with recess to receive gypsum board and flanged frame for rated suspended gypsum board ceiling installations.

a. Manufacturer:
   1) JL Industries, Model "FD".
   2) Milcor, Inc Model "ATR".
   3) Karp Associates, Inc., Model "KATR".
   4) Or equal.

2. Type B: Fire rated flush steel door and flanged frame, UL 1-1/2 hour rated, self latching with direct action knurled knob, for installation in rated walls
   a. Manufacturer:
      1) JL Industries, Model "FDWB".
      2) Milcor, Inc., Model "Fire-Rated Access Door"
      3) Karp Associates, Inc , Model "KRP-250FR"
      4) Or equal.

2.3 ACCESSORIES

A. Smoke Seal: Pemko S-88 smoke seal.

B. Acoustical Sealant: As specified in Section 07 90 00 – Joint Protection.

2.4 FABRICATION

A. Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.

B. Wall and Ceiling Access Door and Panel Hardware:
   1. Hinge: Standard continuous or concealed spring pin type, 175 degree steel hinges.
   2. Lock: Screw driver slot for quarter turn cam lock.

C. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.5 SHOP FINISHING

A. Base Metal Protection: Prime coat units with baked-on rust-inhibitive zinc dust primer.

B. Access Doors at ceramic tile surfaces: Stainless Steel; No. 4 finish.

C. Finish Painting: As specified in Section 09 90 00 – Painting and Coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for access doors and panels are correctly sized and located.

B. Do not install access doors and panels until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate details with other work supporting, adjoining or requiring access doors.

B. Verify that location will serve portion of work to which access is required.

3.3 INSTALLATION

A. General: Install access doors in accordance with manufacturer's instructions and at locations authorized by the Architect in accordance with requirements for work of Divisions 22 and 23.

B. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
1 Set concealed frame type units flush with adjacent finished surfaces.

C. Position unit to provide convenient access to concealed work requiring access.

D. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

E. Provide fire-rated access doors at sound-rated construction. Seal door flanges with specified smoke seal. Seal entire assembly to gypsum board with acoustical sealant.

3.4 ADJUSTING AND CLEANING

A. Thoroughly clean surfaces of grease, oil, or other impurities, touch-up abraded prime coat, and otherwise prepare for finish painting where required.

END OF SECTION

SECTION 08 34 73

SOUND CONTROL DOOR ASSEMBLIES

TRIMBLE ARCHITECTURAL HARDWARE, INC.
SANTA CLARA, CA
PH (408) 472-9212
SUBMITTAL # 27

PART 1 - GENERAL

1.1 SUMMARY

A. Description: This section includes Swinging Steel Sound Control Door and Frame Assemblies where shown on the drawings and as specified herein, including Sound Seal Gasket System, Door Bottom Seal, and Cam-Action Hinges.

B. Related Sections:
1. Section 08 12 14 – Standard Steel Frames.
2. Section 08 71 00 – Door Hardware: Finish Hardware including lock cylinders and thresholds.
3 Section 09 90 00 – Painting and Coating: Finish painting.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.

B. ASTM International:
1. ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2 ASTM E413 – Standard Classification for Rating Sound Insulation.
3 ASTM E1408 – Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems.

C. National Association of Architectural Metals Manufacturers
1. NAAMM/HMMA - 830.
2. NAAMM/HMMA - 861.

D. National Fire Protection Association:
1. NFPA-80 – Standard for Fire Doors and Fire Windows (latest edition).
2. NFPA-101 – Life Safety Codes.

E. Underwriters Laboratories Inc.:
1. UL 10B – Fire Tests of Door Assemblies.
2. UL 10C – Positive Pressure Fire Tests of Door Assemblies.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop drawings: Indicate in elevation with sections and details to scale. Include STC rating with independent test report, metal thicknesses, joining details, field connections, anchorage, concealed and exposed fastening methods, door and framing reinforcement, and metal finishes. Indicate compliance with specified design criteria.

D. Maintenance data: Give instructions for general maintenance and repair of surfaces and finishes.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this product.

1.4 QUALITY ASSURANCE

A. Applicable standards of the following as referenced herein:
1. AAMA, American Architectural Manufacturers Association.
2. ASTM, American Society for Testing and Materials.
3. ADA, Americans with Disabilities Act.
4. NAAMM/HMMA, National Association of Architectural Metals Manufacturers.

B. Doors and frames shall be fabricated by a single manufacturer. The manufacturer must have an effective quality control system in place.

C. Sound Assemblies shall be tested by a certified independent laboratory in accordance with ASTM E90, ASTM E413 and ASTM E1408.

D. Allowable Tolerances as stated in NAAMM/HMMA Technical Manual.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 10 years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years experience, approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver and store materials to prevent damaging and marring finishes.

C. Protect metal surfaces from contact with lime, mortar, cement, acids, and other harmful surfaces and from careless handling, storage or machining.

1.7 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Sound Control Door and Frame assemblies shall be warranted from defects in workmanship and quality for a period of one (1) year from date of Substantial Completion when stored, installed and painted in accordance with manufacturer's instruction and NAAMM HMMA Technical Manual. Adjustments made necessary by shifting or settling of building structure shall not be covered by warranty.

PART 2 - PRODUCTS

2.1 SOUND CONTROL DOOR ASSEMBLIES

A. Manufacturers:
1. Stiles Custom Metal, Inc. www.stilesdoor.com.

2.3 FABRICATION

A. General:
   1. Major portions of the door sections: 0 125 inch wall thickness.
   2. Glazing stop sections: 0 050 inch wall thickness.

B. Entrance Doors:
   1. Door stiles: Not less than 5 inches wide (not including glass stops).
   2. Door stiles and rails: Hairline joints at corners. Heavy concealed reinforcement brackets: Secured with screws and shall be of deep penetration and fillet welded.
   3. Weather stripping: Wool pile, installed in one stile of pairs of doors and in jamb stiles of center pivoted doors.

C. Door stops shall include a bulb weather-strip that complies with ASTM E2203 specification.

D. Glazing:
   1. Factory glaze units.
   2. Dry glaze units with extruded pressure fitting aluminum glazing stops, and a gasket that complies with ASTM E2203 specification.

2.4 FINISH

A. Class I Color anodized Finish: AAMA 611, AA-M10-C22-A44; integrally colored anodic coating not less than 0 7 mils thick.
   1. Color: Dark Bronze.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.5 HARDWARE

A. Hardware for entrance doors (check with entrance door manufacturer for compatibility with door) is specified under Section 07810 – Door Hardware, and shall be sent to the door manufacturer for application.

B. Door hardware supplier shall be responsible for furnishing physical hardware and templates of all hardware to the entrance door manufacturer prior to fabrication, and for coordinating hardware delivery requirements with the hardware manufacturer, the general contractor and the entrance door manufacturer to ensure the building project is not delayed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Job Conditions: Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings.

3.2 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Plumb and align entrance door faces in a single plane for each wall plane and erect doors and materials square and true. Adequately anchor to maintain positions permanently

when subjected to normal thermal movement, specified building movement, and specified wind loads.

C. Install hardware using templates provided.
1 See Section 08710 for hardware installation requirements.

D. Adjust doors for proper operation after installation.

E. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.3 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.5 PROTECTION AND CLEANING

A. Remove protective material from pre-finished aluminum surfaces. Remove labels from glass surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

D. touch-up minor damage to factory applied finish; replace components that canot be satisfactorily repaired.

E. Protect finished work from damage.

END OF SECTION

SECTION 08 41 13

ALUMINUM FRAMED ENTRANCES

AUTOMATIC DOOR SYSTEMS, INC
SAN CARLOS, CA
650-592-8282
SUBMITTAL #38.1 SEE ATTACHED REVISIONS PER RFP001 REV

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum entrance doors, complete with hardware, and related components as shown on the drawings and specified in this section.

B. Related Sections:
1. Section 08710 - Door Hardware: Mortised hardware reinforcement requirements affecting framing members; hardware items other than specified in this section

C Products Installed But Not Supplied Under This Section:
1. Install door hardware for storefront doors supplied under Section 08710.
2. Install aluminum entrance doors in existing aluminum storefront framing.

1.2 REFERENCES

A. American Architectural Manufacturers Association:
1. AAMA 611 – Voluntary Specification for Anodized Architectural Aluminum.

B. ASTM International:
1. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
2. ASTM E2203 – Standard Specification for Dense Thermoplastic Elastomers Used for Compression Seals, Gaskets, Setting Blocks, Spacers, and Accessories.

1.3 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units:
1. Air test unit shall be minimum size of 36 inches x 84 inches

B. Test Procedures and Performances:
1. Entrance doors shall conform to all requirements for the door type referenced in Paragraphs 2.1.B. In addition, the following specific performance requirements shall be met
2. Air Infiltration Test:
   a. With door sash closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 1.57 psf.
   b. Air infiltration shall not exceed 0.50 cfm/SF of unit, for single doors.

C. Project Wind Loads
1. The system shall be designed to withstand the following loads normal to the plane of the wall:
   a Positive pressure of 20 psf at non-corner zones.
   b Negative pressure of 20 psf at non-corner zones

1.4 SUBMITTALS

A Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and door hardware.

D. Samples: Submit two samples 3 inch x 3 inch in size illustrating finished aluminum surface.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Test Reports: Submit test reports.

1.5 QUALITY ASSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in Article 1.3.

B. Test reports shall be accompanied by the entrance door manufacturer's letter of certification stating that the tested door meets or exceeds the referenced criteria for the appropriate AAMA door type.

1.6 WARRANTIES

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Total Entrance Door System:
1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total door installation which includes that of the manufacturer supplied doors, hardware, glass, glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, and structural adequacy as called for in the specifications and approved shop drawings
2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.

PART 2 - PRODUCTS

2.1 ALUMINUM-FRAMED ENTRANCES

A. Manufacturers:
1. EFCO Corp; www.efcocorp.com.
2. Vistawall Architectural Products; www.vistawall.com.
3. United States Aluminum Corporation; www.usalum.com.
4. Substitutions: Section 01630 – Product Options and Substitutions.

B. Product Description and Basis of Design: EFCO® Series D500 Wide Stile Entrance Door.

2.2 MATERIAL

A. Aluminum: 6063-T6 alloy and temper.

B. Exposed Fasteners: Aluminum or stainless steel.

C. Glass: 1/4-inch tempered monolithic.

2. Assa Abloy; Ceco Door Products; www.assaabloydss.com
3. Other SDI or NAAMM members that conform to the specific requirements of this specification.

2.2 DOORS

A. The Sound Control Door products are based on Stiles Custom Metal, Inc. Model No. DS68-51, STC Rating 51.

B. Provide sound control assemblies complete with door, frame, anchors, sound seals, door bottom seal and Cam-action hinges of type and sizes shown as called for.
1. Hinges: Provide 5-inch Cam-Lift hinges.
2. Seals: Provide Stiles #PS1 perimeter seals.
3. Bottom Seal: Provide Stiles ADB8 proprietary, adjustable, flush-mounted bottom seal.

C. Materials: Door face sheets shall be 0.053 in. min. thickness. Exterior openings shall be A60 galvanized.

D. Construction: Doors shall be of the types and sizes shown on approved shop drawings, with no visible seams or joints on faces. Minimum door thickness 1-3/4 inch.
1. Door construction is proprietary. Door weighs 13 2 lbs. per square foot

2.3 FRAMES

A. Steel Door Frame Materials: Frames shall be constructed of 0.067 in. (14 gauge) minimum thickness material. Exterior frames shall also have an A60 zinc coating.

B. Steel Door Frame Construction: Frames shall be welded units of the sizes and types shown on approved shop drawings. Knocked-down frames shall not be accepted. Jamb, header; mullion and sill profiles shall be in accordance with the frame schedule and as shown on the approved submittal drawings.

2.4 LABELED DOORS AND FRAMES

A. Construct and install doors and frames to comply with current issue of National Fire Protection Association (NFPA) Standard Number 80, as herein specified.

B. Doors and/or frames for labeled openings shall bear either a stamped or applied label from Warnock Hersey or Underwriters Laboratory.

C. All doors and frames are to have been tested in accordance with UL10B and UL10C.

2.5 FINISH HARDWARE

A. Doors and frames shall be mortised, reinforced, drilled and tapped at the factory for completely templated mortised hardware only, in accordance with the final approved hardware schedule and templates provided by the hardware supplier. Where surface mounted, anchor hinges, or non-template mortise hardware is to be applied, doors shall be reinforced, with all drilling and tapping done by others in the field. Reinforcement steel shall comply with NAAMM/HMMA 830 and 861.

B. Hardware supplier shall coordinate hardware compatibility with the door manufacturer.

2.6 FACTORY FINISH

A. After fabrication, remove all tool marks and surface imperfections and dress smooth faces of all welded joints.

B. Treat doors and frames to insure maximum paint adhesion and paint all accessible surfaces with one coat of a rust inhibitive, modified Alkyd, Zinc compound, gray primer that meets or exceeds all ANSI A250.10 performance criteria.

C. Primer coat shall be fully cured prior to shipment. Red or brown colored primers shall not be permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. It shall be the responsibility of the installation contractor to perform the following:
1. Tolerances shall meet the requirements of HMMA 840.
2. Solidly pack throat of frames which are installed in metal-stud and gypsum-wallboard partitions with 12 lb./cubic ft. density mineral wool insulation. Continuously caulk voids between wall and frame after installation.
3. Solidly grout-fill frames installed in masonry or poured in place to eliminating all voids.
4. The floor area under a sound control door shall be flat, level and smooth.

3.2 ERECTION TOLERANCES

A. Clearance and tolerances: In compliance with NAAMM / HMMA standards.

3.3 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for final cleaning.

B. Clean doors and frames in accordance with manufacturer's special instructions.

3.4 DEMONSTRATION

A. Instruct the Owner's Maintenance Personnel regarding the operation and maintenance of installed sound control door assemblies.

END OF SECTION

B C A

architecture
planning
interiors

Transmittal

Date: January 22, 2009

Sent Via: ☐U.S. Mail ☒UPS ☐Overnight ☐Courier ☐Hand

To: Tony Gupta

Firm/Agency: Swinerton Management & Consulting

Address: 4220 Farm Hill Blvd,

City, State, Zip Bldg 19
Redwood City, CA 94061

From: Rashelle Jones

Phone: (510) 353-4134

Project #: 07014 (B)

Project Name: Canada Bldg 8

File No.: 7.0 Submittals

CC: Rich Giannini – Schembri Construction
(2 Copies)
Aaron Dodge - IOR
(1 Copy)

We are sending you:

☐ Drawings	☐ Addenda	☐ Supplemental Instructions	☐ Pay Application
☐ Specifications	☐ Copy of letter	☐ Req. for Information	☐ Change Order
☐ Samples	☐ Forms	☐ Clarification Drawings	☐ Fees Due
☒ Submittal	☐ Application	☐ Req. for Proposal	☐ Contract

Copies	Date	No.	Description
1		38-084113-1	Door and Hardware Product Data for Aluminum Framed Entrances

Items transmitted:

- ☐ For Your Use
- ☐ For Review and Approval
- ☐ For Review and Comment
- ☐ For Signature
- ☐ For Processing/Payment

Submittal Status:

- ☐ Reviewed
- ☐ Rejected
- ☒ Furnish as Corrected
- ☐ Revise and Resubmit
- ☐ Submit Specific Items

Remarks:
Tony,

Please find attached for your reference and coordination the above referenced submittal for the Canada Bldg 8 Project, which has been marked **"Furnish as Corrected"**

If there are any questions or concerns, please feel free to contact Sandrine Hitchcock, Associate Project Manager, at 510-353-4135.

Thank you,

Signed: *Rashelle Jones*
Project Administrator

Bunton Clifford Associates, Inc.

Corporate Office
210 Hammond Ave. Fremont, CA 94539
[T] 510 445.1000 [F] 510 445.1005

Branch Office
519 West Main St. Merced, CA 95340
[T] 209 725.1800 [F] 209 725 1818

www.BCAincOnline.com

SCHEMBRI CONSTRUCTION

SUBMITTAL CONTROL RECORD

To: Mr. Anthony Gupta

Swinerton Management & Construction
SMCCCD

From: Schembri Construction Co., Inc.
1485 Bayshore Blvd., #130
San Francisco, Ca 94124

Date: January 16, 2009

Submittal No. 38.1

Project: Cañada Building 8 Phase 2 Renovation

Spec. Section: 08 41 13

Drawing No.

No. of Copies: 5

Title: Aluminum Doors per PR #001R

Subcontractor (Supplier): Automatic Door Systems

Item	Description	Reviewers' Action NE	MC	OUT	REJ
1	Re-submittal: Response to SCC' Submittal #38 for Hardware and Door Product Data for Doors 8201, 8206 and 8208				

FINISH HARDWARE SUBMITTAL REVIEW

- ☐ Approved
- ☑ Approved As Corrected
- ☐ Revise and Re-submit
- ☐ Rejected _____

Approval does not extend or alter any contractual obligation of the contractor or subcontractor.

Submittal review is for conformance with the design concept of the project and compliance with the information provided in the contract documents.

By Bob Manthey Date 01/21/2009

Ingersoll Rand Security Technologies

Comments:

Schembri Construction Co., Inc. herby certifies that all material submitted has been checked for completeness, for correctness, and for compliance with the drawings and specifications, that field dimensions and conditions have been verified, and that exceptions, if any, are clearly noted by Schembri Construction, and/or their subcontractor/supplier.

Reviewer's Remarks:

Transmitted by: Richard Giannini

Tracking: Rec'd By City: _____ Returned To Contractor: _____

NE = No Exceptions Taken
MC = Make Corrections Noted
OUT = Revise & Resubmit
REJ = Rejected. Resubmit

SCHEMBRI CONSTRUCTION

CAÑADA COLLEGE BUILDING 8 PHASE 2
RENOVATION PROJECT

SUBMITTAL NO. 38.1

SPECIFICATION SECTION 08 41 13: Door and Hardware Product Data for Aluminum Framed Entrances per PR #001R

AUTOMATIC DOOR SYSTEMS, INC.
962 TERMINAL WAY
SAN CARLOS, CA.
94070
415/592-8282
FAX/595-1825

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HARDWARE GROUP #010: Door No. 8206
3-0x7-0 WIDE Stile Aluminum Storefront Door ONLY
EPT-2 Power Transfer Hinge
DHS83HD1 HS Cont. Hinge substitute w/EPT cutout
~~*Primus 20-740 (Supplied by others)*~~
ND80PDEU Electrified Storeroom Lockset Sparta lever ←
4041 EDA Manual Closer Use 4041 top jamb mounted x 18G ←
100S Overhead Stop Use 904S ←
8400 10" x 2" LDW Kick Plate
S88 Door Seal
192A/195A Threshold

HARDWARE GROUP #11: Door No. 8208
3-0x7-0 WIDE Stile Aluminum Storefront Door ONLY
DHS83HD1 Half Surface Continuous Hinge for new door in lieu of reusing existing pivots
EPT-2 Power Transfer Hinge
99 Panic Device
E996L Electric Trim FSE x 17 lever ←
~~*[illegible] (Supplied by others)*~~
~~*Primus 20-740 (Supplied by others)*~~
4041 EDA Manual Closer Use 4041 top jamb mounted x 18G ←
Use 904S ←

HARDWARE GROUP #16: Door No. 8201
6-0x7-0 WIDE Stile Aluminum Storefront Door Pair ONLY
EPT-2 Power Transfer Hinge
DHS83HD1 HS Cont. Hinge substitute w/EPT cutout
SD-EL9947DT Electrified Panic Device. Cylinder Dogged
SD-EL9947NL Electrified Panic Device. Cylinder Dogged
PS873-2-AO Power Supply
~~*[illegible] (Supplied by others)*~~
~~*Primus 20-740 (Supplied by others)*~~
~~*[illegible] (Supplied by others)*~~
4041 EDA Manual Closer
4041-18G Drop Plate
4642 Auto Equalizer Automatic Closer HANDING TO BE DETERMINED The LHR leaf is to have the auto operator ←
904S Overhead Stop
S88 Weather Seal
192A/195A Threshold
8310-856 4 ½" Round Hard Wired Push Plate (DOUBLE GANG BOX AND CONDUIT REQUIRED BY OTHERS)
½" TEMPERED GLASS SPECIFICATION

AUTOMATIC DOOR SYSTEMS, INC.
952 TERMINAL WAY
SAN CARLOS, CA.
94070
415/592-6282
FAX/595-4625

SUBMITTAL No. 38's
COMMENTS

11/25/08

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MANUFACTURERS
~~MATERIAL FINISHES~~

HARDWARE GROUP #010; Door No. 8206 Does this opening have a new door and frame? ← YES
3-0x7-0 WIDE Stile Aluminum Storefront Door
EPT-2 Power Transfer Hinge
~~*SL-11 EPT Full Mortise Continous Hinge with EPT*~~ DHS83HD1 HS Cont. Hinge substitute w/EPT cutout
→ If new door and frame why this hinge?
Primus 20-740 (Supplied by others)
ND80PDEU Electrified Storeroom Lockset The Hardware Submittal shows some of the same hardware
4041 EDA Manual Closer → Who is supplying what?
100S Overhead Stop
8400 10" x 2" LDW Kick Plate
S88 Door Seal
192A/195A Threshold

HARDWARE GROUP #11; Door No. 8208 Does this opening have a new door and frame? ← YES
3-0x7-0 WIDE Stile Aluminum Storefront Door
DHS83HD1 Half Surface Continuous Hinge for new door in lieu of reusing existing pivots If new why this hinge?
~~*288-18 Door Cord*~~ TSB-C Door Loop Substitute If new door and frame Why a door loop?
99 Panic Device
E996L Electric Trim FSE → Who is supplying this hardware?
20-057T x ICX (Supplied by others)
Primus 20-740 (Supplied by others)
4041 EDA Manual Closer

HARDWARE GROUP #16; Door No. 8201
6-0x7-0 WIDE Stile Aluminum Storefront Door Pair Verify this is a new door x existing frame. ← YES
EPT-2 Power Transfer Hinge If existing frame how are you going to prep frame for EPT?
~~*SL-11 EPT Full Mortise Continous Hinge with EPT*~~ DHS83HD1 HS Cont. Hinge substitute w/EPT cutout
EL9947DT-CD Electrified Panic Device, Cylinder Dogged This should be SD dogging not CD dogging.
EL9947NL-CD Electrified Panic Device, Cylinder Dogged
PS873-2-AO Power Supply
20-057T x ICX (Supplied by others) Who? Does not show up in Hardware submittal.
Primus 20-740 (Supplied by others)
20-771 (Supplied by others)
4041 EDA Manual Closer This closer should be top jamb mounted. 4041 x 18G to accommodate the overhead stop
4642 Auto Equalizer Automatic Closer The 4642 should be flush ceiling mount to accommodate the OH stop.
100S Overhead Stop If an existing frame this will not work. Use the 904S at both leafs.
FS444 Floor Stop This was changed to an overhead stop.
S88 Weather Seal
192A/195A Threshold
~~*8310-856 4-1/2" Round Hard-Wired Push Plate*~~ 79-HSS Hard Wired Flush Mount Push Plate Substitute
Was this substitution approved by the District?
¼" TEMPERED GLASS SPECIFICATION

Rich Giannini

From: John Tondino [john@autodoorinc.com]
Sent: Thursday, January 15, 2009 4:58 PM
To: rich@schembri.com
Cc: Joshua Boosahda; Zakar Nathan; Melissa Julian; Roehm Tom
Subject: Fwd: PROJ #104, ADS J-5759, REVISED SUBMITTAL TABLE OF CONTENTS
Attachments: ADSJ-5759.PDF; ATT00007.htm; Pages from Reviewed Submittal 38-084113-0 Aluminum Framed Entrances.pdf; ATT00010.htm

Good Afternoon Rich,
Please see the attached revised Table of Contents for Project #104, I created after our phone discussion today addressing the questions posed by Mr. Bob Manthey and those I sent you yesterday via email.
I've colored the revised items in a brick red color.
Per our conversation we will be supplying new Wide Stile Storefront doors only. Please confirm Wide instead of Medium Stile.
We will be supplying all the hardware listed (except those items noted supplied by others) listed on the table of contents.
We will be supplying EPT-2 Electric power transfer hardware on all 3 openings.
We will supply Glynn Johnson 904S door stops for Hardware Group 16 instead of 100S and we have deleted the FS444 floor stop.

We need official approved response to this revised document asap.
We also need to know who our Field Superintendent should contact to conduct our site visit to take accurate dimensions prior to ordering the new doors. Please notify our project coordinator Melissa Julian with this info.

Finally, we need to know which leaf of door #8201 is to be activated by the LCN 4642 swing door operator.

SECTION 08 41 13.5

ALUMINUM-FRAMED FOLDING SYSTEMS

NANA WALL SYSTEMS
MILL VALLEY, CA
PH (415) 383-3148
SUBMITTAL #8

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Sliding/folding aluminum and glass door system, including aluminum frame, threshold, panels, sliding/folding and locking hardware, weather stripping, glass and glazing; designed to provide an opening glass wall, with sizes and configurations as shown on drawings and specified herein

B. Related Sections:
1. Section 05 12 00 - Structural Steel Framing: Steel fabricated attachment members and framed openings.
2. Section 07 90 00 - Joint Protection: System perimeter sealant and back-up materials.
3. Section 08 71 00 - Door Hardware: Mortised hardware reinforcement requirements affecting framing members; hardware items other than specified in this section.
4. Section 08 80 00 - Glazing.
5. Section 09 90 00 - Paints and Coatings: Field painting of interior surface of infill panel surfaces.

C. Products Installed But Not Supplied Under This Section:
1. Install exit devices, door closers, and miscellaneous door hardware at metal-framed storefronts furnished under Section 08710.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 611.98, Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 2603.02, Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
3. AAMA 2605 02, Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
4. AAMA 1303 5, Voluntary Specifications for Forced Entry Resistant Aluminum Sliding Glass Doors.

B. American National Standards Institute (ANSI):
1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings

C. ASTM International:
1. ASTM E283 - Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
2. ASTM E330 - Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
3. ASTM E547 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
4. ASTM 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

5. ASTM E 1996 - Standard Specifications for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

D. Consumer Product Safety Commission (CPSC):
1. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.

E. National Fenestration Rating Council (NFRC):
1. NFRC 100, Procedure for Determining Fenestration Product Thermal Materials.
2. NFRC 200, Procedure for Determining Solar Heat Gain Coefficient.

1.3 PERFORMANCE REQUIREMENTS

A. Unit to comply with applicable manufacturer's independently certified testing results

B. Testing results include:
1. Air infiltration in accordance with ASTM E 283.
2. Water penetration in accordance with ASTM E 547.
3. Structural load deflection in accordance with ASTM E 330.
4. Forced entry in accordance with AAMA 1304.

C. Thermal Performance: Unit to comply with the U value, rated, certified and labeled or simulated in accordance with NFRC 100, shown in manufacturer's latest published data for the glazing and sill specified.

D. Solar Heat Gain Coefficient: Unit to comply with the solar heat gain coefficient, simulated in accordance with NFRC 200, shown in manufacturer's latest published data for the glazing specified.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate system dimensions, direction of swing, configuration, swing panels, typical head jamb, side jambs and sill details, type of glazing material, framed opening requirements and tolerances, general construction, component joining, connections and locations, and hardware locations, affected related Work, expansion and contraction joint location and details

C. Product Data: Submit component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

D. Samples: Submit two samples 12 by 12 inches in size illustrating finished aluminum surface, glass units, infill panels, and glazing materials.

E. Design Data: Indicate framing member structural and physical characteristics, calculations, and dimensional limitations.

F. Manufacture's Installation Instructions: Submit manufacturer's installation instructions.

G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Requirements for submittals

B. Operation and Maintenance Data: Submit Owner's Maintenance Manual from manufacturer. Identify with project name, location and completion date, type and size of unit installed.

1.6 QUALIFICATIONS

A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 15 years experience in providing folding/sliding door systems for large openings in the North American market.

B. Installer: Experienced in the installation of manufacturer's products or other similar products for large openings. Installer to provide reference list of at least 3 projects of similar scale and complexity successfully completed in the last 3 years. Provide project names, locations, completion dates, names and telephone numbers of General Contractor and Owner's contact person.

C. Design structural support framing components under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of California.

1.7 PRE-INSTALLATION MEETING

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Deliver materials to job site in sealed, unopened cartons or crates.

C. Protect units from damage.

D. Store material under cover, protected from weather and construction activities.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install sealants nor glazing materials when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.11 WARRANTY

A. Section 01 77 00 – Contract Closeout: Product warranties.

B. Provide manufacturer's standard warranty against defects in materials and workmanship.

C. Furnish 10 year manufacturer warranty for rollers and for seal failure of insulated glass supplied. For all other components, furnish one year warranty (two years if unit is installed by manufacturer's certified trained installer) from date substantial completion.

PART 2 - PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Manufacturers:
1. NANA Wall Systems, Inc. . 707 Redwood Hwy, Mill Valley, California 94941. Toll Free: (800) 873-5673. Telephone: (415) 383-3148 Fax: (415) 383-0132 Website: www.nanawall.com. Email: info@nanawallsystems.com.
2. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions

B. Product Description: NanaWall SL70, Monumental, Thermally Broken Aluminum Framed Folding System as supplied by NANA WALL SYSTEMS, INC.

2.2 MATERIALS

A. Frame and Panels: From manufacturer's standard profiles, provide head jamb, side jambs, and panels with dimensions shown on drawings.
1. Provide panels with standard one lite.
2. Provide standard bottom rail with manufacturer's standard kickplate with height specified.
3. Aluminum Extrusion: Extrusions with nominal thickness of 0.098-inch. Alloy specified as AlMgSi0.5 with strength rated as 6063-T5 or F-22 (European standard). Anodized conforming to AAMA 611.98, powder coated conforming to AAMA 2603.02.
4. Thermally broken with 3/4 inch polyamide plastic reinforced with glass fibers with additional insulating foam.

B. Glass: Provide manufacturer's standard glass with dry glazing 15/16 thick insulated laminated glass (STC 47). Exact glass dimensions to be provided by manufacturer. ASTM C 1048 Kind FT, select glazing quality float glass; fully tempered safety glass complying with applicable codes. Provide EPDM gaskets and extruded aluminum snap-in glazing bead for dry glazing per manufacturer's instructions. Stops to provide for total glass thickness of 15/16-inch. All glass to comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201. 1/4" (LAMINATED + 1/2" AIR + 1/4" LAMINATED

C. Locking Hardware and Handles: Provide manufacturer's standard nylon handle and concealed two point locking hardware operated by 180 degree turn of handle between each pair of folding panels and on any secondary swing panel. Face applied flush bolt locking will not be allowed.
1. On main entry panel for models with a swing panel, provide manufacturer's standard nylon lever handles on the inside and outside, a Schlage compatible lock set with lockable latch, dead bolt and rods at the top and bottom. Rods to be concealed and not edge mounted. Depression of handles withdraws latch. Lifting of handles engages rods and turn of key or thumb turn engages deadbolt and operates lock.
2. Nylon handle finish: Closest match to frame and panel finish from 13 available colors.
3. Standard locking with fiber glass reinforced polyamide end caps at top and bottom. Rods to have a stroke of 15/16-inch.
4. Provide handle height centered at 41-3/8 inches from bottom of panel.

D. Sliding/Folding Hardware: Provide manufacturer's standard combination sliding and folding hardware with top, bottom tracks and threshold. All running carriages to be with sealed, self-lubrication, ball bearing multi-rollers. Surface mounted hinges and running carriages will not be allowed. Weight of panels to be borne by the bottom of the track will not be allowed.
1. Provide upper guide carriage and lower running carriage with four vertical fiber glass reinforced polyamide wheels and two horizontal wheels. The vertical wheels to ride on top of sill track and lie above the water run-off level. Carrying capacity of lower running carriage to be 440 lbs.
2. Threshold: Dark bronze anodized, E6 C34 flush sill.

3 Hinges: Zinc die cast. Finish: Closest match to finish of frame and panels. Provide stainless steel security hinge pins with set screws.
4 Adjustment: Provide folding/sliding hardware capable of specified amount of compensation and adjustments without needing to remove panels from tracks, in width, 1/8-inch per hinge and in height, 3/16-inch up and down.

E Other Components:
1 Weather stripping: Provide manufacturer's standard double layer EPDM or brush seals with a two layer fiber glass reinforced polyamide fin at both the inner and outer edge of door panels or on frame for sealing between panels and between panel and frame.
2 Provide tapered pins or stainless steel screws for connecting frame components.

2.3 FABRICATION

A. Use extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping as specified herein to make a folding glass wall. Factory pre-assemble as is standard for manufacturer and ship with all components and installation instructions.

B. Sizes and Configurations: See drawings for selected custom dimensions within maximum frame sizes possible as indicated in manufacturer's literature. See drawings for selected number of panels and configuration. Outward opening unit.

2.4 SHOP FINISHING

A. Aluminum Finish: Dark bronze anodized, E6 C34. Same finishes on inside and outside.

B. Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.

C. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar metals.

D. Touch-Up Primer for Galvanized Steel Surfaces: SSPC Paint 20 zinc rich.

E. Extent of Finish:
1. Apply factory coating to surfaces exposed at completed assemblies.
2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.
3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and methods of attachment with other Work.

B. Verify wall openings and adjoining air seal materials are ready to receive Work of this Section.

C. Because of the large dimensions involved and the weight and movement of the panels, verify the structural integrity of the header such that the deflection with the live load is limited to the lesser of L/720 of the span and 1/4 inch.

D. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.

E. Beginning of installation of units constitutes acceptance of existing conditions.

3.2 INSTALLATION

A. Install frame in accordance with manufacturer's recommendations and installation instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
1. Provide appropriate anchorage devices and securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent Work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

G. Install integral flashings and integral joint sealers.

H. Set thresholds in bed of mastic and secure.

I. Install hardware using templates provided. Refer to Section 08 71 00 for installation requirements.

J. Install infill panels using method required to achieve performance criteria.

K. Coordinate installation of glass with Section 08 80 00; separate glass from metal surfaces.

L. Coordinate installation of perimeter sealants with Section 07 90 00.

M. Install panels, handles and lock set in accordance with manufacturer's recommendations and installation instructions.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.5 CLEANING

A. Section 01700 - Execution Requirements: Final cleaning.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect finished Work from damage.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

TRISPEC ARCHITECTURAL HARDWARE, INC
SANTA CLARA, CA
(408) 472-9219
FINAL HARDWARE VERSION ATTACHED

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed

B. This Section includes the following, but is not necessarily limited to:
1. Door Hardware, including electric hardware.
2. Storefront and Entrance door hardware
3. Gate Hardware.
4. Digital keypad access control devices
5. Hold-open closers with smoke detectors.
6. Wall or floor-mounted electromagnetic hold-open devices.
7. Power supplies for electric hardware.
8. Low-energy door operators plus sensors and actuators.
9. Cabinet locks and padlocks.
10. Thresholds, gasket and weather-stripping.
11. Door silencers or mutes.

C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
1. Section 06 20 00 - Finish Carpentry: Finish Hardware Installation.
2. Section 08 12 14 - Standard Steel Frames.
3. Section 08 14 16 - Flush Wood Doors.
4. Section 08 41 13 5 – Aluminum-Framed Folding Systems
5. Section 28 31 00 – Analog Fire Alarm and Detection System

1.2 REFERENCES (Use date of standard in effect as of Bid date.)

A. ADAAG - Americans with Disabilities Act (ACT) Accessibility Guidelines for Buildings and Facilities

B. BHMA - Builders' Hardware Manufacturers Association

C. CCR - California Code of Regulations, Tile 24, Part 2, California State Accessibility Standards.

D. DHI - Door and Hardware Institute.

E. NFPA - National Fire Protection Association.
1. NFPA 80 - Fire Doors and Windows,
2. NFPA 101 - Life Safety Code.
3. NFPA 105 - Smoke and Draft Control Door Assemblies.

F. CBC - California Building Code.

G. UL - Underwriters Laboratories.
1. UL 10C - Fire Tests of Door Assemblies.
2. UL 305 - Panic Hardware.

H. WHI - Warnock Hersey Incorporated.

I. SDI - Steel Door Institute

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

1. Type, style, function, size and finish of each hardware item.
2. Name, part number and manufacturer of each item.
3. Fastenings and other pertinent information.
4. Location of hardware set coordinated with floor plans and door schedule
5. Explanation of all abbreviations, symbols and codes contained in schedule.
6. Mounting locations for hardware.
7. Door and frame sizes and materials.
8. List of manufacturers used and their nearest representative with address and phone number.
9. Keying information

D. Make substitution requests in accordance with Section 01 60 00 – Product Requirements. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution

E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled

F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

G. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 – Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of installed cylinders and their master key code.

C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier

1.5 QUALITY ASSURANCE

A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Responsible for detailing, scheduling and ordering of finish hardware.
2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
3. Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.

C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.6 PRE-INSTALLATION MEETING

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene a pre-installation conference at least one week prior to beginning work of this section.

C. Attendance: Architect, Construction Manager, Contractor, hardware supplier, installer, key District personnel, and Project Inspector.

D. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

1.7 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.

C. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.

D. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

E Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

F Ship all permanent keys, cylinders and/or cores directly from lock manufacturer to Owner.

1.8 COORDINATION

A Coordinate Work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
1 Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

B Sequence installation to accommodate required utility connections.

C Coordinate Owner's keying requirements during course of Work.

1.9 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
1. Closers: Ten (10) years, except electronic closers which shall be two (2) years.
2. Exit devices: Three (3) years.
3 Locksets: Seven (7) years
4 All other hardware: Two (2) years

1.10 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.11 MAINTENANCE SERVICE

A Section 01 70 00 – Contract Closeout: Requirements for maintenance service.

B Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

PART 2 - PRODUCTS

2.1 DOOR HARDWARE

A General: Refer to Section 01 60 00 – Product Requirements.

B Specified Products and Acceptable Manufacturers:

1. General: Catalog numbers used to identify items in the "Hardware Schedule" below are those of the following specified manufactures. Acceptable alternate manufacturers are as listed; items produced by acceptable manufacturers, comparable to those specified in material, weight, size, function, design, and finish will be considered accepted equals to those items specified and will not require submittal of physical sample or request for substitution. Architect's decision regarding any item submitted for approval as equal to that specified shall be final.

2.2 MANUFACTURERS

	Item	Manufacturer	Match Existing Standards
A	Hinges	Hager / Ives	Matches existing standard
B	Locks, Latches & Cylinders	Schlage	Matches existing standard
C.	Exit Devices	Von Duprin	Matches existing standard
D	Closers	LCN	Matches existing standard
E.	Push, Pulls & Protection Plates	Ives	Matches existing standard
F	Flush Bolts	Ives	Matches existing standard
G	Dust Proof Strikes	Ives	Matches existing standard
H	Coordinators	Ives	Matches existing standard
I	Stops	Ives	Matches existing standard
J	Thresholds	National Guard	Pemko
K	Seals & Bottoms	National Guard	Pemko

2.3 MATERIALS

A Continuous Hinges: As manufactured by Select Products Limited. UL rated as required.

B. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Sparta" design fastened with through-bolts.

1 Chassis: Cylindrical design, zinc plated for corrosion-resistance.

2. Latch Bolt: Steel, 1/2" (12mm) throw, deadlocking on keyed and exterior functions. 3/4" (19mm) throw anti-friction latch available for pairs of fire doors

3 Faceplate: Brass, bronze or stainless steel 1-1/8" x 2-1/4" square corner, beveled.

4 Lever Trim: Accessible design, pressure cast zinc, plated to match finish symbols. Roses: Brass

5. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
6. Vandlgard Function: 7 year warranty, outside lever is disengaged when in the locked mode.
7. Rosettes: Minimum 3-7/16" diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
8. Springs: Full compression type.
9. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.

C. Exit devices: Von Duprin as scheduled with push-through pad design, no exposed touch bar fasteners, no exposed cavities when operated.
1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 1994 standards.
2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
3. Mechanism case shall have an average thickness of 0.140 inch.
4. Compression spring engineering.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners
7. All latchbolts shall be deadlocking with 3/4 inch throw and have a self-lubricating coating to reduce friction and wear.
8. Device push bar must release when a force of 15 pounds, or less, of pressure is applied when a force of 250 pounds is applied to the door.
9. Device shall bear UL label for fire and or panic as may be required.
10. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
11. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of 0.130 inch thickness, match lockset lever design.
12. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
13. Furnish glass bead kits for vision lites where required.
14. All Exit Devices to be sex-bolted to the doors.
15. Panic Hardware shall comply with UBC Standard 10-4 and shall be mounted between 30" and 44" above the finished floor surface. The unlatching force shall not exceed 15 lbs. applied in the direction of travel. Panic hardware shall comply with CBC Section 1003.3.1.9.

D. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.
1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at

approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.

5. Closers shall be installed to permit doors to swing 180 degrees.
6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F without requiring seasonal adjustment of closer speed to properly close the door.
7. Drop brackets are required at narrow head rails.
8. Maximum effort to operate doors shall not exceed 5 lbs. for exterior doors and 5 lbs. for interior doors, such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. The Authority having Jurisdiction, may increase the maximum effort to operate fire doors to achieve positive latching, but not to exceed 15 lbs. maximum; per CBC Section 1133B 2.5. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. Reference CBC Sections 1133B 2.1, 1133B 2.5, 1133B2.5.1 and 1003.3.1.8. Doors shall take at least 3 seconds to move from an open position of 70 degrees to a point of 3 inches from the latch jamb.
9. Provide sex-bolted or through bolt mounting for all door closers

E. Flush Bolts and Dust Proof Strikes: Ives as scheduled.
1. Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
2. Manual flush bolts only permitted on storage or mechanical openings as scheduled
3. Provide dust proof strikes at openings using bottom bolts.

F. Coordinators: Ives as scheduled.
1. Coordinator shall be a 1-5/8" wide by 5/8" high aluminum channel with the length variable to the door opening. It shall have a safety mechanism which will allow the active door to close first if under extreme pressure.

G. Door Stops: Ives as scheduled.
1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Do not install floor stops more than four (4) inches from the face of the wall or partition (Title 24, 1133B.8.6).
3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

H. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.

I. Lock Protectors: Lock astragals shall be provided with internally threaded fasteners for flat head machine screws. No hex head or carriage bolt fasteners will be permitted. Must be through bolted to door.

J. Thresholds: As Scheduled and per details
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
2. Finish: Slip Resistant SIA Finish.

3. Furnish with Return Closed Ends (RCE). Threshold is miter cut on a 45 degree angle and returned to the face of the frame for a neat, clean and finished appearance to the opening.
4. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Section 07 90 00 - Joint Protection.
5. Use 1/4-inch fasteners, red-head flat-head sleeve anchors (SS/FHSL)
6. Thresholds shall comply with CBC Section 1133B 2 4 1

K. Seals: Sponge silicone gasket to meet ASTM E 283-1984 test standards. Provide silicone gasket at all rated and exterior doors. All fire rated openings are to be in compliance with UBC 7 2 and UL 10C

L. Rain Drips: Provide rain drips at the heads of all exterior doors where there is not enough overhang to protect the opening

M. Door Shoes and Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.

N. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.4 KEYING

A. Furnish a Grand Master, Master, keyed alike or keyed different system as directed by the District. The District is to verify the Schlage Primus "EFP" Level 3 and existing Classic "EF" Keyway locations. Conduct a keying meeting with the District to establish all keying requirements.

B. Provide construction keying for doors requiring locking during construction; remove temporary cores immediately prior to District occupancy. Permanent cores and keys are to be shipped directly from the factory to the District.

C. Keys: Supply keys and blanks as follows:
1. Supply 2 cut change keys per lock
2. Supply 50 each "EF" 6 pin key blanks stamped "DO NOT DUPLICATE".
3. Supply 20 construction keys.
4. Supply 3 Cut Construction Control keys and 6 Permanent Cut Control keys.

2.5 FINISHES

A. Generally to be oil rubbed bronze US10B (613) unless otherwise noted.

B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless other wise noted.

C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

D. Aluminum items to be finished anodized aluminum US28 (628), except thresholds which can be furnished as standard mill finish.

2.6 FASTENERS

A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.

B. Screws for butt hinges shall be flathead, countersunk, full-thread type.

C Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

D Provide expansion anchors for attaching hardware items to concrete or masonry.

E All exposed fasteners shall have a phillips head.

F Finish of exposed screws to match surface finish of hardware or other adjacent work.

G All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.1 EXAMINATION

A Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.

B Verify electric power is available to power operated devices and is of correct characteristics.

C Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

A Install hardware in accordance with manufacturer's instructions and requirements of DHI.

B Use the templates provided by hardware item manufacturer

C Mounting heights for hardware shall be as recommended by the Door and Hardware Institute Operating hardware will to be located between 30" and 44" AFF Per CBC Section 1133B 2.5.1.

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

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

F Set thresholds for exterior doors in full bed of butyl-rubber sealant

G If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

3.3 FIELD QUALITY CONTROL

A Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturer's instructions and as specified herein.

3.4 ADJUSTING

FINAL VERSION

TriSpec Architectural Hardware, Inc.
811 Monroe Street
Santa Clara, CA 95050
(408) 472-9212
Fax (408) 216-9694

Architectural Hardware
Wood Doors
Hollow Metal Doors & Frames
Custom Hollow Metal
Specifications

SCHEDULE OF FINISH HARDWARE

Specification Section 08 71 00
Our Job 08-16

PROJECT: Canada College Bldg 8 Renovation
4200 Farm Hill Blvd.
Redwood City, CA 94061

Ship To: Same

Contractor: Schembri Construction
1485 Bayshore Blvd. Suite 130
San Francisco, CA 94124
415-656-0300
Fax 415-656-0310

Architect: BCA Architecture
210 Hammond Avenue
Fremont, CA 94539
510-445-1000
Fax 510-445-1005

Job Contact: Rich Giannini
Job Phone: (415) 716-0334
Job Fax: (650) 364-3042
Cell:

Submittal Date: 7/31/2008
Revision: *11/2/08 - RFP001R/Our COR#3
Revision: **12/7/08 - Add Dr/Frame/Hdwe Dr 8109
***12/26/08 - Revise Primus Core Locations
+1/7/09 - Add Locks 2nd Floor/Delete Alum Dr Hdwe

Submitted by: Mary L. Hodgson
E-Mail: hdwemom@yahoo.com

Canada College Bldg 8 Renovation

SUMMARY

BUTTS - STANLEY

H1	3	EA	Butts FBB168 US10A 5 x 4-1/2
H2	21	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
H3	3	EA	Butts FBB168 US10A 5 x 4-1/2 NRP
H4	21	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
H5	3	EA	Elec Hinge CE-54-FBB179 US10A 4-1/2 x 4-1/2

LOCKS - SCHLAGE

L1	2	EA	Lock ND70RD SPA US10B x 13-047 x 10-025
L1A	1	EA	Lock ND70RD SPA US10B x 13-047 x 10-013
L2	13	EA	Standard Core 23-030 606
L3	4	EA	Lock ND53RD SPA US10B x 13-047 x 10-025 *
L3A	4	EA	Lock ND53RD SPA US10B x 13-047 x 10-013
L4	5	EA	Lock ND80RD SPA US10B x 13-047 x 10-025
L4A	1	EA	Lock ND80RD SPA US10B x 13-047 x 10-013
L5	12	EA	Primus Core 20-740 606
L6	3	EA	Lock ND80RD-EU SPA US10B x 13-047 x 10-025 +
L7	2	EA	Rim Cylinder 20-057 US10B +
L8	1	EA	Lock ND85PD SPA US10B x 13-047 x 10-025
L9	1	EA	Standard Cyl 23-000 606
L10	1	EA	Latch ND10S SPA US10B x 13-001 x 10-025
L11	2	EA	Mort. Cyls 26-091 1-1/4" US26D +

CLOSERS - LCN

C1	6	EA	Closers 4041 695 x SNB
C2	1	EA	Closers 4041EDA 695 x SNB

FLUSH BOLTS - IVES

B1	2	EA	Flush Bolts 358B10B
B2	1	EA	Dust Proof Strike DP2 US10B

STOPS - IVES

S1	14	EA	Floor Stop FS436 US10B

RFP #013

KICKPLATE - IVES

K1	5	EA	Kickplate 10 x 34 US10B .050

THRESHOLD - PEMKO

T1	1	EA	Threshold 14/1A 3/6 x 5" x Drill x MS/A

MISC.

M1	44	EA	Silencers GJ64

VISION LITES - AIR LOUVERS

VL1	7	EA	Vision Lite Kits VLF-EZ 8 x 40 Bronze

Canada College Bldg 8 Renovation

FIRST FLOOR

HEADING 1 HW001

EP 1 Single Door 8109 Flex Space 8120 to Files 8109 RH
3/6 x 7/0 x 1-3/4 SC x HM **
Door Type D1

H1	3	EA	Butts FBB168 US10A 5 x 4-1/2 **
L1	1	EA	Lock ND70RD SPA US10B x 13-047 x 10-025
L5	1	EA	Primus Core 20-740 606 **
C1	1	EA	Closer 4041 695 x SNB **
S1	1	EA	Floor Stop FS436 US10B **
M1	3	EA	Silencers GJ64 **

** Added Door per RFP 1R2

HEADING 1A HW001A

E 1 Single Door 8118 Flex Space 8120 to Kitchen 8118 RH
3/0 x 7/0 x 1-3/4 SC x HM*
Door Type D1*

H2	3	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
L1	1	EA	Lock ND70RD SPA US10B x 13-047 x 10-025
L2	1	EA	Standard Core 23-030 606
C1	1	EA	Closer 4041 695 x SNB
K1	1	EA	Kickplate 10 x 34 US10B .050
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64

*Addded Dr/Frame/Hdwe Group 001A per RFP001R

HEADING 2 HW002

1 Door 8110 Flex Space 8120 from Conference 8110
1 Door 8110A Flex Space 8120 from Conference 8110
1 Door 8119 Flex Space 8120 from Conference 8119
1 Door 8119A Flex Space 8120 from Conference 8119
Alum Dr/Frame by Other

All Hardware by Others

IVES FS436 DOME STOP PER RFP #013

HEADING 3 HW003

E 1 Single Door 8111 Flex Space 8120 to Office 8111 — LH
E 1 Single Door 8112 Flex Space 8120 to Office 8112* — RH
E 1 Single Door 8115 Flex Space 8120 to Office 8115 — RH
3/0 x 7/0 x 1-3/4 SC x HM*
Door Type D3

H2	9	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
L3	3	EA	Lock ND53RD SPA US10B x 13-047 x 10-025
L2	3	EA	Standard Core 23-030 606
S1	3	EA	Floor Stop FS436 US10B
M1	9	EA	Silencers GJ64
VL1	3	EA	Vision Lite Kits VLF-EZ 8 x 40 Bronze

*New Frames @ 8111, 8115/New Dr/Frame/Hdwe @ 8112 per RFP001R

HEADING 4 HW004

~~1 Single Door 8112 Flex Space 8120 from Office 8112~~ — RH
~~3/0 x 7/0 x 1-3/4 (E) SC x (E) HM~~
~~Door Type -~~

*See New Dr/Frame/Hardware Group 003 per RFP001R above.

HEADING 5 HW005

EP 1 Single Door 8114 Files 8109 from Mechanical 8114 — RHR
3/6 x 7/0 x 1-3/4 HM x HM STC51
Door Type D1

H3	3	EA	Butts FBB168 US10A 5 x 4-1/2 NRP
L4	1	EA	Lock ND80RD SPA US10B x 13-047 x 10-025
L5	1	EA	Primus Core 20-740 606
C1	1	EA	Closer 4041 695 x SNB
S1	1	EA	Floor Stop FS436 US10B
T1	1	EA	Threshold 14/1A 3/6 x 5" x Drill x MS/A

Balance of Hardware & Acoustic Dr Seals by Dr Mfg.

HEADING 6 HW006*

E 1 Single Door 8116 Flex Space 8120 to Office 8116 * RH
3/0 x 7/0 x 1-3/4 SC x HM *
Door Type D3

H2	3	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
L3	1	EA	Lock ND53RD SPA US10B x 13-047 x 10-025
L2	1	EA	Standard Core 23-030 606
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64
VL1	1	EA	Vision Lite Kits VLF-EZ 8 x 40 Bronze

*New Frame/Hdwe 006 per RFP001R

HEADING 7 HW007

1 Single Door 8117 (E) Area from Hallway 8117 LHR

All Hardware by Others

HEADING 8 HW008

EP 1 Pair Doors 8121 Flex Space 8120 from Closet 8121 RHR ACT
(PR) 3/0 x 7/0 x 1-3/4 SC x HM
Door Type D2

H4	6	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
L4	1	EA	Lock ND80RD SPA US10B x 13-047 x 10-025
L5	1	EA	Primus Core 20-740 606
B1	2	EA	Flush Bolts 358B10B
B2	1	EA	Dust Proof Strike DP2 US10B
M1	2	EA	Silencers GJ64

*Wall Stops deleted per Approved as Noted Submittal 11/19/08

HEADING 9 HW09

1 Pair Doors 8120 (E) Lobby from Flex Space 8120

(E) Hardware to Remain

Drs/Frame/Hdwe to Remain as Originally specified-No Changes per RFP001R

HEADING 10 HW012

EP 1 Single Door 8122 Flex Space 8120 from Storage 8122 LHR
3/0 x 7/0 x 1-3/4 SC x HM *
Door Type D1

H4	3	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
L4	1	EA	Lock ND80RD SPA US10B x 13-047 x 10-025
L5	1	EA	Primus Core 20-740 606
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64

*New Frame added per RFP001R

HEADING 11 HW017

1 Single Door 8115A Office 8115 to Office 8116 LH
3/0 x 7/0 x 1-3/4 SC x HM *
Door Type D1

H2	3	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
L10	1	EA	Latch ND10S SPA US10B x 13-001 x 10-025
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64

*Added Dr/Frame/Hdwe per approved COR#3

SECOND FLOOR

HEADING 12 HW004

E 1 Single Door 8202 Circulation 8201 to Office 8202 + LH
E 1 Single Door 8203 Office 8202 to Office 8203+ RH
E 1 Single Door 8206A Office 8206 from Office 8207 RHR
E 1 Single Door 8209 Office 8210 to Office 8209 + RH
3/0 x 7/0 x 1-3/4 (E) SC x (E) HM
Door Type -

L3A 4 EA Lock ND53RD SPA US10B x 13-047 x 10-013 +
L2 4 EA Standard Core 23-030 606 +

Balance of Hardware to Remain

*Door 8207 moved to new Group 014A per RFP001R

HEADING 12A HW004A

EP 1 Single Door 8204 Circulation 8201 from Janitor 8204 + LHR
3/0 x 7/0 x 1-3/4 (E) SC x (E) HM
Door Type -

L4A 1 EA Lock ND80RD SPA US10B x 13-047 x 10-013 +
L5 1 EA Primus Core 20-740 606 +

Balance of Hardware to Remain

HEADING 12B HW004B

E 1 Single Door 8211 Circulation 8201 to Meeting Rm 8211B + LH
3/0 x 7/0 x 1-3/4 (E) SC x (E) HM
Door Type -

L1A 1 EA Lock ND70RD SPA US10B x 13-047 x 10-013 +
L2 1 EA Standard Core 23-030 606 +

Balance of Hardware to Remain

HEADING 13 HW009

EP 1 Pair Doors 8201 (E) Lobby from Circulation 8201
(PR) 3/0 x 7/0 x 1-3/4 Alum x (E) Alum +

L7 1 EA Rim Cylinder 20-057 US10B +
L11 2 EA Mort. Cyls 26-091 1-1/4" US26D (@ Cyl Dogging) +
L5 3 EA Primus Core 20-740 606 +

Balance of Hardware by Others +

HEADING 14 HW010

EP 1 Single Door 8206 Exterior from Office 8206 — RHR
3/0 x 7/0 x 1-3/8 Alum x (E) Alum
Door Type D5

L5	1	EA	Primus Core 20-740 606 +

Balance of Hardware by Others +

HEADING 15 HW011

EP 1 Single Door 8208 Exterior from Hallway 8208 — LHR
3/0 x 7/0 x 1-3/8 Alum x (E) Alum
Door Type D5

L7	1	EA	Rim Cylinder 20-057 US10B +
L5	1	EA	Primus Core 20-740 606 +

Balance of Hardware by Others +

HEADING 16 HW012

EP 1 Single Door 8212 Meeting Rm 8211 from Tel/Data 8212 — RHR
E 1 Single Door 8213 Meeting Rm 8211 from Closet 8213 — RHR
2/4 x 7/0 x 1-3/8 SC x HM
Door Type D1

H4	6	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
L4	2	EA	Lock ND80RD SPA US10B x 13-047 x 10-025
L2	1	EA	Standard Core 23-030 606 (Dr 8213) ***
L5	1	EA	Primus Core 20-740 606 (Dr 8212)
S1	1	EA	Floor Stop FS436 US10B
M1	6	EA	Silencers GJ64

HEADING 17 HW013

E 1 Single Door 8214 Circulation 8201 to Unisex 8214 — RH
3/0 x 7/0 x 1-3/4 SC x HM
Door Type D1

H2	3	EA	Butts FBB179 US10A 4-1/2 x 4-1/2
L8	1	EA	Lock ND85PD SPA US10B x 13-047 x 10-025
L9	1	EA	Standard Cyl 23-000 606
C1	1	EA	Closer 4041 695 x SNB
K1	1	EA	Kickplate 10 x 34 US10B .050
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64

HEADING 18 HW014*

E 1 Single Door 8202A Circulation 8201 to Office 8202 LH
E 1 Single Door 8210 Circulation 8201 to VP Office 8210 LH
3/0 x 7/0 x 1-3/4 SC* x (E) HM*
Door Type D3*

H4	4	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
H5	2	EA	Elec Hinge CE-54-FBB179 US10A 4-1/2 x 4-1/2
L6	2	EA	Lock ND80RD-EU SPA US10B x 13-047 x 10-025
L2	2	EA	Standard Core 23-030 606
C1	2	EA	Closers 4041 695 x SNB
K1	2	EA	Kickplate 10 x 34 US10B .050
S1	2	EA	Floor Stop FS436 US10B
M1	6	EA	Silencers GJ64
VL1	2	EA	Vision Lite Kits VLF-EZ 8 x 40 Bronze

Balance of Hardware by Others

*New Dr & Hdwe per RFP001A. Frame to remain

HEADING 19 HW014A*

EP 1 Single Door 8207 Circulation 8201 fom Office 8207 LHR
3/0 x 7/0 x 1-3/4 SC* x (E) HM*
Door Type D3*

H4	2	EA	Butts FBB179 US10A 4-1/2 x 4-1/2 NRP
H5	1	EA	Elec Hinge CE-54-FBB179 US10A 4-1/2 x 4-1/2
L6	1	EA	Lock ND80RD-EU SPA US10B x 13-047 x 10-025
L5	1	EA	Primus Core 20-740 606
C2	1	EA	Closer 4041EDA 695 x SNB
K1	1	EA	Kickplate 10 x 34 US10B .050
S1	1	EA	Floor Stop FS436 US10B
M1	3	EA	Silencers GJ64
VL1	1	EA	Vision Lite Kits VLF-EZ 8 x 40 Bronze

Balance of Hardware by Others

*New Dr & Hdwe per RFP001A. Frame to remain

HEADING 20 HW015

Doors 8205 - Existing Dr/Frame/Hdwe to Remain +

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.5 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Clean adjacent surface soiled by hardware installation.

3.6 DEMONSTRATION

A. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.

3.7 HARDWARE LOCATIONS

A. Conform to CCR, Title 24, Part 2, and ADAAG for positioning requirements for persons with disabilities. Operating hardware to be mounted between 30" and 44" above finished floor.

3.8 SCHEDULE SEE "FINAL VERSION" ATTACHED

A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.

B. The Door Schedule on the Drawings indicates which hardware set is used with each door.

General Specification

Manufacturers Abbreviations (Mfr.)

GLY	=	Glynn-Johnson Corporation	Overhead Stops
HAG	=	Hager	Hinges
IVE	=	Ives	Push, Pulls, Protection Plates, & Stops
LCN	=	LCN	Door Closers, Auto Operators
NGP	=	National Guard Products	Thresholds, Gasket & Weatherstrip
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders
SEL	=	Select	Continuous Hinges
VON	=	Von Duprin	Exit Devices & Mullions
		IVES	DOME STOP

NOTE: THIS PROJECT IS TO HAVE A SCHLAGE PRIMUS LEVEL 3 KEYING SYSTEM AT LOCATIONS INDICATED IN THE HARDWARE SCHEDULE. THE BALANCE OF OPENINGS IS TO HAVE A SCHLAGE KEYWAY PER DIRECTION OF THE DISTRICT. ALL PERMANENT CORES AND KEYS ARE TO BE SHIPPED DIRECTLY FROM THE FACTORY TO THE DISTRICT. DURING CONSTRUCTION THE PROJECT IS TO HAVE CONSTRUCTION CORES. VERIFY ALL KEYING REQUIREMENTS WITH DISTRICT.

SPECWORKS # 79728-B6PL3EEK9

HW SET: 001 INTERIOR
DOOR NUMBER:
8109

EACH TO HAVE:

1	EA	CLASSROOM LOCK	ND70RD SPA	613	SCH
1	EA	CORE ONLY	23-030 (CONVENTIONAL CORE)	606	SCH
			BALANCE OF HARDWARE EXISTING		

HW SET: 001A INTERIOR / KITCHEN
DOOR NUMBER:
8118

EACH TO HAVE:

3	EA	HINGE	BB1279	640	HAG
1	EA	CLASSROOM LOCK	ND70RD SPA	613	SCH
1	EA	CORE ONLY	23-030 (CONVENTIONAL CORE)	606	SCH
1	EA	SURFACE CLOSER	4041	695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	613	IVE
1	EA	DOME STOP	FS436	613	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 002
DOOR NUMBER:
8110 8110A 8119 8119A

EACH TO HAVE:

1	SET	HARDWARE	BY DOOR MFG

HW SET: 003 INTERIOR / OFFICE
DOOR NUMBER:
8111 8112 8115

EACH TO HAVE:

3	EA	HINGE	BB1279	640	HAG
1	EA	ENTRANCE LOCK	ND53RD SPA	613	SCH
1	EA	CORE ONLY	23-030 (CONVENTIONAL CORE)	606	SCH
1	EA	DOME STOP	FS436	613	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 004 INTERIOR / EXISTING DOOR AND FRAME
DOOR NUMBER:
8206A

EACH TO HAVE:				
1	EA	ENTRANCE LOCK	ND53RD SPA	613 SCH
1	EA	CORE ONLY	23-030 (CONVENTIONAL CORE)	606 SCH
			BALANCE OF HARDWARE EXISTING	

HW SET: 005 INTERIOR / RATED /ACOUSTICAL/ MECH
DOOR NUMBER:
8114

EACH TO HAVE:				
3	EA	HINGE	BB1168 5 X 4.5 NRP	640 HAG
1	EA	STOREROOM LOCK	ND80RD SPA	613 SCH
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
1	EA	SURFACE CLOSER	4041	695 LCN
1	EA	DOME STOP	FS436	613 IVE
1	SET	GASKET	PER SELECTED DOOR MFGR	

SEE DETAIL 10/A10 81 FOR BALANCE OF HARDWARE

HW SET: 006 INTERIOR / OFFICE
DOOR NUMBER:
8116

EACH TO HAVE:				
3	EA	HINGE	BB1279	640 HAG
1	EA	ENTRANCE LOCK	ND53RD SPA	613 SCH
1	EA	CORE ONLY	23-030 (CONVENTIONAL CORE)	606 SCH
1	EA	DOME STOP	FS436	613 IVE
3	EA	SILENCER	SR64	GRY IVE

HW SET: 007 EXTERIOR / EXISTING ALUMINUM STOREFRONT
DOOR NUMBER:
8117

EACH TO HAVE:			
1			RE-USE EXISTING DOORS, FRAMES, & HARDWARE
1	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION

NOTE: SINCE THIS IS AN EXISTING DOOR AND FRAME, VERIFY IF A SUFACE MOUNTED DOOR CONTACT IS TO BE USED

HW SET: 008 INTERIOR PAIR / CLOSET
DOOR NUMBER:
8121

EACH TO HAVE:				
6	EA	HINGE	BB1279 NRP	640 HAG

2	EA	MANUAL FLUSH BOLT	FB358	613 IVE
1	EA	DUST PROOF STRIKE	DP2	613 IVE
1	EA	STOREROOM LOCK	ND80RD SPA	613 SCH
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
2	EA	DOME STOP	FS436	613 IVE
2	EA	SILENCER	SR64	GRY IVE

HW SET: 009 EXISTING PAIR ALUMINUM STOREFRONT / NO WORK AT THIS TIME
DOOR NUMBER:
5-301B 5-301C 8120

EACH TO HAVE:
1 EXISTING DOORS, FRAMES, & HARDWARE TO REMAIN

HW SET: 010 EXTERIOR / ACAMS
DOOR NUMBER:
8206

EACH TO HAVE:

1	EA	POWER TRANSFER	EPT-2	313 VON
1	EA	CONTINUOUS HINGE	SL11 EPT	DKB SEL
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
1	EA	EU STOREROOM LOCK	ND80TDEU SPA	613 SCH
1	EA	SURFACE CLOSER	4041 EDA	695 LCN
1	EA	OVERHEAD STOP	100S	613 GLY
1	EA	KICK PLATE	8400 10" X 2" LDW	613 IVE
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY	
1	EA	CARD READER	PROVIDED UNDER SECURITY SECTION	
1	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION	
1	EA	POWER SUPPLY	PROVIDED UNDER SECURITY SECTION	
1	EA	RX MOTION DETECTOR	PROVIDED UNDER SECURITY SECTION	

NOTE: VERIFY CONDITION OF EXISTING PIVOTS, REPLACE IF NECESSARY. WIDE STILE DOORS REQUIRED FOR ALUMINUM STOREFRONTS THE TOP RAIL SHOULD BE LARGE ENOUGH TO ACCOMODATE A PARALLEL ARM CLOSER

HW SET: 011 EXTERIOR / ACAMS
DOOR NUMBER:
8208

EACH TO HAVE:

1	EA	POWER TRANSFER	EPT-2	313 VON
1	EA	CONTINUOUS HINGE	SL11 EPT	DKB SEL
1	EA	PANIC HARDWARE	99L E996L X 17 FSE	313 VON
1	EA	IC RIM CYLINDER	20-057T X ICX (CONST CORE)	613 SCH
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
1	EA	SURFACE CLOSER	4041 EDA	695 LCN
1	EA	OVERHEAD STOP	100S	613 GLY

1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY
1	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION
1	EA	POWER SUPPLY	PROVIDED UNDER SECURITY SECTION
1	EA	RX MOTION DETECTOR	PROVIDED UNDER SECURITY SECTION

NOTE: VERIFY CONDITION OF EXISTING PIVOTS, REPLACE IF NECESSARY. WIDE STILE DOORS REQUIRED FOR ALUMINUM STOREFRONTS. THE TOP RAIL SHOULD BE LARGE ENOUGH TO ACCOMMODATE A PARALLEL ARM CLOSER. THIS OPENING HAS ELECTRIFIED TRIM PANIC HARDWARE.

HW SET: 012 INTERIOR / TELE/ DATA

DOOR NUMBER:
8122 8212 8213

EACH TO HAVE:

3	EA	HINGE	BB1279 NRP	640 HAG
1	EA	STOREROOM LOCK	ND80RD SPA	613 SCH
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
1	EA	DOME STOP	FS436	613 IVE
3	EA	SILENCER	SR64	GRY IVE

HW SET: 013 INTERIOR / SGL STALL RESTROOM

DOOR NUMBER:
8214

EACH TO HAVE:

3	EA	HINGE	BB1279	640 HAG
1	EA	FACULTY RESTRM LOCK	ND85PD SPA	613 SCH
1	EA	SURFACE CLOSER	4041	695 LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	613 IVE
1	EA	DOME STOP	FS436	613 IVE

HW SET: 014 INTERIOR / OFFICE / ACCESS CONTROL

DOOR NUMBER:
8202A 8210

EACH TO HAVE:

2	EA	HINGE	BB1279 NRP	640 HAG
1	EA	THRU-WIRE HINGE	BB1279 4 5 X 4 5 ETW-4	640 HAG
1	EA	EU STOREROOM LOCK	ND80TDEU SPA	613 SCH
1	EA	SURFACE CLOSER	4041	695 LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	613 IVE
1	EA	DOME STOP	FS436	613 IVE
3	EA	SILENCER	SR64	GRY IVE
1	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION	
1	EA	KEY PAD	PROVIDED UNDER SECURITY SECTION	
1	EA	POWER SUPPLY	PROVIDED UNDER SECURITY SECTION	

HW SET: 014A INTERIOR / ACAMS

DOOR NUMBER:

8207

EACH TO HAVE:				
2	EA	HINGE	BB1279 NRP	640 HAG
1	EA	THRU-WIRE HINGE	BB1279 4 5 X 4 5 ETW-4	640 HAG
1	EA	PERMANENT CORE	20-740 (PRIMUS)	606 SCH
1	EA	EU STOREROOM LOCK	ND80TDEU SPA	613 SCH
1	EA	SURFACE CLOSER	4041 EDA	695 LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	613 IVE
1	EA	DOME STOP	FS436	613 IVE
3	EA	SILENCER	SR64	GRY IVE
1	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION	
1	EA	KEY PAD	PROVIDED UNDER SECURITY SECTION	
1	EA	POWER SUPPLY	PROVIDED UNDER SECURITY SECTION	

HW SET: 015 EXISTING

DOOR NUMBER:

8202 8203 8204 8205 8209 8211

EACH TO HAVE:	
1	EXISTING DOORS, FRAMES, & HARDWARE TO REMAIN

HW SET: 016 EXTERIOR PAIR / ALUMINUM STOREFRONT / ACCESS CONTROL / AUTO OPERATOR / NEW DOORS and EXISTNG FRAME

DOOR NUMBER:

8201

EACH TO HAVE:				
2	EA	POWER TRANSFER	BY ACCESS CONTROL	DKB
2	SET	CENTER PIVOTS	BY DOOR SUPPLIER	313 VON
1	EA	DOGGED EL DEVICE	SD-EL9947DT X 990DT	313 VON
1	EA	DOGGED EL DEVICE	SD-EL9947NL X 990NL	613 SCH
1	EA	IC RIM CYLINDER	20-057T X ICX (CONST CORE)	606 SCH
1	EA	PERMANENT CORE	20-740 (PRIMUS)	613 SCH
2	EA	MORTISE CYLINDER	20-771 (FOR SD DOGGING)	695 LCN
1	EA	SURFACE CLOSER	4041 TOP JAMB MOUNT X 18G PLATE	695 LCN
1	EA	AUTO-EQUALIZER	4642 (CS) (REG (PUSH SIDE MOUNTED)	613 GLY
2	EA	OVERHEAD STOP	904S	613 IVE
2	EA	KICKPLATES	8400 10" X 2" LDW (If wanted by District)	
1	SET	WEATHER SEAL	SUPPLY WITH DOOR (SHOWS ON EXISITING DOOR PHOTO)	
1	EA	THRESHOLD	PER DETAIL OR REUSE EXISTING (VERIFY CONDITION)	GRY VON
1	EA	POWER SUPPLY	PS873 X 2 X AO	
2	EA	DOOR CONTACT	PROVIDED UNDER SECURITY SECTION	
1	EA	KEY PAD	PROVIDED UNDER SECURITY SECTION	
2	EA	ACTUATOR, WALL MOUNT	8310-856	LCN
2	EA	FLUSH MOUNT BOX	8310-868F	LCN

NOTE: USE FLUSH CEILING MOUNT FOR THE AUTO OPERATOR IN ORDER TO INSTALL THE

OVERHEAD STOP

HW SET: 017 INTERIOR / NEW DOOR
DOOR NUMBER:
8115A

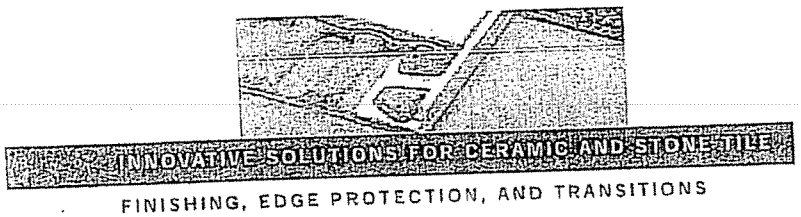
EACH TO HAVE:					
3	EA	HINGE	BB1279	640	HAG
1	EA	LATCHSET	ND10S SPA	613	SCH
1	EA	DOME STOP	FS436	613	IVE
3	EA	SILENCERS	SR64		IVE

END OF SECTION

Schluter Systems

PROFILE OF INNOVATION

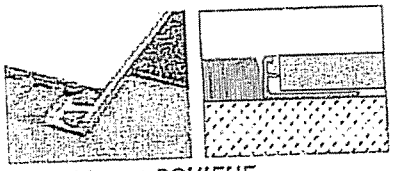
FLOOR PROFILES



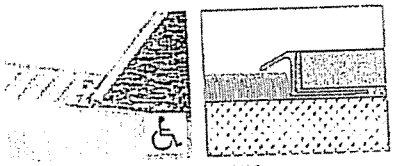
INNOVATIVE SOLUTIONS FOR CERAMIC AND STONE TILE

FINISHING, EDGE PROTECTION, AND TRANSITIONS

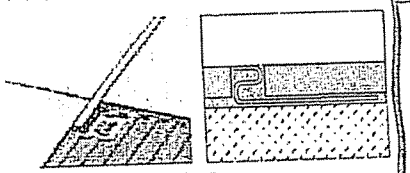
Because ceramic and stone tiles are inherently brittle, their exposed edges can chip and crack if left unprotected. Transitions between floor surfaces and at thresholds are particularly vulnerable to damage. Schluter®-Systems offers a variety of profiles to provide edge protection and transitioning at thresholds and between adjacent surfaces, resulting in durable, maintenance-free tiled coverings. The profiles can be grouped into two categories: transitions between same-height surfaces and transitions between different-height surfaces.



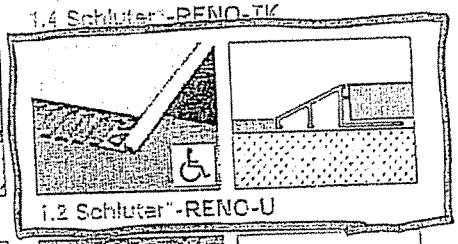
1.1 Schluter®-SCHIENE



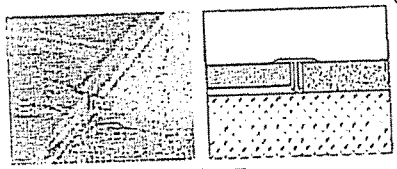
1.4 Schluter®-RENO-TK



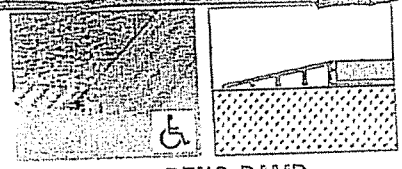
1.6 Schluter®-DECO



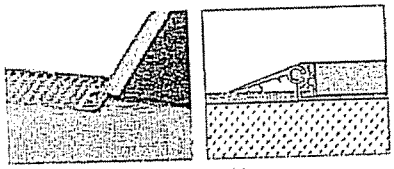
1.2 Schluter®-RENO-U



1.3 Schluter®-RENO-T



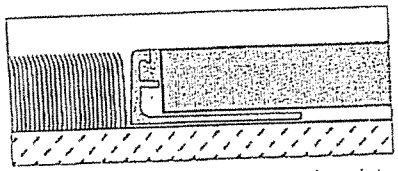
1.8 Schluter®-RENO-RAMP



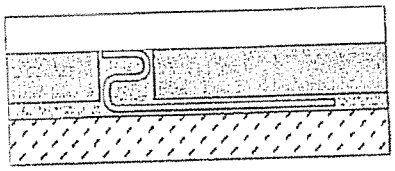
1.7 Schluter®-RENO-V

Application and Function

Same-height Transitions

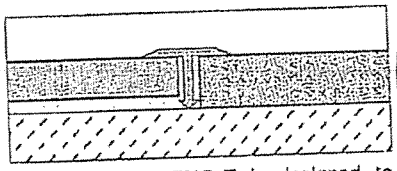


1.1 Schluter®-SCHIENE is designed to provide edging for tile coverings. Typical applications include edge protection where tile is bordered by carpet at expansion joints, or as a decorative edging for stairs. Schluter®-SCHIENE is available in stainless steel, solid brass, aluminum, and anodized aluminum. The profile features a trapezoid-perforated anchoring leg which is secured in the mortar bond coat beneath the tile, and an 87° sloped vertical wall section that transfers point loads to the substrate and surface covering while protecting tile edges from damage. Schluter®-SCHIENE in solid brass, aluminum, and anodized aluminum features a 5° sloped top flange and fillet at the anchoring leg/vertical section interface to enhance edge protection by reducing stresses on the tile, and in sizes greater than 1/4" *(6 mm)*, features an integrated joint spacer that establishes a defined joint cavity between the tile and the profile. The anchoring leg of Schluter®-SCHIENE, in all materials, is available with a special radius perforation "R" so that the profile can be used to form curves.



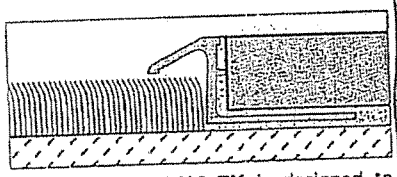
1.6 Schluter®-DECO is designed to provide decorative lines within tile coverings and edge protection at transitions from tile coverings to other same-height surface coverings, such as wood or carpet. The profile is available in stainless steel, solid brass, chrome-plated solid brass, and anodized aluminum. Schluter®-DECO features a trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile, and a 1/4" *(6 mm)*-wide visible surface that meets the high aesthetic requirements of showrooms, lobbies, galleries, exhibition booths, etc. The anchoring leg of Schluter®-DECO, in

solid brass, chrome-plated solid brass and anodized aluminum is available with a special radius perforation "R" so that the profile can be used to form curves DECO in chrome-plated brass requires a relatively large bending radius

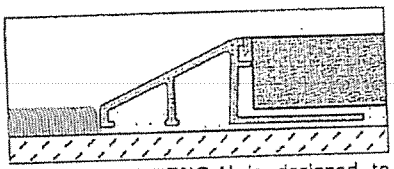


1.3 Schluter®-RENO-T is designed to provide transitions between existing same-height, hard-surface floor coverings (e g , ceramic tile or natural stone, parquet flooring, concrete pavers, laminate, etc), primarily in retrofit applications The profile is available in stainless steel solid brass, and anodized aluminum Schluter®-RENO-T is installed within the existing joint cavity and overlaps adjoining surface materials, thus preventing edges from becoming damaged when subjected to mechanical stress RENO-T in brass and anodized aluminum size 9/14 is flexible in the lateral direction and can be used in curved applications

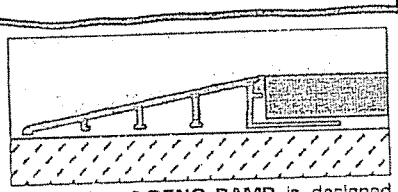
Different-height Transitions



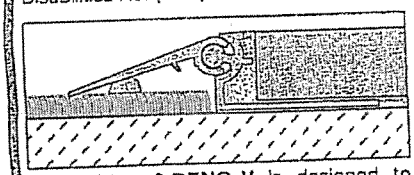
1.4 Schluter®-RENO-TK is designed to provide a smooth transition from tile coverings to floor coverings at lower elevations, typically carpet The profile is available in stainless steel, solid brass, and anodized aluminum Schluter®-RENO-TK features a trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile, and a sloped surface to eliminate trip hazards and protect tile edges The 1/4" *(6 mm)* channel beneath the sloped flange of the profile hides and protects the cut edge of lower adjoining surface coverings All sizes of the Schluter®-RENO-TK are compliant with the Americans with Disabilities Act (ADA) Schluter®-RENO-TK in solid brass and anodized aluminum, features an integrated joint spacer that establishes a defined joint cavity between the tile and the profile The anchoring leg of Schluter®-RENO-TK, in solid brass and anodized aluminum, sizes 60 to 100, is available with a special radius perforation "R" so that the profile can be used to form curves



1.2 Schluter®-RENO-U is designed to provide a smooth transition between tile coverings and floor coverings at lower elevations or finished concrete The profile is available in stainless steel, solid brass, and anodized aluminum Schluter®-RENO-U features a trapezoid-perforated anchoring leg which is secured in the mortar bond coat beneath the tile, and a sloped surface (approximately 25°) that eliminates trip hazards and protects tile edges The leading edge of the profile abuts the lower surface covering, typically VCT Schluter®-RENO-U, in brass and aluminum, features an integrated joint spacer that establishes a defined joint cavity between the tile and the profile In installations where the leading edge abuts a lower surface covering, all sizes of Schluter®-RENO-U, except the 3/4" *(20 mm)* and 11/16" *(17 5 mm)*, are compliant with the Americans with Disabilities Act (ADA) In installations where the leading edge rests on top of the lower floor covering (e g , finished concrete), the 3/4" *(20 mm)*, 11/16" *(17 5 mm)*, and 9/16" *(15 mm)* sizes are not ADA-compliant



1.8 Schluter®-RENO-RAMP is designed to provide a smooth transition between tile coverings and floor coverings at lower elevations or finished concrete, particularly in commercial applications where wheel carts are used (e g , bakeries, hospitals, etc) The profile is available in anodized aluminum Schluter®-RENO-RAMP features a trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile and a 2-7/16" *(61 mm)* or 3-3/8" *(86 mm)* sloped transition surface that terminates at the height of the tile edge The profile protects tile edges and provides a sloped surface to eliminate trip hazards and allow easy access for wheel carts Schluter®-RENO-RAMP features an integrated joint spacer that establishes a defined joint cavity between the tile and the profile All sizes of Schluter®-RENO-RAMP, except sizes 9/16" *(15 mm)* and 3/4" *(20 mm)*, are compliant with the Americans with Disabilities Act (ADA)



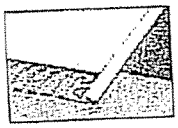
1.7 Schluter®-RENO-V is designed to provide a smooth transition between tile coverings and floor coverings at lower elevations The profile is available in solid brass and anodized aluminum Schluter®-RENO-V features a trapezoid-perforated anchoring leg, which is secured in the mortar bond coat beneath the tile and a movable transition arm that allows the profile to adjust to the height of the adjacent floor covering via a ball-and-socket joint The profile protects tile edges and provides a sloped surface to eliminate trip hazards Schluter®-RENO-V features an integrated joint spacer that establishes a defined joint cavity between the tile and the profile Schluter®-RENO-V is also suitable for heavy-duty applications (e g , entrances to garages or loading docks) In such cases the adjustable arm is backfilled with mortar

Material Properties and Areas of Application

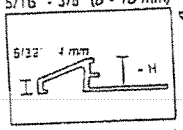
Schluter® edge-protection and transition profiles are resistant to most chemicals encountered in tiled environments In special cases, the suitability of a proposed type of profile must be verified based on the anticipated chemical, mechanical, and/or other stresses Exceptions and special considerations are listed below:

Stainless steel profiles are roll-formed resulting in a slightly different contour than those made of extruded brass or aluminum Stainless steel can sustain high mechanical stresses and is especially well suited for

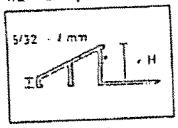
1.2 Schlüter-RENO-U



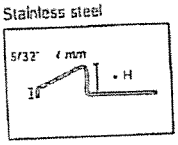
Aluminum, Brass
5/16" - 3/8" (8 - 10 mm)



1/2" - 3/4" (12.5 - 20 mm)



Stainless steel



H = Tile Thickness	Stainless steel 304 (1.4301 = V2A) (E)	Stainless steel 304, brushed (1.4301 = V2A) (EB)	Solid brass (M)	Item No: Aluminum, satin anodized (AE)	Aluminum, bright chrome anodized (ACB)	Aluminum, satin nickel anodized (ANI)	Aluminum, satin copper/bronze anodized (AK)	Aluminum, antique bronze anodized (AB)	Aluminum, satin brass anodized (AM)
5/16" - 8 mm	EU 80	EBU 80	MU 80	AEU 80	AU 80 ACB	AU 80 ANI	AU 80 AK	AU 80 AB	AU 80 AM
3/8" - 10 mm	EU 100	EBU 100	MU 100	AEU 100	AU 100 ACB	AU 100 ANI	AU 100 AK	AU 100 AB	AU 100 AM
1/2" - 12.5 mm	EU 125	EBU 125	MU 125	AEU 125	AU 125 ACB	AU 125 ANI	AU 125 AK	AU 125 AB	AU 125 AM
9/16" - 15 mm	EU 150	EBU 150	MU 150	AEU 150	–	–	–	–	–
11/16" - 17.5 mm	EU 175	EBU 175	MU 175	AEU 175	–	–	–	–	–
3/4" - 20 mm	EU 200	EBU 200	MU 200	–	–	–	–	–	–

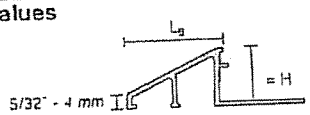
Length supplied: 8 2-1/2" — 2.50 m

1.2 Schlüter-RENO-U

H = Tile Thickness	Item No: Aluminum, bright brass anodized (AMB)
5/16" - 8 mm	AU 80 AMB
3/8" - 10 mm	AU 100 AMB
1/2" - 12.5 mm	AU 125 AMB

Length supplied: 8 2-1/2" — 2.50 m

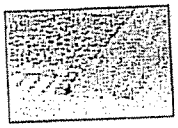
Diagram Values



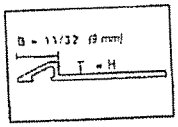
H = In. - mm	L_g = In. - mm	
	Aluminum/Brass	Stainless Steel
5/16 - 8	15/32 - 12	17/32 - 13
3/8 - 10	21/32 - 17	11/16 - 17
1/2 - 12.5	7/8 - 22	29/32 - 23
9/16 - 15	1-1/16 - 27	1-1/8 - 29
11/16 - 17.5	1-1/16 - 27	1-11/32 - 34
3/4 - 20	1-1/4 - 31	1-9/16 - 40

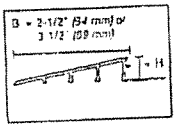
ADA-Compliant

Note: When leading edge abuts lower surface covering, sizes 3/4" (20 mm) and 11/16" (17.5 mm) are not ADA-compliant. When leading edge rests on top of lower surface covering, sizes 3/4" (20 mm), 9/16" (15 mm), and 11/16" (12.5 mm) are not ADA-compliant



1.8 Schlüter-RENO-RAMP





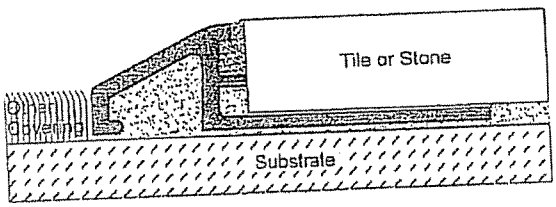
H = Tile Thickness	Item No: Aluminum, satin anodized (AE)
B = 11/32" - 9 mm	
1/8" - 3.5 mm	AERP 30 B9
B = 2-1/2" - 64 mm	
3/8" - 10 mm	AERP 100 B65
1/2" - 12.5 mm	AERP 125 B65
B = 3-1/2" - 89 mm	
1/2" - 12.5 mm	AERP 125 B90
9/16" - 15 mm	AERP 150 B90
3/4" - 20 mm	AERP 200 B90

Length supplied: 8 2-1/2" — 2.50 m

ADA-Compliant

Note: RENO-RAMP sizes 3/4" - 20 mm and 9/16" - 15 mm are not ADA-compliant

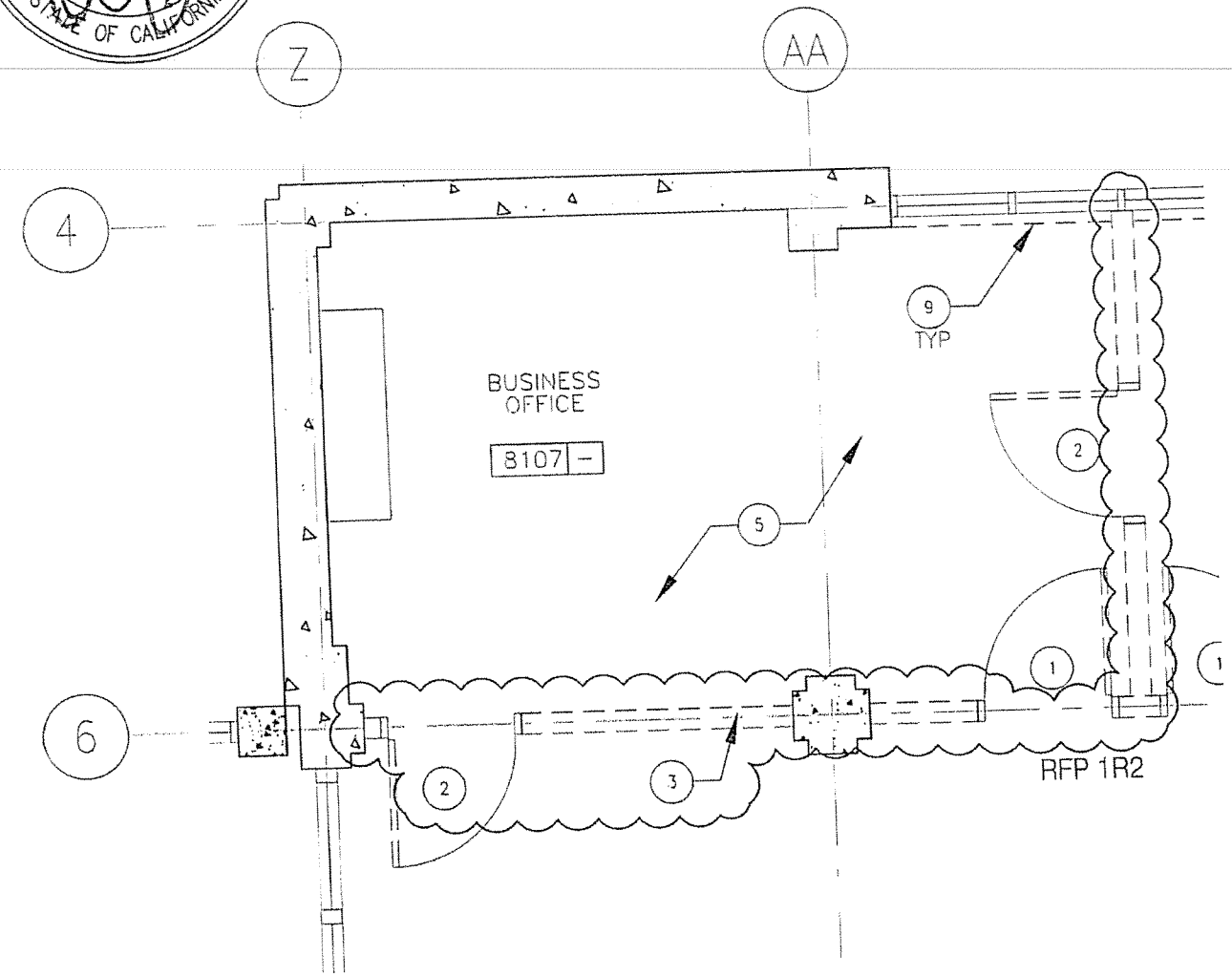
Schluter® - RENO-U



Scale: N T S

RFP 001R2
FILE NO 41-C1
APPL NO 01-109554

LICENSED ARCHITECT
PAUL CURTIS BUNTON
No. C018559
Ren. 9/30/09
STATE OF CALIFORNIA



1 PARTIAL FIRST FLOOR DEMO PLAN

REF: 1/A1.1

1/4"

BC|A
architecture
planning
interiors

210 Hammond Ave.
Fremont, California 94539
[T] 510.445.1000
[F] 510.445.1005

Title:
PARTIAL FIRST FLOOR DEMOLITION FLOOR PLAN

Project Name:
CAÑADA COLLEGE
BLDG 8 PHASE 2 RENOVATION
4200 Farm Hill Blvd.
Redwood City, CA 94061
FILE NO 41-C1 APPL 01-109554

Revision:

ASI No :-
RFP 001R2

Date
11-18-08

Drawing Number
ASK-3A R

Scale
NTS

Project Number
07014

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

HARRISON DRYWALL, INC
SAN FRANCISCO, CA
(415) 821-1584
SUBMITTING #18

PART 1 - GENERAL

1.1 SUMMARY

A Section Includes: Shaft wall system; gypsum board and joint treatment, exterior gypsum sheathing board, accessories, and textured finish

B Related Sections:
1 Section 05 40 00 - Cold-Formed Metal Framing
2 Section 06 10 53 – Miscellaneous Rough Carpentry: Wood blocking for support of wall-mounted equipment and accessories
3 Section 07 21 16 - Blanket Insulation: Thermal and acoustic insulation
4 Section 07 27 00 - Air Barriers
5 Section 07 84 00 - Firestopping: Firestopping at rated walls and partitions
6 Section 07 90 00 - Joint Protection: Caulking and sealants
7 Section 08 31 13 - Access Doors and Frames: Metal access panels
8 Section 09 22 16 - Non-Structural Metal Framing: Building metal framing system

1.2 REFERENCES

A ANSI - American National Standards Institute:
1 A118.9 - Test Methods and Specifications for Cementitious Backer Units

B ASTM International:
1 ASTM C475 - Standard Specification for Joint Compound and Jont Tape for finishing Gypsum Board
2 ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board
3 ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0 033 in. to 0 112 in. in Thickness.
4 ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
5 ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
6 ASTM C1396 – Standard Specification for Gypsum Board
7 ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
8 ASTM E119 - Method for Fire Tests of Building Construction and Materials

C CBC - California Building Code, 2001 Edition; Chapters 7 and 25

D Division of State Architect:
1 DSA IR M-4, September 1999

E GA - Gypsum Association:
1 GA 214 – Recommended Levels of Gypsum Board Finish
2 GA 216 – Application and Finishing of Gypsum Board
3 GA 600 – Fire Resistance Design Manual

F Intertek Testing Services (Warnock Heresy Listed):
1 WH – Certification Listings

G. National Fire Protection Association:
1 NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials.

H. NWWCB - Northwest Wall and Ceiling Bureau:
1 RS - Recommendations and Specifications.

I. UL – Underwriters Laboratories, Inc :
1. UL – Fire Resistance Directory and Building Material Directory
2. UL 723 – Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Where indicated, provide materials and construction which are identical to those assemblies whose fire resistance rating has been determined in accordance with ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction. Products used in the assembly shall carry a classification label from a testing agency acceptable to the authority having jurisdiction.

1.4 PERFORMANCE REQUIREMENTS

A. Shaft Wall: Perform to the following:
1. Air Pressure Within Shaft: 5.0 psf with maximum mid-span deflection of L/240 inches
2 Acoustic Attenuation: 47 STC in accordance with ASTM E90.

1.5 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures

B Product Data: Submit manufacturer's product data on gypsum board, exterior gypsum sheathing board, joint tape, acoustic accessories, and the following:
1. Fire Resistance Data: Include required fire test results for gypsum board systems on partitions, ceilings and columns. Correlate with supporting metal framing details.
2 Sound Transmission Data: Include certified evidence that installed gypsum board systems and materials meet required STC levels.

C Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with GA-214, GA-216, and GA-600.

B. Fire Rated Wall and Ceiling/Roof Construction: Rating as indicated on Drawings.
1 Tested Rating: Determined in accordance with ASTM E119.
2 Fire Rated Partitions: Listed assembly by UL, GA; File Numbers as shown on drawings.
3. Fire Rated Ceiling: Listed assembly by UL, GA; File Numbers as shown on drawings.
4. Fire Rated Shaft Wall Requirements: One hour in accordance with GA File No. 6800.

1.7 QUALIFICATIONS

A Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B Installer: Company specializing in performing Work of this section with minimum three years documented experience

1.8 DELIVERY, STORAGE, AND HANDLING

A Section 01 60 00 – Product Requirements

B Acceptance at Site: Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier. Verify board and accessories as undamaged.

C Storage and Protection:
1. Store materials inside under cover and keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.
2. Handle gypsum boards to prevent damage to edges, ends and surfaces.
3. Store and handle steel framing and related accessories in accordance with A I S I Ccode of Standard Practice."

1.9 PROJECT CONDITIONS

A Environmental Conditions:
1. Establish and maintain environmental conditions for application and finish gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations. Maintain not less than 40 degrees Fahrenheit minimum room temperature.
2. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during day, hot weather to prevent materials from drying too rapidly.

1.10 WARRANTY

A Section 01 77 00 – Contract Closeout: Product warranties.

B Materials Warranty for Exterior Gypsum Sheathing: Provide sheathing manufacturer's standard warranty covering sheathing materials for five years from date of substantial completion.

C Weathering Warranty for Exterior Gypsum Sheathing: Provide sheathing manufacturer's standard warranty covering in-place exposure damage to sheathing for six months commencing on date of installation completion.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A Manufacturers:
1. ✓ G-P Gypsum Corporation: www gp com/gypsum.
2. National Gypsum Company: www.nationalgypsum com.
3. United States Gypsum Co : www usg.com
4. BPB America Inc : www.bpb-na com
5. Pabco Gypsum.
6. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

GEORGIA PACIFIC SUBMITTAL # 18

2.2 COMPONENTS

A. Shaft Wall Studs and Accessories:
1. Manufacturers:
   a. United States Gypsum Co. (USG® Cavity Shaft Walls).
   b. National Gypsum Co. Gold Bond Building Products Division (I-Stud Cavity Shaftwall).
   c. Georgia-Pacific Corp. (Fireguard® Shaft Liner™)
2. Steel Framing: ASTM C645.
   a. Protective Coating: Manufacturer's standard corrosion-resistant coating.
   b. Studs: Manufacturer's standard CH or CT profile for fire-resistance-rated assembly indicated and in depth and thickness indicated on Drawings, length as required.
   c. Track (Runner): Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches in depth matching studs and in thickness indicated on Drawings.
   d. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches in depth matching studs, and not less than 0.0329 inch thick.
   e. Corner and End Members: Manufacturer's standard E-profile framing member for use at corners or where assembly terminates at other work, in depth matching studs and in manufacturer's standard thickness not less than the stud thickness indicated on Drawings; length as required.

B. Interior Gypsum Board Materials:
1. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
2. Fire Rated Gypsum Board: ASTM C1396; fire resistive type, UL rated; 5/8 inch thick unless otherwise indicated, maximum permissible length; ends square cut, tapered and beveled edges.
3. Moisture Resistant (Fire Rated) Gypsum Board: ASTM C1396; 5/8 inch thick, maximum available length in place; ends square cut, square edges.
GP TOUGHROCK FIREGUARD SUBMITTAL #18
4. Gypsum Shaftliner (Coreboard): ASTM C442, 1 inch thick, maximum available size in place, beveled edges, ends square cut, identified with UL Classification label.

C. Exterior Gypsum Sheathing Board Materials:
1. Acceptable Products: GP DENSGUARD SUBMITTAL #18
   a. 5/8 inch DensGlass Gold Fireguard sheathing.
2. Composition: Gypsum sheathing manufactured in accordance with ASTM C1177 with glass mats both sides and long edges, water-resistant treated core.
3. Fire Resistance:
   a. Non-combustible when tested in accordance with ASTM E136.
   b. 5/8 inch DensGlass Gold Fireguard: Sheathing is rated "Type X" as defined in ASTM C36 when tested in according to ASTM E119.
4. Accessories:
   a. Joint Tape: 2 inch wide 10 x 10 glass mesh tape.
   b. Joint Compound: G-P Gypsum setting-type joint compound.
5. Sealants, Caulk and Tape:
   a. Sealant: Dow Corning 795 or equivalent; Pecora 895 or equivalent.
   b. Caulk: Borden HPPG Elmers Siliconized Acrylic Latex Caulk or equivalent; Pecora AC-20 acrylic latex sealant; GE Silicone Silpruf Sealant; Tremco Dymonic.
   a. Tape: 2 inch wide 10 x 10 glass mesh Quick Tape, or equivalent.

2.3 ACCESSORIES

A Fasteners to Wood Members:
1. General: Manufactured by U S. Steel Corp.
2. Alternate Manufacturers: Comparable products manufactured by Commercial Steel and Supply Co , or accepted equal.
3. Screws: ASTM C1002, Type W drywall screws.
4. Nails:
   a. General: Phosphate etched, concave head, steel wire nails, specially made for attachment of gypsum board.
   b. 5/8 inch Board: 1-7/8 inches long, 13 gauge.
   c. Double Layer 1/2 inch Board: 2-1/4 inches long, 12 gauge.

B Fasteners to Steel Members:
1. Screws: ASTM C1002, Type 'S' steel drill screws for fastening gypsum board to steel framing members less than 0 033-inch thick. ASTM C954 Type "S-12" steel drill screws for fastening gypsum board to steel framing members 0 033 to 0 112-inch thick; cadmium-plated for exterior locations.
2. Screws: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs

C. Insulation: As specified in Section 07 21 16.

D Gypsum Board Accessories:
1. Corner Beads and Casing Beads: ASTM C1047, sheet steel zinc coated by hot-dip process. Flanges shall be free of dirt, grease and other materials that may adversely affect bond of joint treatment

E. Joint Materials: ASTM C475, GA-216, and as recommended by gypsum board manufacturer for project conditions; reinforcing tape, joint compound, adhesive, and water

2.4 FINISHES

A Levels of Gypsum Board Finish as Defined by Gypsum Association:
1. Level 1:
   a. Ceiling Plenum Areas, Concealed Areas, Storage Rooms, Janitor Closets and Where Indicated: All joints and interior angles shall have tape embedded in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable
2. Level 2:
   a. Glass Mat Backer Board Substrate for Ceramic Tile; and Where Indicated: All joints and interior angles shall have tape embedded in joint compound and 1 separate coat of joint compound applied over all joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
3. Level 3:
   a. Areas Which Are to Receive Heavy or Medium Texture (Spray or Hand Applied) Finishes Before Final Painting or Where Heavy Grade Wall Coverings Are to Be Applied as the Final Decoration: All joints and interior angles shall have tape embedded in joint compound and 2 separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compound shall be smooth and free of tool marks and ridges.
4. Level 4:
   a. Offices, Work Rooms and Private Areas and Where Indicated to Receive Light Textures: All joints and interior angles shall have tape embedded in joint compound and 3 separate coats of joint compound applied over all joints, angles, fastener heads and accessories. All joint compound shall be smooth and free of tool marks and ridges
5. Level 5:

a Areas to Receive Gloss, Semi-Gloss, Enamel or Nontextured Flat Paints, Where Severe Lighting Conditions Occur, in Lobbies, Waiting Areas and Other Public Spaces and Where Indicated: All joints and interior angles shall have tape embedded in joint compound and 3 separate coats of joint compound applied over all joints, angles, fastener heads and accessories. A thin skim coat of joint compound or a material manufactured especially for this purpose, shall be applied to entire surface. Surface shall be smooth and free of tool marks and ridges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

B. Examine areas and surfaces to receive gypsum board and verify the following:
1. Proper alignment and spacing of backing and framing support systems.
2. Complete installation of mechanical, electrical or other items to be enclosed in partitions that cannot be installed after installation of board.

3.2 PREPARATION

A. Protect surrounding areas and surfaces to preclude damage.
1. Exercise care to avoid soiling, spatter and damage to work of other trades.
2. Use cover clots or other means of protection. Remove, clean and repair any soiled or damaged work as required.
3. Protect from damage at all times.

3.3 INSTALLATION

A. Shaft Wall Framing:
1. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
   a. GA-600 requirements.
   b. ASTM C754 requirements for installing steel framing.
2. Position steel runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and maximum 24 inches on center.
3. Cut liner panels 1 inch less than floor-to-ceiling height and erect vertically between J-Runners. Where shaft walls exceed maximum available panel height, position liner panel end joints within upper and lower third points of wall. Stagger joints top and bottom in adjacent panels. Screw studs to runners on walls over 16 feet.
4. Use steel C-H studs 3/8-inch to not more than 1/2-inch less than floor-to-ceiling height, and install between liner panels with liner inserted in the groove. Install full-length E-Studs over gypsum liner panels both sides of closure panels. For openings, frame with vertical E-Stud or J-Runner at edges, horizontal J-Runner at head and sill, and reinforcing as shown on drawings. Suitably frame all openings to maintain structural support for wall.
5. Install floor-to-ceiling steel E-Studs each side of steel hinged door frames and jamb struts each side of elevator door frames to act as strut-studs. Attach strut-stud to floor and ceiling runners with two 3/8-inch Type S-12 pan screws. Attach strut-studs to jamb anchors with 1/2-inch Type S-12 screws. Over steel doors, install a cut-to-length section of J-Runner and attach to strut-studs with 3/8-inch Type S-12 screws.
6. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout

loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

7 At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of installation and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

8 Isolate shaft-wall assemblies from building structure to prevent structural movement from transferring to shaft-wall assemblies.

9 Seal gypsum board shaft-walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with manufacturer's written instructions or ASTM C919, whichever is more stringent.

10 In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 2 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or 5/8-inch thick, gypsum board cants covering tops of projections as follows:

a Slope cant panels at least 75 degrees from horizontal. Set base of panels in adhesive and secure tope edges to shaft walls at 24 inches on center with screws fastened to shaft-wall framing.

b. Where required to support gypsum board cants, install steel framing spaced at 24 inches on center maximum; extend studs from top of projection to shaft-wall framing behind cant.

B. Gypsum Board Installation:

1 Install and finish gypsum board to comply with GA-216 and GA-600.

a. Single Layer: Install in accordance with ASTM C840, except as amended or required by specific fire resistive or sound isolation system detailed. In that instance, application shall conform to requirements of the manufacturer's tests as reviewed and accepted in the submittal.

b. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

2 Apply in vertical direction with ends and edges falling on supports. In vertical applications, gypsum board shall be of length required to reach full height of vertical surfaces in one continuous piece.

3. Position boards so that like edges abut, tapered edges against tapered edges and field cut ends against field cut ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

4. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.

5 Double Layer Application:

a Joints: Stagger 24 inches between layers

b. Sound-rated construction: Tape face layer.

C. Fire Resistant Assemblies: Wherever fire rated gypsum board construction is indicated, provide materials and installation methods, including types and spacing of fasteners, in accordance with CBC. Apply firestopping at 10 feet on center vertically within walls, at top of wall and at penetrations through fire resistant assembly in accordance with Section 07 84 00.

D Sound Retardant Installations:

1. Follow manufacturer's directions and specifications for conditions of installation. Install where indicated. Include around all Toilet Rooms, whether indicated or not. Install from floor surface to bottom side of next floor surface.

a Wrap with insulation and seal electrical or other outlets in sound isolating partitions.

b. Install sealant to completely fill void between gypsum board edges and adjacent surface.

2 Sound-rated edge condition: Stagger (i.e., ship-lap) gypsum board layers at vertical

intersections. Provide a 1/4-inch nominal gap around the gypsum board face layer at floor and ceiling intersections. Fill the 1/4-inch gap with acoustical sealant to form an airtight seal.

E. Fastenings: Attach gypsum board to framing with screws, lengths and sizes as recommended by manufacturer and in accordance with CBC.
1. General: Place not less than 3/8 inch from edges of board, with heads dimpled slightly below surface; do not cut through paper.
2. Ceilings, Non-rated: Nails, 7 inches on center; screws, 12 inches on center.
3. Walls, Non-rated: Nails, 8 inches on center; screws, 12 inches on center
4. Walls, One-hour Rated: As shown.

F. Access Doors: Install gypsum board into access door frames specified in Section 08 31 13 where required and where indicated on the Drawings. Anchor firmly into position, and align properly to achieve an installation flush with adjacent finished surfaces.

G. Acoustic Accessories Installation:
1. Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
2. Install acoustic sealant at gypsum board perimeter at:
   a. Wood Framing: One bead.
   b. Face Layer.
   c. Seal penetrations of partitions by conduit, pipe, duct work, and rough-in boxes.

H. Accessories:
1. Control Joints: Place control joints consistent with lines of building spaces and as follows:
   a. Not more than 30 feet apart on walls and ceilings over 50 feet long.
   b. At exterior soffits, not more than 30 feet apart in both directions.
2. Corner Beads: Install at external corners, using longest practical lengths.
3. Casing Beads: Install whenever edge of gypsum board would otherwise be exposed or semi-exposed, or where abutting dissimilar materials.
4. After accessories are installed, correct surface damage and defects.
5. Install trims and expansion joints where required.

I. Allowable Tolerances:
1. Offset Between Planes of Board Faces: 1/16-inch.
2. Plane, Level, Warp and Bow: 1/8-inch in 8'-0".
3. Shim panels as necessary to comply with tolerances.

3.4 INSTALLATION – EXTERIOR GYPSUM SHEATHING

A. Provide DensGlass Gold sheathing where indicated on drawings. Install sheathing in accordance with manufacturer's instructions and applicable instructions in GA-253 and ASTM C1280.

B. Install DensGlass Gold sheathing with gold side out.

C. Use maximum lengths possible to minimize number of joints.

D. Metal Framing: Attach DensGlass Gold sheathing to metal framing with screws spaced 8 inches on center at perimeter where there are framing supports; and 8 inches on center along intermediate framing in field.

E. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink.

F. Locate fasteners minimum 3/8 inch from edges and ends of sheathing panels.

G Air Barrier: Install air barrier over exterior gypsum sheathing as specified in Section 07 27 00, with flashing around openings.

3.5 FINISHING OF GYPSUM BOARD

A Apply joint treatment at gypsum board joints; flanges of corner bead, edge trim and penetrations, fastener heads and surface defects in accordance with ASTM C840 and GA 214 (provide designated level as described in Article 2 4). Number of coats of treatment shall be as specified above.

B Apply joint tape at joints between gypsum boards.

C Finish interior gypsum board by applying the number of coats of treatment as specified above. Sand between coats and after last coat.

D Texture Finish: Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions, and to match approved sample.
1. Texture Required: Orange-Peel.

E Finish Painting: As specified in Section 09 90 00.

F Caulking:
1 Caulk openings around pipes, fixtures and other items projecting through gypsum board as specified in Section 07 90 00.
2. Caulk top of fire rated walls and partitions and penetrations through fire rated walls and partitions in accordance with Section 07 84 00.
3 Apply caulking material with exposed surface flush with gypsum board.

3.6 FINISHING OF EXTERIOR GYPSUM SHEATHING

A. Seal fasteners using Dow Corning 795 or Borden HPG Elmers Siliconized Acrylic Latex Caulk or equivalent.

B. Finish joints using Dow Corning 795 or Borden HPPG Elmers Siliconized Acrylic latex Caulk or equivalent. Reinforce with 2 inch wide 10 x 10 glass mesh Quick Tape or equivalent.

3.7 FIELD QUALITY CONTROL

A. Installer shall be present at the Architect's inspection of Work. Touch up as required and directed subsequent to finish application.

3.8 ERECTION TOLERANCES

A Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

D Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet.

3.9 CLEANING

A. Clean all beads, screeds, metal base, metal trim, mechanical and electrical items.
   1. Wipe clean, leaving work ready for finish specified under other Sections.
   2. As work is completed in each space, clean all rubbish, utensils and surplus materials from the space. Leave floors broom clean.

3.10 PROTECTION

A. Provide protection to gypsum board construction from damage or deterioration.

3.11 FINISH LEVEL SCHEDULE

A. Finishes in accordance with GA-214 Level:
   1. Level 1: Above finished ceilings concealed from view.
   2. Level 2: Utility areas and areas behind cabinetry.
   3. Level 3: Walls scheduled to receive textured wall finish.
   4. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
   5. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

HARRISON DRYWALL, INC.
SAN FRANCISCO, CA
(415) 821-9584
SUBMITTAL #18 & 18.1

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal stud framing and accessories at interior locations.

B. Related Sections:
1. Section 05 40 00 - Cold-Formed Metal Framing: Structural load bearing metal stud framing.
2. Section 05 50 00 - Metal Fabrications: Metal fabrications attached to stud framing.
3. Section 06 10 53 - Miscellaneous Rough Carpentry: Rough wood blocking within stud framing.
4. Section 07 21 16 - Blanket Insulation: Insulation between framing members.
5. Section 07 27 00 - Air Barriers.
6. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for partitioning.

1.2 REFERENCES

A. ASTM International:
1. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A879/A879M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
4. ASTM A924: Specification for General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.
5. ASTM A1003/1003M – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
6. ASTM A1011 - Specification for Steel, Sheet and Strip, Carbon, Hot- Rolled, Structural Quality.
7. ASTM C645-07 - Standard Specification for Nonstructural Steel Framing Members.
8. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
9. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
10. ASTM D1056: Specification for Flexable Cellular Materials -Sponge or Expanded Rubber.

B. National Association of Architectural Metal Manufacturers:
1. NAAMM ML/SFA 540 - Lightweight Steel Framing Systems Manual

C. SSPC: The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)

D. Steel Stud Manufacturer's Association:
1. ICC ER-49043P – Product Technical Information

1.3 SYSTEM DESCRIPTION

A. Interior Walls: Metal stud framing system with batt type acoustic insulation specified in Section 07 21 16, interior gypsum board specified in Section 09 21 16.

B. Maximum Allowable Deflection:
1. For interior non-rigid finishes: 1:120.
2. For interior ceramic tile and plaster finishes: 1:360.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data describi9ng standard framing member materials and finish, product criteria, load charts, and limitations.

C. Shop Drawings: Submit shop drawings illustrating standard details and special details
1. Indicate component details, stud layout, framed openings, anchorage to structure, type and location of fasteners, and accessories or items required of other related work.
2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement to framing connections.

D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C754, and NAAMM ML/SFA 540.

B. Form, fabricate, install, and connect components in accordance with NAAMM ML/SFA 540.

C. Furnish framing materials in accordance with SSMA - Product Technical Information.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
1. Framing Manufacturer: Current member of Steel Stud Manufacturers Association.

CEMCO SUBMITTAL 18 & 18.1

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETING

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 COORDINATION

A. Coordinate placement of components within stud framing system specified in Division 26.

PART2 - PRODUCTS

2.1 METAL FRAMING SYSTEM

A. Manufacturers:
1. Dietrich Industries, Inc.: www.dietrichindustries.com.
2. California Expanded Metal Products (CEMCO): www.cemco.com.
3. The Steel Network, Inc (TSN): www.SteelNetwork.com.
4. Clark Western Building Systems: www.clarkwestern.com
5. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 COMPONENTS

A. Non-Loadbearing Studs: ASTM C645-07; galvanized sheet steel, non-load bearing rolled steel, channel shaped, punched for utility access, of size and properties necessary to comply with ASTM C754 for the spacing indicated, and as follows:
1. Subject to compliance with requirements, provide Dietrich UltraSTEEL™ Framing, 20 gauge-equivalent. CEMCO PER SUBMITTAL #18.
2. Depth: 6 inches, 4 inches, 3-5/8 inches, and as shown.
2. Thickness: 0.0296 inch (20 gauge); or members that can show independently verified test performance per ASTM C645-07 Section 9.2

B. Loadbearing Studs: As specified in Section 05 40 00.

C. Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud. Ceiling Runners: With extended leg retainer.

D. Furring and Bracing Members. Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.

E. Channels:
1. Furring: 25 gage steel sheet, roll-formed, 2-3/4 inch x 7/8 inch deep with 1/2 inch wide flanges.
2. Runners: 1/2 inch cold formed steel weighing not less than 475 lbs. per 1000 lineal feet, or as indicated.
3. Stiffeners: 3/4 inch cold formed steel weighing not less than 300 lbs. per 1000 lineal feet; rust-inhibitive coated.
4. Channel Bridging and Bracing: U-Channel Assembly; Base metal thickness of 0.0538 inch and minimum 1/2-inch wide flanges. Subject to compliance with requirements provide: CEMCO PER SUBMITTAL 18
   a. ~~Dietrich~~ Metal Framing: Spazzer® 9200 Bridging and Bracing Bar.
   b. U-Channel Assembly: 3/4 inches, 1-1/2 inches, 2 inches, as designated.
      1) Dietrich Metal Framing; EasyClip™ U-Series™ Clip Angle, or equivalent.
5. Resilient Channel: 1/2 inch deep, steel sheet members designed to reduce sound transmission, galvanized G40.
   1. Subject to compliance with requirements, provide Dietrich Metal Framing Resilient Cannel (RCSD) or (RCUR) UltraSTEEL™ 20 gauge equivalent.

F. Fasteners: ASTM C1002, self drilling, self tapping screws.
1. Screws: Type S bugle head; sizes recommended by gypsum board manufacturer. GRABBER/HILTI SUBMITTAL 18

G. Vertical Deflection Connectors:
1. Manufacturer's standard (bypass) or (head) clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
2. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement; 68 mils minimum thickness, size as required by structural design calculations

3. Required use of connection products that have a valid ICC ES Report or equivalent complying with ICC Acceptance Criteria AC261.
   a. The Steel Network, Inc.: VertiClip® and VertiTrack® (ICC #ESR-1903).
   b. Dietrich Metal Framing; SLP-TRK® Slotted Deflection Track by Brady Innovations.
   c. Dietrich Deflection clips: Fast Strut™ / Fast Top™ Clips / FastClip™ Slide Clips / QuickClip™/ Slide Clip ™ (SD).

H. Firestop Track:
1. As specified in Section 07 84 00 – Firestopping: Fire Resistive Joint Systems. Comply with UL 2079.
2. Available Products: Required use of connection products that have a valid ICC ES Report or equivalent complying with ICC Acceptance Criteria AC261. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. The Steel Network, Inc.: VertiClip® and VertiTrack® (ICC #ESR-1903)
   b. Dietrich Metal Framing, SLP-TRK® Slotted Deflection Track by Brady Innovations
   c. CEMCO PER SUBMITTAL #13

I. Drift Clips:
1. Manufacturer's standard head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.
2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. The Steel Network, Inc.: DriftClip® and DriftTrack™
   b. Approved Equivalent.

J. Flat Strap and Backing Plate: Sheet for blocking and bracing in length and width indicated, for reinforcement of accessories:
1. Subject to compliance with requirements, provide Dietrich Metal Framing: Danback™ Fire Treated Wood Backing Plate (D16F) or (D24F).
2. Galvanized Sheet Steel: 0.0538 inch thick.

K. Anchorage Devices: Powder Driven Fasteners:
1. General: Kwik Bolt II manufactured by Hilti, Inc.; 3/16 inch diameter.
2. Expansion Bolts: FS FF-S-325, Group III, expansion shield (self-drilling tubular expansion shell anchor bolts); Type 1 or 2, unless otherwise shown.
3. Alternate Manufacturers: Comparable products with current ICBO.
4. KWIK BOLT TZ EXPANSION ANCHOR PER SUBMITTAL #13

L. Acoustic Sealant: As specified in Section 07 90 00.

M. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 (Type I Inorganic) or Type II Organic, zinc rich.

N. Neoprene Tape: ASTM D1056. Grade SCE41, soft sponge neoprene with adhesive one side; black; 1/4 inch x 1/2 inch, unless otherwise shown.

O. Wire Hangers: 8 gage galvanized soft steel wire.

2.3 SHOP FINISHING

A. Studs and Channels: Non-Structural Members: Meeting requirements of ASTM C645-07; roll-formed from galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion-resistant coating.

B. Tracks and Headers:
1. Structural Members: ASTM A653/A653M G60 Hot dipped galvanized (ASTM C955).

2. Non-Structural Members: Meeting requirements of ASTM C645-07; roll-formed from galvanized steel; complying with ASTM A1003 and ASTM A653 G40 or equivalent corrosion-resistant coating

C. Accessories: Same finish as framing members

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough-in utilities are in proper location.

3.2 PREPARATION

A. Examination: Examine conditions of work in place before beginning work; report defects.

B. Measurements: Take field measurements; report variance between plan and field dimensions.

3.3 INSTALLATION OF STUD FRAMING

A. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

B. Metal Framing:
1. General: ANSI A97.2.
2. Structural Studs: MLSFA.

C. Assemblies:
1. Fire Rated: Per UL and code requirements. Use one manufacturer for each assembly, unless otherwise permitted by governing authorities.
2. Sound Controlled: Use one manufacturer for each assembly, unless otherwise permitted by manufacturer.

D. Metal Stud Partitions:
1. General: Install complete with matching runner tracks and accessories. Align runner tracks accurately to partition layouts.
2. Floor Runners: Secure with 1/4 inch diameter expansion bolts or powder driven - fasteners at least 1 inch long, where permitted by code. Space fasteners 4 inches from ends of each piece; maximum 24 inches on center intermediately; minimum of 2 fasteners per piece of runner.
3. Ceiling Runners: Fasten as shown.
4. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
5. Studs: Gages, depths, and spacing shown. Where not shown, provide per stud manufacturer's recommendations.
6. Stiffeners: 2 rows at third points for studs with finish one side only; one row at midpoint for studs with finish both sides. Snap into punched web of each stud; nest laps and wire tie.
7. Chase Wall Partitions: Cross brace at quarter points with 5/8 inch thick gypsum wallboard; braces 12 inches by width of partition. Fasten to studs with 3 fasteners per edge.
8. Fabricate corners using minimum of three studs.
9. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.

10. Brace stud framing system rigid.
11. Coordinate erection of studs with requirements of door frames; install supports and attachments.

E. Double Wall Partitions:
1. Do not brace or connect rigid members across separation between stud rows. Use the specified resilient sway bracing only. At fire-rated conditions of 2 hours and less conform to UL Design U493.
2. Provide two welded 16 gage structural studs at sound-rated door openings, unless otherwise detailed.

F. Furred Partitions:
1. General: Install furring channels at 24 inches on center; level and plumb with steel shims.
2. To Concrete: Fasten with powder driven fasteners at 24 inches on center.
3. To Concrete Block: As specified for concrete.
4. To Structural Steel: As specified for metal stud partitions.

G. Blocking: Secure steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, casework, toilet accessories, and as required for built-in items.

H. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Install extended leg ceiling runners.

I. Coordinate placement of insulation in stud spaces after stud frame erection.

J. Install studs vertically at 16 inches on center.

K. Align stud web openings horizontally.

L. Secure studs to tracks using fastener method. Do not weld.

M. Stud splicing is not permissible.

N. Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.

O. Coordinate installation of bucks, anchors, and blocking with electrical and mechanical work to be placed within or behind stud framing.

P. Backing: Use steel channels or steel studs secured to studs. Provide backing for support of plumbing fixtures; toilet partitions; wall cabinets; toilet accessories; hardware; and opening frames.

3.4 CEILING AND SOFFIT FRAMING

A. Comply with requirements for ASTM C754.

B. Install furring after work above ceiling or soffit is complete. Coordinate location of hangers with other work.

C. Install furring independent of walls, columns, and above-ceiling work.

D. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated.

E. Space main carrying channels at maximum 4 feet on center, and not more than 6 inces from wall surfaces. Lap splice securely.

F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

H. Reinforce openings in suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.

I. Laterally brace suspension system.

3.5 CLEANING

A. General: Keep premises free from accumulation of waste and rubbish. At the completion of work remove surplus materials, rubbish, and debris.

3.6 ERECTION TOLERANCES

A. Maximum Variation From Indicated Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

C. Maximum Variation of any Member from Plane: 1/4 inch.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTERING

HARRISON DRYWALL INC
S.F. CA
(415) 821-9584
SUBMITTAL #18

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Portland cement plaster system.

B. Related Sections:

1. Section 05 40 00 – Cold-Formed Metal Framing: Metal studding and framing behind plaster base.
2. Section 07 21 16 – Blanket Insulation.
3. Section 07 27 00 – Air Barriers.
4. Section 07 65 00 – Flexible Flashing.
3. Section 07 90 00 – Joint Protection.
6. Section 09 21 16 – Gypsum Board Assemblies: Exterior gypsum sheathing substrate.

1.2 REFERENCES

A. ASTM International:

1. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
2. ASTM C150 - Standard Specification for Portland Cement.
3. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes
4. ASTM C847 - Standard Specification for Metal Lath.
5. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
6. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.
7. ASTM C932 - Standard Specification for Surface-Applied Bonding Agents for Exterior Plastering.
8. ASTM C954 - Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.33 in. to 0.112 in. in Thickness.
9. ASTM C1063 - Specification for Installation of Lathing and Furring for to Receive Interior and Exterior Portland Cement-Based Plaster.
10. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
11. ASTM D522 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
12. ASTM D2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
13. ASTM D2486 – Standard Test Methods for Scrub Resistance of Wall Paints.
14. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
15. ASTM E84 – Standard Test Methods for Surface Burning Characteristics of Building Materials
16. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
17. ASTM G155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

B. CBC - California Building Code, 2001 Edition, Chapter 25.

C. CLPCA - California Lathing and Plastering Contractors Association, Inc.

1. Plaster/Metal Framing Systems; Lath Manual, 1977 edition. Lathing and Plastering Reference Specifications.

D. FS - Federal Specifications:
1. UU-B-790A - Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellent and Fire Resistant).

E. ML/SFA - Metal Lath/Steel Framing Association:
1. Specifications for Metal Lathing and Furring, and Metal Lath Technical Bulletins.

F. Northwest Wall and Ceiling Bureau (Plastering Industry Bureau, Inc.):
1. Stucco Resource Guide.

G. Portland Cement Association:
1. PCA – Portland Cement Plaster (Stucco) Manual.

H. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory.

I. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Provide exposed plaster finish surfaces that are true and even without waves, cracks or other imperfections. Cracks, blisters, pits or discoloration will not be acceptable.
2. Sheathing, lath and related accessories shall provide proper, secure base and reinforcement for plaster systems. Unless specifically noted otherwise, conform to ML/SFA.
3. Exterior Vertical Wall System:
   a. Wind Loading: Design and size members to withstand dead loads and live loads caused by pressure and suction of wind in accordance with CBC Section 2311.
   b. Maximum deflection of studs and composite wall system shall be L/360.

B. ~~E Finish Application: Dryvit's patented* E Finish(es), coating(s), primer(s), and patching compounds for use over exterior stucco.~~ NOT USED

C. Performance Requirements of E Finish Application:
1. Water Vapor Transmission (ASTM E96) Vapor Permeable.
2. Moisture Resistance (ASTM D2247) - 14-day exposure. No deleterious effects.
3. Salt Spray Resistance (ASTM B117) - 500 hours. No deleterious effects.
4. Accelerated Weathering (ASTM G155) - 5000 hours. No deleterious effects.
5. Freeze/Thaw Resistance (EIMA 101.01) 60 cycles – no deleterious effects.
6. Tensile Adhesion (EIMA 101.03) Minimum 5 psi; no failure in finish.
7. Wet Scrub Resistance (ASTM D2486) 2000 cycles. No cracking, checking or loss of film integrity.
8. Mildew Resistance (ASTM D3273) - Passes.
9. Flame Spread (ASTM E84) - <25, Class I.
10. Mandrel Bend: (ASTM D522) – Passed 1/2-inch at 70 degrees F and 1-inch at 40 degrees F.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on plaster materials, characteristics and limitations of products specified.

C. Samples: Submit two samples, 24 inch by 24 inch in size, illustrating finish color and texture

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C926; Northwest Wall and Ceiling Bureau (Plastering Industry Bureau, Inc) - Stucco Resource Guide; and PCA Portland Cement Plaster (Stucco Manual).

B. Substrates:
1. Application of **E** Finish shall be applied only to the following substrates when prepared in accordance with this specification: Sound stucco.
2. Applicator shall verify that the proposed substrate is acceptable prior to application of **E** Finish.
3. Perform field bond tests when applying **E** finishes over questionable surfaces.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience. Finish system applicator shall be knowledgeable in the application of exterior acrylic architectural finishes and coatings.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver Dryvit materials to the job site in original, unopened packages with labels intact. Upon arrival, inspect materials for physical damage, freezing or overheating. Questionable materials shall not be used.

B. Store Dryvit materials in a cool, dry location, out of direct sunlight and protected from weather and other damage.

C. Minimum storage temperature: 40 degrees F for **E** Finish, Color Prime™, and Color Prime-W™.

1.9 SITE CONDITIONS

A. Section 01 60 00 - Product Requirements.

B. Environmental Conditions for Exterior Plaster Work: Do not apply cement plaster when ambient temperature is less than 40 degrees F.

C. Protection:
1. Protect adjacent areas/materials from damage, drops and spills during the application of Dryvit materials.
2. Protect Dryvit materials by permanent or temporary means from weather and other damage, prior to during, and immediately after application. Take care to prevent

condensation and/or heat buildup when using tarp or plastic to prevent damage to the Dryvit materials.

D. Sequencing and Scheduling:
1. Coordinate application of Dryvit materials with other construction trades.
2. Employ sufficient labor and equipment to ensure a continuous operation, free of cold joints, texture variations, and scaffold lines.

1.11 WARRANTY

A. Section 01 77 00 – Contract Closeout: Product warranties.

B. Furnish 5 year manufacturer's warranty for **E** Finish system.

PART 2 - PRODUCTS

2.1 LATH MATERIALS

A. Air Barrier: As specified in Section 07 27 00 – Air Barriers.

B. Backing Material: FS-UU-B-790a, Type 1, Style 2, Grade "D" building paper
1. Fortifiber Building Systems Group; Model: Jumbo Tex; or accepted equal.

C. Metal Lath: SUBMITTAL #18
1. Metal Lath: ASTM C847, diamond mesh, self-furring, minimum weight of 3.4 pounds per square yard, galvanized in accordance with ASTM A-924, G-60.

D. Accessories: Provide ASTM C1063, galvanized steel, accessories of the following:
1. Corner and Strip Reinforcement: Expanded large-mesh diamond metal lath fabricated from welded wire mesh fabricated from 0.0475-inch diameter zinc-coated (galvanized) wire.
2. Metal Corner Beads:
a. Straight Corner: Western Metal Lath; #1A Expanded Corner Bead, 26 gauge galvanized steel, ASTM A924; flanges shaped to permit complete embedding in plaster, minimum 2.5 inch flange.
b. Accepted equal.
3. Casing Beads:
a. Square-edged style, with expanded flanges and removable protective tape, of zinc-coated (galvanized) steel; ASTM A924.
b. Manufacturer: Fry Reglet Corp., "Fry "J" Molding"; Western Metal Lath; or equal.
4. Control Joints:
a. One-Piece Expansion Control Joint:
1) Prefabricated, galvanized steel, minimum 0.0172-inch thick, vented and non-vented. Provide removable protective tape on plaster face of control joints.
2) Manufacturer: Western Metal Lath – XJ15 Control Joint, or equal.
b. Two-Piece Expansion Control Joint:
1) ASTM A924, Prefabricated, galvanized steel, 26 gauge, pair of casing beads with back-to-back flanges formed to provide slip-joint action, adjustable for joint widths from 1/4-inch to 5/8 inch.
2) Manufacturer: Manufacturer: Western Metal Lath - #40 Expansion Joint, or equal.
5. Foundation Sill (Weep) Screed: Manufacturer's standard profile, fabricated from zinc-coated (galvanized) steel sheet. CEMCO SUBMITTAL #18
6. Stucco Drip Screed:

a. Vented and non-vented, zinc coated galvanized steel, 7/8-inch thick for thick and thin set Portland cement plaster.
b Manufacturer: Fry Reglet Corp., "Stucco Drip Screed" and "Thin Stucco Drip Screed", or equal.

2.2 PLASTER MATERIALS

A. Plaster Base Coats:
1. Portland Cement: ASTM C150, Type I. BMI 690 SUBMITTAL #13
2. Sand for Portland Cement Plaster: ASTM C897; graded in accordance with CLPCA requirements.
3. Plasticizing Agents:
a. PRF:
1) Non-toxic resin with high safety factor to provide compressive strength in Portland cement to minimize or eliminate cracking.
2) Manufacturer: A. E. Gibson, "Plast-R-Fat PRF", or equal.
b. Plastic Cement: Portland cement to which not more than 12 percent by volume plasticizing agents have been added at mill.
4. Plaster Mix Reinforcement:
a. Glass fibers, 1-1/2 inch nominal length, alkali resistant, as manufactured by Dur-O-Wal, Inc., "Dur-O-Fiber", or approved equal.
b Acrylic Compounds: As manufactured by Thoro Systems Products, "Acryl 60", or approved equal.
5. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
6. Optional Pre-Blended Product: BMI Products, Inc., BMI 690, ASTM C926-98a for Portland Cement Based Plaster.
a. BMI 690 is a premium pre-blended cement-lime-sand mixture that has been specially formulated to allow the application of scratch and brown coats on the same day.

B. Plaster Finish Coat: — TEXTURE AND COLOR TO MATCH EXISTING ADJACENT PER RFI #013
1. ~~E Finish:~~ Water-based, lightweight acrylic coating with integral color and texture and formulated with DPR (Dirt Pickup Resistance) chemistry.
2. Manufacturer: Dryvit Systems, Inc., or equal.
3. Texture: Selected by Architect from manufacturer's standard textures.
a. Quarzputz® E: A 100 percent acrylic based finish with a coarse aggregate producing an open textured pattern in a regular or random style.
b. Sandpebble® E: A 100 percent acrylic based finish with a pebble like texture.
c. Sandpebble® Fine E: A 100 percent acrylic based finish with a fine, pebble like texture.
4. Colors: As selected by Architect from manufacturer's standard colors.
5. Color-Prime W: A pigmented, exterior acrylic primer.

C. Fasteners and Attachments: Comply with:
1. Screws: ASTM C646.

D. Tie Wire: 18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A 641 with Class I coating.

2.3 MIXES

A. Mix and proportion cement plaster in accordance with ASTM C926.

B. Base and Brown Coats:

1. Plasticizing Agents: 3 ounces of PRF per cubic foot. Add to water before adding cement and sand.
2. Fiber Reinforcement: Add glass fibers at the rate of 1-1/2 pounds per sack of cement.

C. Finish Coats: Mix in accordance with manufacturer's instructions.
1. Thoroughly mix Dryvit **E** finish with a Goldblatt Jiffler Mixer #15311H76 or equivalent powered by a 1/2 inch drill at 400-500 RPM; or until a uniform workable consistency is attained. It should not be necessary to add water.
2. If a looser workability is desired after mixing, add no more than 2 ounces of water per pail of any **E** finish.

D. Proportions: In accordance with ASTM C926 and as follows:
1. Scratch Coat: 1 part Portland cement, 3-1/2 parts sand, 3 ounces PRF, 2 pounds glass fibers.
2. Brown Coat: 1 part Portland cement, 4 parts sand, 1 part acrylic compound, 3 ounces PRF, 3 parts water.

2.4 FINISHES

A. Portland Cement Plaster: Provide finish texture to match approved sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

B. Mechanical and Electrical: Verify services within walls have been tested and approved.

3.2 PREPARATION

A. Dampen masonry surfaces to reduce excessive suction.

B. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.

C. Roughen smooth concrete surfaces and apply bonding agent or dash-bond coat. Dash bond coat shall be left undisturbed and shall be moist cured not less than 24 hours. When dash bond is applied, first coat of base coat plaster may be omitted.
1. Dash Bond Coat: Mixed in proportions of 1-1/2 part volume of sand to 1 part volume of Portland cement or plastic cement

3.3 INSTALLATION OF AIR BARRIER

A. Air Barrier: Install in accordance with Section 07 27 00 – Air Barriers.

3.4 INSTALLATION OF METAL LATH AND ACCESSORIES

A. Building Paper Installation:
1. Apply building paper over air barrier substrate in accordance with manufacturer's recommendations, laid smooth without folds or bunches of material.
a. Seam Overlap: As recommended by building paper manufacturer for specific building paper material and application indicated.

b. Sealing: Seal edges and items projecting through vapor retarders and vapor barriers.

2. Cover building paper as soon as possible. Inspect product to ensure it is free of any protrusions or damage which may detract from the weather-resistive barrier integrity Seal holes, tears, or punctures with compatible sealant or sheathing tape.

B. Lath Installation:

1. General. Install metal lath in accordance with ASTM C1063.
   a. Apply metal lath taut, with long dimension perpendicular to supports.
   b. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.
   c. Lap sides of diamond mesh lath minimum 1-1/2 inches. Nest outside ribs of rib lath together.
   d. Attach metal lath to metal stud supports using screws through sheathing into framing members at maximum 24 inches on center. Vertical attachment of lath to studs: 6 inches on center. Fasteners to penetrate into framing support studs
   e. Continuously reinforce internal angles with corner mesh, except where metal lath returns 3 inches from corner to form angle reinforcement; fasten at perimeter edges only.
   f. Place corner bead at external wall corners; fasten at outer edges of lath only.
   g. Place base screeds at termination of plaster areas; secure rigidly in place.
   h. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
   i. Place lath vertically above each top corner and each side of door and glazed frames to 6 inches above ceiling line.
   j. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
   k. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.
   l. Bend lath taut and continue around corners to next framing member and/or corner reinforcement.
   m. Attach lath at furring points.
   n. Fasteners to penetrate into wood or steel framing members. Fasteners to penetrate a minimum of 3/4 inch into wood framing members.
   o. Center fasteners on flange (ends) or framing members, minimum 3/8 inch from edge. Both legs of staple to penetrate framing member.

2. At Openings:
   a. Hang lath at openings with cut-out to include at least 1 and possibly 2 opening corners.
   b. Horizontal joints in line with head or vertical joints in line with jamb will not be permitted.

3. Accessories:
   a. Install accessories in accordance with ASTM C1063.
   b. Unless indicated to receive formed metal corner or edge guards, apply corner reinforcement at external plaster corners using single lengths without joints.
   c. Install casing beads at terminations of plaster surfaces unless otherwise indicated.
   d. Use screeds to adjust plaster thickness or between plaster types.
   e. Control Joints:
      1) Verify location of control joints with the Architect.
      2) Install exterior control joints in accordance with ML/SFA unless otherwise indicated.
      3) Set vertical joints, first. Provide continuous joints.
      4) At control joint intersections, miter control joints, and set in bead of sealant.

f. Fasten at both ends and at maximum 12 inch centers to prevent dislodging or misalignment by subsequent operations.

g. Where plaster meets dissimilar material, terminate with plaster casing bead unless otherwise shown.

h. Install weep screed at all locations where walls terminate at decks or grade.

3.5 MIXING

A. Mix materials in approved mechanical mixers of type in which quantity of water can be controlled accurately and uniformly.
   1. Avoid excessive mixing or agitation.
   2. Discard plaster which has begun to set before it is used; retempering will not be permitted. Do not use caked, or lumped materials.
   3. Mix ready-mixed plaster in accordance with manufacturer's printed instructions.

3.6 PLASTER APPLICATION

A. Apply plaster in accordance with ASTM C926, Plastering Industry Bureau, Inc. (Stucco Resource Guide), and Portland Cement Association - PCA Plaster (Stucco Manual);

B. Plaster Staging Joints:
   1. Schedule work so that entire area, bounded by natural breaking points, is completed top to bottom within 1 day period whether scratch, brown or finish coat.
   2. Do not stop brown coat, except at an "architectural break".
   3. Score finish plaster at junction with metal frames.

C. Apply stucco first (scratch) coat in a nominal thickness of 3/8 inch. First coat to completely embed the lath. First coat to be thick enough to go beyond lath to allow for scoring of cement plaster surface.

D. Apply stucco second (brown) coat in a nominal thickness of 3/8 inch over stucco first coat Second coat thickness to bring the combined basecoats (first and second) thickness to a nominal thickness of 3/4 inch.
   1. Apply second coat over a damp first coat. If required, apply a fine spray of clean water, so as to dampen only. Do not saturate. Allow water sheen to disappear before applying the second coat.

E. Apply second coat with sufficient material and pressure to ensure a tight uniform bond to first coat.

F. Utilize "double-back" method of applying successive coats. This procedure has little or no delay between applying the second coat over the first coat.
   1. Apply second coat as soon as the first coat is rigid enough to receive it.

G. Rod the second coat to a true, even plane, filling surface defects with cement plaster.

H. Trowel-float the second coat surface uniformly.
   1. Float the basecoat after it has set and when moisture is still present in it. The float should not adhere to surface that is to be worked.

I. Curing of Basecoat:
   1. Climatic conditions dictate the need for moist-curing.
      a. Cure cement plaster basecoat for a minimum of seven days before starting finish coat application. Moist cure for the first two days.
      b. Moist curing is recommended when the ambient temperature is 77 degrees F or higher and/or when ambient relative humidity is below 70 percent and conditions are windy.

1) Moist cure in the morning and/late afternoon for a period of two days.
2) Moist-cure with a fine mist of clean water; do not saturate.
3) Moist-cure only after the basecoat has set and is hard.
4) Extreme weather conditions may require plastic sheets to retard evaporation.

c. Protect stucco basecoat from freezing for a period of 24 hours after application.
1) Do not moist-cure if basecoat is subject to freezing.
2) Do not use frozen materials in mix.
3) Do not apply cement plaster to a surface that is frozen or contains frost.

3.7 E FINISH APPLICATION

A. Inspect substrate and substrate preparation to ensure it is in compliance with project documents and this specification.

B. Mixing:
1. Mix the **E** Finish thoroughly to a uniform homogeneous consistency using a Goldblatt Jiffler Mixer No. 15311H7 powered by a 1/2-inch drill 400-500 RPM or equivalent. Mix until a uniform workable consistency is attained. It should not be necessary to add water. If a looser workability is desired after mixing, add no more than 60 ml (2 oz) of water per pail of any **E** Finish.

C. General.
1. The **E** Finish can be spray or trowel applied in accordance with specific product instructions.
2. No additives shall be added under any circumstances.
3. The finish shall be applied to the entire wall surface in a continuous application to a natural break.
4. Finish shall be protected from airborne contamination such as dust, soot, etc. and from weather and other damage until fully dried.

D. Quarzputz **E**:
1. Using a stainless steel trowel, apply and level a coat to a uniform thickness, no thicker than the largest aggregate. Using a plastic float, lightly texture the finish to a uniform appearance. Best results are achieved using less pressure when troweling and floating than with standard full weight finishes.

E. Sandpebble **E** and Sandpebble Fine **E**:
1. Using a stainless steel trowel, apply an even coat to a thickness slightly thicker than the largest aggregate size. Using a plastic float, lightly texture the finish to a uniform appearance. Best results are achieved using less pressure when troweling and floating than with standard full weight finishes.

F. Color Prime-W:
1. Apply to recommended coverage rate by brush, roller or airless spray equipment.
2. A maximum 3/4 inch nap polyester or polyester blend with nylon or lamb's wool, beveled ends and phenolic core is recommended.
3. An 18 inch wide roller frame with 2-1/4 inch inside diameter roller is recommended.
4. Apply in a continuous application, maintaining a wet edge, to a natural break.

3.8 ERECTION TOLERANCES

A. Maximum Variation from True Flatness: 1/8-inch in 10 feet, with maximum inward and outward allowance not occurring in less than 20 feet.

3.9 ADJUSTING

A. Remove damaged or defective plaster by cutting and replace with specified materials to match adjacent plaster.

B. Upon completion, point-up plaster around trim and other locations where plaster meets dissimilar materials.

END OF SECTION

SECTION 09 30 00

TILING

CALIFORNIA TILE INSTALLERS, INC.
SAN JOSE, CA
(408) 926-0600
SUBMITTAL #23

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes ceramic and ceramic mosaic tile for floor and wall applications, using thin-set application method; glass mat backer board as tile substrate; and thresholds at door openings.

B. Related Sections:
1. Section 03 30 00 - Cast-in-Place Concrete: Troweling of floor slab for tile application.
2. Section 07 90 00 - Joint Protection.
3. Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

A. General: Refer to Section 01 42 00 – References and Definitions for reference standards, applicable codes and definitions.

B. American National Standards Institute:
1. ANSI A108.1 - Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile Installed with Portland Cement Mortar.
2. ANSI A108.3 – Quarry and Paver Tile Installed with Portland Cement Mortar.
3. ANSI A108.5 - Ceramic Tile Installed with Dry-set Portland Cement Mortar or Latex-Portland Cement Mortar.
4. ANSI A108.10 - Installation of Grout in Tilework.
5. ANSI A118.1 - Dry-Set Portland Cement Mortar.
6. ANSI A118.3 – Chemical Resistant, Water Cleanable, Tile Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
7. ANSI A118.4 - Latex-Portland Cement Mortar.
8. ANSI A118.6 – Ceramic Tile Grouts.
9. ANSI A118.7 - Polymer Modified Cement Grouts for Tile Installation.
10. ANSI A118.10 – Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
11. ANSI A118.11 - EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar.
12. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.
13. ANSI A137.1 - Ceramic Tile.

C. ASTM International:
1. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
2. ASTM C150 - Standard Specification for Portland Cement.
3. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
4. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
5. ASTM C1028 – Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynometer Poull Meter Method.
6. ASTM C1178 – Standard Specification for Glass Matt Gypsum Substrate Used as Sheathing.
7. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.

D. Portland Cement Association (PCA): Plaster Manual.

E. TCA - Tile Council of North America.

1. TCA – Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Submit drawings indicating tile layout, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

C. Product Data: Submit manufacturer's data completely describing products. Submit instructions for using grouts and adhesives.

D. Samples: Submit samples of tile set in grouted joints mounted on plywood panels for each color and type of tile, showing color range, size and texture.
   a. Interior Floor and Wall Tile: Minimum 4 tiles per panel.
   b. Trim Shapes: 1 for each color type and shape upon request.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Manufacturer's Instructions: Submit manufacturer's installation instructions, including instructions for using mortars, bond coats and grouts.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Closeout procedures.

B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

B. Packing and Shipping:
   1. Deliver containers with grade-seals unbroken. Containers having broken seals will not be accepted. Immediately remove rejected containers from job site.

2. Provide manufactured mortars and grouts in containers having identification certifying compliance with referenced standards. Product shall be as recommended by tile manufacturer for intended application.

C. Storage and Protection: Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements.

B. Do not install adhesives and grouts in unventilated environment.

C. Maintain ambient and substrate temperature of not less than 50 degrees Fahrenheit during installation of mortar materials.

1.10 EXTRA MATERIALS

A. Section 01 77 00 – Contract Closeout: Spare parts and maintenance products.

B. Extra Materials:
1. Supply 5 sq ft of each size, color, and surface finish of tile specified.
2. Provide in original unbroken containers plainly marked with type and quantity of contents, and area of installation.

PART 2 - PRODUCTS

2.1 TILE

A. Manufacturers:
1. Dal-Tile International, "Keystones™" Series and "Keystones™ Select" Series Tile.
2. Dal-Tile International, "Semi-Gloss™" Tile.
3. Dal-Tile International, "Matte™" Tile.
4. Alternate Manufacturer: American Olean Tile Co.
5. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 COMPONENTS

A. Unglazed Ceramic Mosaic Floor Tile ANSI A-137.1, conforming to the following:
1. Manufacturer: Dal-Tile, Corp.
2. Series: Keystones and Keystones Select.
3. Factory mounted flat tile complying with these requirements:
   a. Type: Porcelain (less than 1/2 percent absorption).
   b. Wearing Surface: 7.5 percent abrasive content.
   c. Nominal Facial Dimensions: 2 inch by 2 inch.
   d. Nominal Thickness: 1/4 inch.
   a. Minimum coefficient of friction: 0.6 per ASTM C1028.
4. Colors: Randomly mixed as indicated in table below:

Application	Reference	Color	Color Code	Mix
Field	MT-1/A	Gold Dust	D138	10%
Field	MT-1/B	Mottled Med. Brown	D050	65%
Field	MT-1/C	Brownstone Range	D156	15%
Field	MT-1/D	Ebony	D311	10%
Border	MT-2	Ebony	D311	All

B. Glazed Wall Tile: ANSI A-137.1, conforming to the following:
1. Manufacturer: Dal-Tile, Corp.
2. Series: Semi-Gloss, or Matte.
3 Flat tile complying with these requirements:
a. Type: Non-Vitreous (no more than 80 percent absorption.)
b. Nominal Face Dimensions: 6 inch by 6 inch.
c. Nominal Thickness: 5/16 inch.
4. Colors: As shown in table below.

Application	Reference	Color	Color Code	Note
Built-up Base	T-4	Ebony	D311	Mfg style: MB-5A
Field	T-1	Arctic White	190	
Liners	T-2	Arctic White	190	1" x 6" size
Accent	T-3	Arctic White	190	Matte Finish
Bullnose	T-5	Arctic White	190	

C. Trim:
1. Provide tile trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
a. Same type, color, thickness, face size and finish as tile specified.
b. Base for Portland Cement Mortar Installations: Coved to tile, same size as adjacent floor tile.
c. Wainscot for Thin-Set Mortar Installations: Surface cap.
d. Wainscot for Flush Installations: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above.
e. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of at least 3/4 inches, unless otherwise noted.
f. Internal Corners: Field-Butted square corners, except for coved base and cap angle pieces designed to member with stretcher shapes.

D. Accent Band at Wall:
1. Wall tiles start above a built-up cove tile base.
2. An accent band in tile is set 6 full field tile units above the base. Accent band consists of two 1" x 6" liner binds bracketing a single run of standard 6" x 6" wall tiles. Arrange liners so that joint lines are offset from field tiles in a 25/75% arrangement. Both top and bottom liners shall have offsets which oppose each other. Horizontally offset the 6" x 6" tile in the middle of the accent band from the field by 50%.

2.3 ACCESSORIES

A. Adhesive Materials:
1. Organic Adhesive: ANSI A136.1, thin-set bond type.
a. Type I at wet areas and Type I or Type II at dry areas.
2. Tile Setting Adhesive: Elastomeric, waterproof, liquid applied.
CUSTOM BUILDING PRODUCTS RELIABOND CERAMIC TILE ADHESIVE TYPE I.

B. Mortar Materials:
1. Dry-set mortar: ANSI A118.1
2. Latex-portland cement mortar: ANSI 118.4. (MegaFlex Crack Isolation Mortar by Custom Building Products) or (MegaLite Lightweight Non-Sag Ultra High Bond Crack Isolation Mortar by Custom Building Products. Contributes to LEED Certification)
3. Thin Set Mortar: ANSI A118.4 and A118.11 (Megaflex™ Crack Prevention Mortar by Custom Building Products.)

C. Grout Materials:
1. Standard Grout: ANSI A118.6, A118.7, or A118.3.
POLYBLEND GROUT #135 NOW INFO

a. Fast setting, high early strength, low shrinkage polymer-modified proprietary mixture of cementitious compounds, select quartz aggregates and color fast pigments.
b. Manufacturer: Custom Building Products Polyblend (ANSI A118.6) or PRISM SureColor Grout (ANSI A118.7). (Contributes to LEED Certification), Mapei, Ultra/Color Grout, or approved equal. Sanded or Unsanded per manufacturer's recommendations.
c. PolyBlend Grout by Custom Building Products. Available in 48 Colors.
d. Supplier: Dal-Tile Corporation.
e. Color: Equal to Bostik Findley Hydroment x125/U210 "Taupe 117". #185 NEW TAUPE (SUBMITTAL #23)

D. Trim: Sheet steel zinc-coated by hot-dip process.

E. Metal framing fasteners: Screws: Light-gauge metal framing, Type S, bugle or wafer head, self-tapping, rust resistant. Heavy-gauge metal framing, Type S-12, bugle or wafer head, rust resistant.

F. Cleavage Membrane: No. 15 asphalt saturated felt, or 4 mil thick polyethylene film.

G. Waterproofing Membrane (at Floors): ANSI A118.10, RedGard Waterproofing and Crack Prevention Membrane by Custom Building Products.

H. Reinforcing Mesh: 2 x 2 inch size weave of 16/16 wire size; welded fabric, galvanized.

I. Neutralizers, Primers and Sealers: As recommended by adhesive manufacturer.

I. Expansion Joint Sealant: Polyurethane type complete with back-up and bond breaker materials as necessary. Product: MONO 555 by Tremco. Conform to requirements of Section 07 90 00.

J. Thresholds: Marble type; color selected by Architect; honed finish, 4 inch wide by 1/2 inch thick by full width of wall or frame opening; beveled both sides, radiused edges from bevel to vertical face; without holes, cracks or open seams.
1. Applications: Provide at the following locations:
a. At doorways where tile terminates.
b. At open edges of floor tile where adjacent finish is a different height.

K. Accessories:
1. Cleaning, finishing and Sealing Materials: As recommended by tile manufacturer.

2.4 GLASS MAT BACKER BOARD

A. Acceptable products: Georgia-Pacific Corporation, Dens-Shield Fireguard Type X.

B. Characteristics:
1. Size: Dens-Shield Fireguard Type X: 5/8 inch thick; board size 32 inches by 5 feet and 4 feet by 8 feet.
2. Composition: Water-resistant treated core with glass mat moisture protectant coating and embedded glass mats, both sides. Face side: Surfaced with heat-cured copolymer water- and vapor-retardant coating.
3. Fire Resistance: 5/8 inch Dens-Shield Fireguard Type X: Type X when tested in accordance with ASTM E119, UL classified.

C. Reference Standard: ASTM C1178.

2.5 JOINT TREATMENT MATERIALS

A. Joint tape:

1. 2 inch wide, 10 by 10 glass mesh tape.
2. Reinforcing fabric: Balanced, alkali-resistant, open-weave, glass fiber fabric, made from continuous multi-end strands with tensile strength of not less than 120 lbs. and 140 lbs. in warp and fill directions, respectively, per ASTM D 1682 and complying with ASTM D 578, and of 4.30 oz./sq. yd. minimum weight.

B. Setting-type joint compound: Untiled, non-wet areas: Georgia-Pacific setting compounds.

C. Tile setting material: Mastic or mortars, organic adhesive ANSI A136.1, dry set ANSI A118.1, latex portland cement mortar ANSI A118.4, ANSI A118.4 only for floors specified.

2.6 MIXES

A. Mortar, Bond Coat and Grout Mix: Mix and proportion setting bed, bond coats and grout materials in accordance with applicable ANSI or TCA standards or manufacturer's instructions where cited.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive tile and verify that:
1. Surfaces are free of defects that would adversely affect tile work.
2. Surfaces are firm, level or plumb, dry, clean and free of oily or waxy film.
3. Inserts, accessories, plumbing and membranes are placed or provided for.

B. Do not start work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Protection:
1. Comply with closing of spaces to traffic and protection requirements of ANSI A108.1, Article 1.5, Sub-articles A-1.5.1, A-1.5.2 and A-1.5.2.1.
2. Protect adjacent work, surfaces and equipment from effects of tile installation procedures.

B. Tile Layout:
1. General: Comply with ANSI A108.1, Article A-3.3, unless otherwise specified herein.
2. Center fields and patterns on areas so that no tile is less than half size.
3. For heights stated in feet and inches, maintain full courses to nearest attainable height without cutting tile.
4. Locate precisely expansion joints and accessories before tile is installed.

C. Surface Preparation:
1. Vacuum clean surfaces and damp clean.
2. Seal substrate surface cracks with filler.
3. Install cementitious backer board. Tape joints and corners, cover with skim coat of dry-set mortar to feather edge.
4. Prepare substrate surfaces for adhesive installation.
5. Prevent rapid evaporation of moisture from mortar beds. Cure mortar beds in accordance with applicable requirements of ANSI A108.1, Article A-3.2.

3.3 INSTALLATION

A. General Requirements:

1. Install tile, thresholds, and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook requirements.
2. Provide glass mat backer board where indicated on drawings using fastening systems specified.
3. Lay tile to pattern as shown on approved shop drawings. Do not interrupt tile pattern through openings.
4. Place thresholds at locations indicated or as scheduled.
5. Cut and fit tile to penetrations through tile, leaving sealant joint space. Fit tile closely around outlets, pipes, fixtures and fittings so that plates, escutcheons and collars overlap cuts. Form corners and bases neatly. Align floor, base, and wall joints No staggered joints will be permitted.
6. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
   a. Ceramic Tile: 1/16 inch.
7. Form internal angles coved and external angles bullnosed.
8. Install ceramic accessories rigidly in prepared openings.
9. Sound tile after setting. Replace hollow sounding units.
10. Keep expansion and control joints free of adhesive or gout. Apply sealant to joints.
11. Allow tile to set for a minimum of 48 hours prior to grouting.
12. Grout tile joints. Use standard grout unless otherwise indicated.
13. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

B. Installation – Floors –Thin-Set Methods:
1. Over second-floor interior concrete substrates, install in accordance with TCA handbook Method F113, Dry-Set mortar or Latex-Portland Cement Mortar.
2. Membrane bond coat: 1 part RedGard by Custom Building Products) to 4 parts water. Allow to cure to a tacky consistency.
3. Encapsulation/Waterproofing Barrier over the concrete slab: RedGard by Custom Building Products. Apply RedGard at full strength, 2 coats; allow to cure 1-2 hours between coats. Apply with 3/4-inch nap paint roller to achieve required thickness of 47 mils dry.
4. Thin-set Mortar: Megaflex™Crack Prevention Mortar by Custom Building Products.
5. Grout: 100% Solids Epoxy Grout, by Custom Building Products.

C. Installation - Wall Tile – Coated Glass Mat Water-Resistant Gypsum Backer Board Method:
1. Over coated glass mat backer board on metal studs install in accordance with TCA Handbook Method W245, thin-set with dry-set mortar or latex-portland cement mortar.
2. At walls, install glass mat backer board panels vertically or horizontally.
3. Finishing:
   a. Substrate for Tile: Apply glass mesh joint tape over joints. Embed tape in setting material indicated for specified tile finishes. Allow joints to dry prior to installing tile systems.
   b. Substrate for Paint, Dry area (untiled): Apply glass mesh joint tape over joints. Embed tape in setting-type joint compound specified. Apply skim coat of setting-type joint compound over surface of tile backer for smooth finish.
4. Accessories: Install accessories where indicated and in accordance with tile backer manufacturer's instructions.

D. Place thresholds at locations indicated.

E. Joint Treatment:
1. Thoroughly clean joints of debris or other foreign material before proceeding with grouting.
2. Grouting: Install grout in accordance with manufacturer's recommendations, standards as specified herein, ANSI A108.10.

3. Align floor tile joints with wall tile joints.

F. Expansion and Control Joints: Provide expansion and control joints conforming to the following requirements: ANSI A108.1, Article AN-3.8.3, TCA's Handbook Installation Method EJ171 and as indicated on the Drawings.

G. Wall imperfections, holes, gaps after removal of existing fixtures and accessories: Patch walls with appropriate caulking or grout or repair with tile where necessary.

3.4 CLEANING

A. Section 01 74 00 – Cleaning: Final Cleaning.

B. Clean entire new tile installation with neutral, non-alkaline chemical cleaner free from lye or caustics. Do not use acid or acid containing cleaners.

C. Seal tile with materials and methods as recommended by tile manufacturers.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Do not permit traffic over finished floor surfaces for 4 days after installation.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

T3 INC.
FREMONT, CA
510 440-0157
SUBMITTAL #34

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes suspended metal grid ceiling system and perimeter trim and acoustic panels.

B. Related Sections:
1. Section 07 90 00 - Joint Protection
2. Section 23 05 00 - Heating, Ventilating and Air Conditioning: Air diffusion devices in ceiling system.
3. Section 26 50 00 - Lighting: Light fixtures in ceiling system.
4. Section 28 31 00 - Analog Fire Alarm System: Fire alarm components in ceiling system.

1.2 REFERENCES

A. ASTM International:
1. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
3. ASTM C635 – Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
4. ASTM C636 – Practice for Installation Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E580 – Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
7. ASTM E795 - Practices for Mounting Test Specimens During Sound Absorption Tests.
8. ASTM E1264 - Classification of Acoustical Ceiling Products.

B. CBC - California Building Code, 2007 Edition.

C. Ceilings and Interior Systems Construction Association:
1. CISCA - Acoustical Ceilings, Use and Practice.

D. Division of the State Architect – Interpretations of Regulations:
1. IR M-3: Metal Suspension Systems for Lay In Panel Ceilings.

E. ICBO - International Conference of Building Officials:
1. UBCS - Uniform Building Code Standards.
   a. 25 - 2 - Metal Suspension Systems for Acoustical Tile and for Lay-In Panel Ceilings.

F. Intertek Testing Services (Warnock Hersey Listed):
1. WH – Certification Listings.

G. Underwriters Laboratories, Inc:
1. UL – Fire Resistance Directory.
2. UL723 –Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
1. Plumb, true, straight and rigid framing for support of attached materials.
2. Design system to accommodate construction tolerances, deflection of building structural members, support of attached materials and clearances of intended openings in accordance with CBC.
3. Seismically anchor ceiling in accordance with UBC Standard 25-2 for intermediate-duty structural classification.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Submit shop drawings showing suspension system details and reflected ceiling plans indicating location of light fixtures, mechanical air supply and return outlets and other items affecting ceiling construction. Identify locations of types of suspension systems and types of panels or tile including access panels, where required.

C. Product Data: Submit manufacturer's product data for each type of product specified.

D. Samples: Submit samples for verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
1. Submit 6 inch by 12 inch samples of each panel type, pattern, and color.
2. Set of 12 inch long samples of concealed suspension system members.
3. Set of 12 inch long samples of exposed moldings for each color and system type required.

E. Certificates: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

F. Research reports or evaluation reports of ICBO acceptable to authorities having jurisdiction that show compliance of components with DSA/ORS IR M-3 and CBC

G. Closeout:
1. General: Refer to Section 01 77 00 – Contract Closeout: Contract Closeout.
2. Maintenance Data: Manufacturer's instructions.
3. Guarantee: Provide in required form for a period of one (1) from date of final acceptance by Owner.

1.5 QUALITY ASSURANCE

A. Conform to CISCA requirements.

B. Single-Source Responsibility: Provide acoustical panel units and grid components by a single source manufacturer.

C. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
   a. Flame Spread: 25 or less
   b. Smoke Developed: 50 or less

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

E. Suspended ceilings will be subject to special inspection.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience

B. Installer: Company specializing in performing Work of this section with minimum three (3) years documented experience.

1.7 PRE-INSTALLATION MEETING

A. Section 01 31 19 - Administrative Requirements: Pre-installation meeting.

B. Convene one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site: Deliver acoustical panels and suspension system components to Project site in original, unopened packages.

B. Storage and Protection:
1. Store acoustical panels and suspension components in fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
2. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content
3 Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements.

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

1.10 SEQUENCING AND SCHEDULING

A. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustic units after interior wet work is dry

1.11 EXTRA MATERIALS

A. Section 01 77 00 – Contract Closeout: Spare parts and maintenance products.

B. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
1 Acoustical Ceiling Panel: Furnish quantity of full-size units equal to 10 percent of each type panel installed.

PART 2 - PRODUCTS

2.1 SUSPENDED ACOUSTICAL CEILINGS

A. Manufacturer:
1. USG Interiors; www.usg.com
2. Substitutions: Not permitted. USG Interiors is District standard.

B. Grid:
1. General: Heavy Duty System manufactured by USG Interiors, Inc.; Donn
2. Substitutions: Not permitted. USG, Donn/DX is District standard.

C. Non Fire-Rated Grid: ASTM C6355 heavy duty exposed tees, all components die cut and interlocking, commercial quality, cold rolled steel with galvanized coating.
1. Non Fire-Resistance Rated, Direct-Hung, Double-Web Suspension System, DSA Approved Ceiling System Donn DX/DXL24: USG Interiors, 'Donn DX/DXL24 for main runner, with DX-216, 416, 424, or 524 cross runners, "Intermediate Duty".

2.2 COMPONENTS

A. General: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
1. Mounting Method for Measuring Noise Reduction Coefficient (NRC): Type E-400 (plenum mounting in which face of test specimen is 15-3/4 inches away from the test surface) per ASTM E795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
1. ✓ Acoustical Panel: USG Millenia® ClimaPlus™; Illusion Two/24 Panels; Item No. 78780
   a. ASTM E1264, Type III, Form 1 or 2, Pattern G.
   b. Material: Mineral fiber.
   c. Surface Texture: Smooth texture.
   d. Surface Finish: White.
   e. Size: 24 inches by 48 inches.
   f. Thickness: 3/4 inch.
   g. Density: 1.04 pounds per square foot.
   h. Edge Profile: SLT Reveal, beveled edge for lay-in.
   i. Noise Reduction Coefficient: 0.70.
   j. Ceiling Attenuation Class: 35.
   k. Flame Spread: ASTM E1264; Class A; Flame spread 25; Smoke developed 25; (UL labeled).
   l. Light Reflectance: 85 percent.
   m. Recycled Content: 80 percent.
   n. Durability: Washable, Impact-Resistant, Scratch-Resistant, Soil-Resistant."

2.3 CEILING SUSPENSION SYSTEM

A. Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16 inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
1. Structural Classification: ASTM C 635, Heavy Duty.
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise

3 Acceptable Product: USG Donn/DX.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, prestretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
1 Perimeter wall molding: Minimum 2 inch flange.

E. Accessories:
1. Light Fixture Protection and Hold Down Clips: Provide light fixture protection panels, fasteners and hold down clips as required by UL listing; manufacturer's standard types.
2. Stabilizer bars, furring clips, splices, edge moldings, and seismic compression posts as required for suspended grid system.

F Finish: Baked enamel finish on exposed surfaces. Flame spread: 76-200.

G Carrying Channels and Hangers: Of black steel; size and type to suit application, seismic requirements, ceiling system flatness requirements, and to rigidly secure the complete acoustic unit ceilings with maximum deflection of 1/360.

H. Hanger Wires and Brace Wires: Size and location as specified and noted on drawings.

I. Hold Down Clips: Manufacturer's standard, use at all 24 by 24 inch acoustical panels.

J Compression Struts: "Donn Compression Posts" manufactured by USG Interiors, Inc. Alternate Manufacturers: No known equal.

2.4 ACOUSTICAL SEALANT

A. As recommended by acoustical material manufacturer, for application shown.

2.5 METAL SUSPENSION SYSTEMS

A. Provide 12 gauge minimum hanger wires for use up to and including 4 feet by 4 feet grid spacing along main runners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify layout of hangers will not interfere with other work.

B. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage.

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

3.2 PREPARATION

A. Environmental Requirements: Maintain temperature approximating operational conditions, before, during and after installation; humidity not more than 70 percent.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other Sections.

C. Measure each ceiling area and establish the layout of acoustical panel to balance border widths at opposite edges of each ceiling. Avoid using less than half width units at borders, and conform to the layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

B. Lay-In Grid Suspension System:

1. Complying with IR M-3: Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members should be at least 1/2 inch free of other walls. Provide sets of four 12 ga. splayed bracing wires oriented 90 degrees from each other at the following spacing or 12 feet on center each way. Splices in bracing wire and vertical hanger wire will not be permitted unless specifically approved by Architect. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduits, etc. It is acceptable to attach lightweight items such as single electrical conduit not exceeding 3/4 inch nominal diameter to hanger wires using connectors acceptable to Architect. Attach all light fixtures to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Flush or recessed light fixtures and air terminals or services weighing less than 56 pounds may be supported directly on the runners of a heavy duty grid system but, in addition, they must have a minimum of two 12 ga. slack safety wires attached to the fixture at diagonal corners and anchored to the structure above.

2. 12 ga. (min.) hanger wires may be used for up to and including 4'x4' grid spacing along main runners.

3. Provide 12 ga. hanger wires at the ends of all main and cross runners within 8 inches from the support or within 1/4 of the length of the end tee whichever is least, for the perimeter of the ceiling area. End connections for runners which are designed and detailed to resist the applied horizontal forces may be used in lieu of the 12 ga. hanger wires subject to Architect's review and approval. Tie together ends of main beams and cross tees to prevent their spreading.

4. Provide trapeze or other supplementary support members at obstructions to main hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.

5. Ceiling grid members may be attached to not more than 2 adjacent walls; opposite walls must have a 3/4 inch clearance. Ceiling grid members should be at least 3/4 inch free of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free and a minimum of 3/4 inch clear of wall.

6. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a 16 ga. wire with a positive mechanical connection to the runner may be used. Where the perpendicular distance from the

wall to the first parallel runner is 12 inches or less, this interlock is not required.

7. Provide sets of four 12 ga splayed bracing wires oriented 90 degrees from each other at the following spacing: offsets.
   a. Place sets of bracing wires at a spacing not more than 12 feet by 12 feet on center.
   b. Provide bracing wires at locations not more than 1/2 the spacing given in "a" above from each perimeter wall and at the edge of vertical ceiling offsets.
   c. Provide a compression strut, steel section with L/R ratio of 200 maximum at each set of splayed wires, attach to main runner with 1/2 inch diameter machine bolt and to structure with #12 x 4 inch long. Compression strut shall not replace hanger wire

The slope of these wires should not exceed 45 degrees from the plane of the ceiling and should be taut without causing the ceiling to lift. Splices in bracing wires are not to be permitted without special Architect's approval.

8. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires wit" 4 tight turns. Make all tight turns within a distance of 1-1/2 inches. Hanger 01 bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire. Note: Wire turns made by machine where both strands have been deformed or bent if wrapping can waive the 1-1/2 inch requirement, but the number of turns should be maintained, and be as tight as possible.

9. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4 inch nominal diameter, to hanger wires using connectors acceptable to Architect.

10. Compression Struts: Install as shown.

11. Attach all light fixtures to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures.

12. Flush or recessed light fixtures and air terminals or services weighing less than 56 pounds may be supported directly on the runners of a heavy duty grid system but, in addition, they must have minimum of two 12 ga. slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. All 4 ft by 4 ft. light fixtures must have slack safety wires at each corner.
    a. All flush or recessed light fixtures and air terminals or services weighing 56 pounds or more must be independently supported by not less than 4 taut 12 ga wires each attached to the fixture and to the structure above regardless of the type of ceiling grid system used.
    b. The 4 taut 12 ga. wires including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.

13. All fixtures and air terminals or services supported on intermediate duty grid systems must be independently supported by not less than 4 taut 12 ga. wires each attached to the fixture or terminal and to the structure above.

14. Support surface mounted light fixtures by at least two positive devices which surround the ceiling runner and which are each supported from the structure above by a 12 ga. wire. Spring clips or clamps that connect only to the runner are not acceptable.
    a. Provide additional supports when light fixtures are 8 feet or longer.

15. Support pendant mounted light fixtures directly from the structure above with hanger wires or cable passing through each pendant hanger and capable of supporting 4 times the weight of the fixture. Provide 4 splayed bracing wires as specified in Paragraph B 7 above at each pendant hanger at the plane of the ceiling.

16 Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

17. Ceiling areas over 1000 SF must have horizontal restraint wire or rigid bracing.

18. Ceiling areas over 2500 SF must have seismic separation joints or full height partitions.

19. Ceilings without rigid bracing must have 2-inch oversized trim rings for sprinklers and other penetrations.

20. Changes in ceiling plane must have positive bracing

21. Cable trays and electrical conduits must be independently supported and braced.

B. Acoustical Panels: Install acoustical panels in coordination with suspension system. Place splines or suspension system flanges into kerfed edges so that panel-to-panel joints are closed by double lap of material.
1. Fit adjoining panel to form flush, tight joints. Scribe and cut panel for accurate fit at borders and around penetrations through panel.
2. Hold panel field in compression by inserting leaf-type, spring-steel spacers between panel and moldings, spaced at 12 inches on center.
3. Ceiling installer shall protect lighting fixtures and air ducts to comply with requirements indicated for fire resistance rated assembly.
4. Install hold-down clips within 20 feet of exterior doors to retain panels tight to grid system.

C Edge Moldings and Trim: Unless otherwise noted, install edge moldings and trim of type indicated at perimeter of acoustical panel ceiling area and where necessary to conceal edges of acoustical units.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not over 16 inches on center and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8-inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

3.4 ADJUSTMENT

A. General: Adjust sags or twists which develop in ceiling systems; replace improperly installed or damaged suspension system components and acoustical panels, as directed by the Architect.

3.5 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.6 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. General: Upon completion, thoroughly clean exposed surfaces per manufacturer's instructions.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

School Specialty
MANSFIELD, OH
831-801-5521
SUBMITTAL #25

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:
1. Slip Resistant Sheet Vinyl Safety Flooring.
2. Resilient base.
3. Installation accessories.
4. Calcium chloride concrete moisture testing.

B. Related Sections:
1. Section 03 30 00 - Cast-in-Place Concrete
2. Section 07 26 00 - Concrete Vapor Control Barrier: Moisture Remediation.

1.2 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. ADAAG - Americans with Disabilities Act (ADA):
1. Accessibility Guidelines for Buildings and Facilities.

C. ASTM International:
1. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
2. ASTM E 648/NFPA 253 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
3. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
4. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
5. ASTM F 970 - Standard Test Method for Static Load Limit.
6. ASTM F1482 - Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring.
7. ASTM F1861 - Wall Base: Rubber and Vinyl Plastic.
8. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
9. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing.
10. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

D. Resilient Floor Covering Institute (RFCI)
1. RFCI Standard Slab Moisture Test Method (Calcium Chloride Method).

E. Bay Area Air Quality Management District: www.baaqmd.gov
1. BAAQMD 8-51 – Regulation 8, Rule 51 – Adhesive and Sealant Products.

F. Calcium Chloride Test developed by the Rubber Manufacturer's Association.

G. CCR - California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

H. Federal Specifications:
1 FS RR-T-650 – Treads, Metallic and Non-metallic, Non-skid.
2. FS SS-T-312b – Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.

I. International Standards Organization:
1. ISO 9001: 2000 Certification.
2. ISO 14001: 2004 Certification.

J. National Fire Protection Association:
1. NFPA 253 – Test Method for Critical Radiant Flux of floor covering Systems Usng a Radiant Energy Source.
2. NFPA 258 – Recommended Practice for Determining Smoke Generation of Solid Materials.

K. South Coast Air Quality Management District:
SCAQMD Rule 1168 - Adhesive and Sealant Applications.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide slip resistant sheet vinyl safety flooring which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals

B. Product Data: Submit manufacturer's current printed product literature, specifications, installation instructions, and field reports.

C. Shop Drawings: Submit shop drawings to indicate materials, details, and accessories, including but limited to the following:
1. Submit a cut diagram indicating seam locations and roll direction. Use mitered seam layouts for corners when changing directions 180 degrees (e.g. when running material down corridors which bisect at a right angle), unless approved otherwise.

D. Samples: Submit duplicate 12 inch x 12 inch sample pieces of sheet material, and 12 inch long sample pieces of rubber base.

E. Quality Assurance Submittals: Submit the following:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
2. Manufacturer's Instructions: Current published manufacturer's installation and maintenance instructions.
3. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Contract Closeout: Closeout procedures.

B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing. Include precautions against cleaning materials and methods detrimental to finishes and performance.

C. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
1 Training: Installer who has attended an Altro safety flooring installation training clinic.

B. Regulatory Requirements: Provide slip resistant sheet vinyl safety flooring in compliance with the following:
1 Americans with Disabilities Act Architectural Guidelines (ADAAG).
2. Occupational Safety & Health Administration (OSHA).

1.7 MOCKUP

A. Install at project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standards.

B. Construct mockup, 10 feet by 10 feet.

C. Locate where directed by Architect.

D. Upon approval, this test installation shall then be considered the standard of quality and basis of comparison for the balance of the project.

E. Maintain mock-up during construction period for workmanship comparison; remove and legally dispose of mock-up when no longer required; OR

F. Incorporate accepted mockup as part of Work, upon Owner's approval.

G. Areas found to be deficient by specification standards or application procedures shall be repaired/replaced at contractor's expense.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings.

B. Convene minimum one week prior to commencing work of this section.

C. Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.9 DELIVERY, STORAGE & HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver, store and handle resilient flooring materials in accordance with Section 01 60 00 - Product Requirements

C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

E. Store rolls in dry locations. Stand rolls on end. Protect and secure rolls from falling.

1.10 WASTE MANAGEMENT AND DISPOSAL

A. Deposit all packaging materials in appropriate container on site for recycling or reuse.

B. Avoid using landfill waste disposal procedures when recycling facilities are available.

C. Keep all discarded packaging away from children.

1.11 PROJECT CONDITIONS

A. Temperature Requirements: If storage temperature is below 65 degrees F, the Altro safety flooring product must be moved to a warmer place and allowed to reach this temperature before unrolling or installation. The room temperature must not be below 65 degrees F and the floor temperature 50 degrees F. For further information, refer to current Installation Guide.

B. Maintain air temperature and structural base temperature at flooring installation area between 65 degrees F and 80 degrees F for 48 hours before, during and 24 hours after installation.

1.12 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

C. Warranty Period for Altro Maxis Suprema shall be 7 years commencing on Date of Substantial Completion.

1.13 EXTRA MATERIALS

A. Section 01 77 00 – Contract Closeout: Spare parts and maintenance products.

B. Extra Materials: Deliver to owner extra materials from same production run as Products installed. Package products with protective covering and identify with descriptive labels.
   1. Quantity: Furnish 25 square feet of flooring and 10 LF of base of each type and color specified.
   2. Delivery, storage and protection: Comply with owner's requirements for delivery, storage and protection of extra materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer:
   1. Altro. 467 Forbes Boulevard, South San Francisco CA 94080 Toll-free: 800.941.1696 Tel: 650.941.1696 Fax: 650 941 2961.; E-mail: info@altrofloors.com Web Site: www.altrofloors.com.
   2. Substitutions: Not permitted. Alto is District Standard.

2.2 SAFETY FLOORING

A. Slip Resistant Sheet Vinyl: To ASTM F1303, Type 2, Grade 1, sheet vinyl flooring with moisture resistant backing Class A. Static coefficient of slip resistance in excess of 0 6 when tested in accordance with ASTM D2047, AltroSan™ integrated bacteriostat

B. ✓ Acceptable material: Altro Maxis Suprema (measurements and product weights given below are approximate):
1. Thickness: 0.08 inch (2 0 mm).
2. Roll Width: 6' - 7" (2 m).
3. Roll Length: 66 feet (20 m).
4. Roll Weight: 220 lb
5. Slip Resistance (Dry): 0.6.
6. Color: SU2019 "Ull". ✓ NEVER CHANGED TO MINERVA

2.3 RESILIENT BASE

A. ✓ Manufacturers:
1. Burke Mercer.
2. Substitutions: Not permitted. Burke is District standard.

B. Base: ASTM F1861, Group 1 rubber; Type TS (vulcanized thermoset rubber) Style B (coved) as shown on drawings; top set.
1. Height: 4 inch.
2. Thickness: 0 125 thick.
3. Finish: Matte
4. Length: Roll
5. Accessories: Premolded external corners, internal corners, and end stops
6. Color: 523 – Black Brown

2.4 EDGING STRIPS

A. General: Specified products are manufactured by BurkeMercer Products Co., Inc ; color as selected by Architect.

B. Alternate Manufacturer: Comparable products manufactured by the Johnsonite Division of Duramax, Inc., or accepted equal.

C. Resilient Flooring to Carpet: Model No. 152 or Model 710

D. Resilient Flooring to Concrete: Model No. 170.

E. Resilient Flooring to Ceramic Tile Transition: Model No. 365 Cerco Edge T, with No. 970/980/990 Track.

F. Ceramic Tile to Carpet: Model No. 150 Tile-Carpet Joiner

G. Tile Reducer: Model No. 633 Tile Reducer.

2.5 ACCESSORIES

A. Vinyl welding rod: Acceptable material:
1. Altro weld rod

B. Gulley edge: Acceptable material, vinyl, sized to suit application:
1. Altro Gulley Edge GE 35/25, GE 35RE, GE 25RE.

C. Joint cover strip: Acceptable material, vinyl, sized to suit application:
1. Altro Joint Cover Strip EJC75/20, EJC50/20, EJC75/32

D. Acrylic Adhesive: For dry areas with no spillage, use Ecofix, a one-part, water-based, acrylic adhesive as recommended by manufacturer.

E. Polyurethane Adhesive: For areas subjected to spillage, extreme temperature changes or heavy rolling loads, use Altrofix 30 or 300, a two-part resin-based polyurethane adhesive

F. Subfloor Filler and Leveler: Use only gray Portland cement-based underlayments, and patching compounds. Use for filling cracks, holes or leveling. White gypsum materials are not acceptable. Contact Altro for more information and recommendations.

G. Metal edge strips:
1. Aluminum extruded, smooth, mill finish, with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

2.6 SOURCE QUALITY

A. Source Quality: Obtain safety flooring products from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 EXAMINATION

A. 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 SUBFLOOR PREPARATION

A. Remove ridges and bumps.

B. Apply subfloor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure. Never install Altro flooring over gypsum-based toppings, underlayments, leveling or patching compounds.

C. Meet ASTM F710 Standard for Concrete or other monolithic floors.

D. Prepare and seal porous and powdery concrete surfaces in accordance with flooring manufacturer's written instructions.

E. Ensure concrete slopes to drains and other floor sinks.

F. Remove dust, old adhesive, paint, dirt, wax, sealer and foreign matter from existing surfaces.

3.4 PREPARATION

A. Safety flooring shall be installed over concrete subfloors conforming to ASTM F710.

B. Maintain air temperature and structural base temperature at flooring installation area between 65 degrees F and 80 degrees F for 48 hours before, during and 24 hours after installation.

C. Perform moisture tests on concrete floors regardless of the age or grade level. Verify concrete substrate is dry in accordance with the RFCI Industry Standards Slab Moisture Test Method (Calcium Chloride Method), in strict accordance with instructions.

D. Perform moisture condition test in each major area. A minimum of 1 test per 1000 sq ft, prior to installation. Moisture emissions from concrete subfloors must not exceed 3 lbs per 1000 sf per 24 hours for acrylic adhesive and 5lbs for polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869). If subfloor moisture exceeds the allowable maximum for installing Altro flooring, please call your local Altro distributor for advice

E. Conduct moisture tests around room perimeter, at columns and where moisture may be evident.

F. Conduct relative humidity testing per ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Slab Using in situ Probes:
1. This test method covers the quantitative determination of percent relative humidity in concrete slabs for field or laboratory test.
2. Conduct one test for every 1,000 square feet (minimum 3 tests) to ensure concrete does not exceed 85 percent internal relative humidity.

G. Perform alkalinity testing per ASTM F710 to ensure pH levels of concrete subfloor surface do not exceed pH 9.9. Concrete must be neutralized if above pH 9 9.

H. General Contractor shall be responsible for insuring independent inspection of items 3.4.C, 3.4.D, 3 4 E, 3.4.F, and 3.4 G 1, 2 above. Contractor shall verify in writing to the Owner, Architect, and subcontractor, a minimum of thirty (30) days prior to scheduled resilient flooring installation, the following substrate conditions: Reference Section 01 45 23.

I. Contingency for High Moisture Readings: If at the time of testing the moisture readings are in excess of manufacturer's recommendations, the Contractor shall proceed with application of concrete vapor control barrier as specified in Section 07 26 00.

J. Moisture Remediation: Basic Steps as follows:
1. Removal of all floor coverings, adhesive residue, curing compounds, parting compounds or other surface contaminants by mechanical means (shot-blasting, or other suitable method).
2. Identification and treatment of all cracks and joints, by the sealer manufacturer's approved methods.
3. Application of the sealer (Must be a product designed and warranted for the purpose of controlling excessive concrete moisture vapor emission and the alkali it may carry).
4. Application of a sacrificial cementitious topping to act as a substrate for the installation of resilient floor coverings

K. Do not proceed with work until results of moisture condition and/or pH tests are acceptable.

L. Underlayment and Patching Compounds: Use only grey colored Portland cement based underlayments; patching compounds are used for filling cracks, holes and leveling. White gypsum materials are not acceptable

3.5 INSTALLATION – SAFETY FLOORING

A. Safety Flooring Installation: Install Altro safety flooring in accordance with the current published Altro Installation Guide. Seams shall be heat welded with Altro Weldrod™ only. Failure to install Altro safety flooring in accordance with recommended procedures will void the Altro Limited Product Warranty.

B. Drains: Fit Altro safety flooring and mechanically fasten to drain outlets to ensure a permanent, watertight installation.
   1. New Round Drains: Install round flash clamping ring type drains to accommodate Altro safety flooring. Install drains to fit flush with surrounding floor surface. Acceptable drain manufacturers and drain types include Wade FC-1100. Please refer to Altro's current Installation Guide for approved drain manufacturers and styles.
   2. Existing Drains: When existing drains are to be used, provide mechanically fastened stainless steel drain rings over all round drain outlets. Fit rings over slip resistant sheet vinyl safety flooring and permit inside diameter that will allow clean out plate to be removed after installation. Drill into concrete to accommodate lead or plastic anchors. Screw drain rings to create a tight seal with beveled head stainless steel screws.
   3. Square and Rectangular Drains and Floor Sinks: Install Altro Gully Edge GE25RE or GE35RE around perimeter of drain which has been set in concrete in accordance with Altro Installation Guide. Do not use Altro Gully Edge around drains set in wood floors. Provide stainless steel strips, mechanically fastened with stainless steel screws. Use stainless steel strips in other areas where it is not practical to use Altro Gully Edge.

C. Coved Installation: Where Altro safety flooring is coved up wall surfaces and other abutments, installation shall be in accordance with Altro safety flooring Installation Guide using the following accessories:
   1. Top set cove base: Install in accordance with manufacturer's instructions.
   2. Reducer strip - Reducer strip GE25RE/GE35RE where Altro safety flooring will not adjoin other materials or surfaces.

3.6 INSTALLATION - BASE

A Fit joints tight and make vertical. Maintain minimum measurement of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

D. Install base on solid backing. Bond tight to wall and floor surfaces.

E. Scribe and fit to door frames and other interruptions.

F. Install base at casework where occurs in rooms scheduled for rubber base.

3.7 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
   1. Site Visits: Minimum of one site visit of two hour duration.

3.8 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Cleaning: Remove temporary coverings and protection of adjacent work areas.
   1. Repair or replace damaged installed products.
   2. Clean installed products in accordance with manufacturer's instructions prior to

Owner's acceptance.

3. Remove construction debris from project site and legally dispose of debris.

3.9 PROTECTION

A Cover and protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting.

B Protection:

1. Protect the newly installed flooring from foot traffic for 24 hours and heavy rolling traffic for 72 hours.
2. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 09 68 16

SHEET CARPETING

SCHOOL SPECIALTY
MANFIELD, OH
831-801-5521
SUBMITTAL #25

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes carpet direct glued to substrate; carpet; and accessories

B. Related Sections:
1. Section 09 65 00 – Resilient Flooring: Base finish.
2. Section 26 01 00 – Basic Materials and Methods: Electrical floor cover plate with recess for carpet.
3. Section 09 65 00 – Resilient Flooring: Termination edging of adjacent floor finish.

1.2 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC):
1. AATCC 16 – Test Method for Colorfastness to Light
2. ATCC 134 – Test Method for Electrostatic Propensity of Carpets.

B. ASTM International:
1. ASTM C1028 – Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
2. ASTM D1335 – Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
2. ASTM D1667 – Standard Specification for Flexible Cellular Materials – Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
3. ASTM D3936 – Standard Test Method for Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering.
4. ASTM D5116 – Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.
5. ASTM D5417 – Standard Practice for Operation of the Vetterman Drum Tester.
6. ASTM E648 – Test Method for Critical Radiant Flux of Floor Covering Systems using a Radiant Heat Energy Source.
7. ASTM E662 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

C. Consumer Products Safety Commission:
1. CPSC FF 1-70
2. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.

D. National Fire Protection Association:
1. NFPA 253 – Standard Method of Test for Critical Radiant Flux for Floor Covering Systems Using a Radiant Heat Energy Source.
2. NFPA 258 – Standard Method of Test for Smoke Density

E. South Coast Air Quality Management District:
1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate the extent of carpet, seam direction of carpet, and accessories. Indicate columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet. Copy of approved shop drawings to be available on job site during installation.

C. Carpet schedule using same room designations indicated on drawings.

D. Product Data: Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colors available, and method of installation.

E. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial color selection.

F. Verification Samples: Submit two 18" x 18" samples illustrating color and pattern for each carpet material specified.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Warranty.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Closeout procedures.

B. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

1.5 QUALIFICATIONS

A. Manufacturer:
1. Company specializing in manufacturing specified carpet/backing with minimum 5 years documented experience.
2. Upon request, manufacturer to provide representative to assist in project start-up and to inspect installation while in process and upon completion. Representative will notify designated contact if any installation instructions are not followed.
3. Single Source Responsibility: Obtain each type of carpet from one source and by a single manufacturer.

B. Installer:
1. Flooring contractor must be certified by the carpet manufacturer prior to bid.
2. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have prior experience in the installation of these types of materials.
3. Flooring contractor possessing Contract for the carpet installation shall not sub-contract the labor without written approval of the Project Manager.
4. Flooring contractor will be responsible for proper product installation, including floor testing and preparation as specified by the carpet manufacturer and PROJECT CONDITIONS herein.
5. Flooring contractor to provide Owner a written installation warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of one year after job completion.

1.6 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.

B. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65 percent. Protect from damage and soiling. Stack carpet rolls horizontally on a flat surface, stacked no higher than two rolls.

C. Make stored materials available for inspection by the Owner's representative.

D Store materials in area of installation for minimum period of 48 hours prior to installation.

1.8 PROJECT CONDITIONS

A. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and Manufacturer's installation instructions

B. The maximum permissible amount of water vapor emission from the floor is 3.0 pounds per 1,000 square feet in 24 hours. The acceptable pH level of the substrate is between 7.0 and 9.0. Flooring contractor is responsible for floor testing.

C All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid.

D Maintain minimum 65 degrees F ambient temperature and 65 percent Relative Humidity for 72 hours prior to, during, and 48 hours after installation.

E. Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.9 EXTRA MATERIALS

A. Provide additional 3 percent of each type, color, and pattern furnished; product to be rolled and bound. Coordinate storage location with owner.

B. Deliver all unused carpet and large scraps to Owner for "attic stock." Dispose of scraps less that 2 square foot in area or less than 8 inches in width.

1.10 WARRANTY

A Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Warranty to be sole source responsibility of the Manufacturer. Second source warranties and warranties that involve parties other than the carpet manufacturer are unacceptable

C. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.

D. Chair Pads are not required for carpet warranty coverage.

E. Warranty shall not exclude carpet product installed on stairs provided it is properly installed and maintained.

F. Warranty shall be for a minimum non-prorated period of twenty-five years and shall cover against
1. Excessive Surface Wear: More than 15 percent loss of pile fiber weight
2. Excessive Static Electricity: More than 3 0 kV per AATCC 134.
3. Resiliency Loss of the Backing: More than 10 percent loss of backing resiliency.
4. Delamination
5. Edge Ravel.
6. Zippering.

G. Tuft Bind warranty in lieu of edge ravel and zippering is not acceptable.

H. Provide certification and warranty that product is fully or partially recyclable through manufacturer's or aligned partner's recycling program. Include information regarding what portions of the product will be recycled into other recyclable/non-recyclable products, down-cycled, landfilled, and/or incinerated.

PART 2 – PRODUCTS

2.1 CARPET

A. Manufacturers:
1. Collins & Aikman Floorcoverings.
2. Substitutions: Not permitted. Specified product is District Standard.

2.2 FIBER

A. Nylon Fiber: Bulked Continuous Filament Type 6,6 Nylon.

B. Mill-extruded fibers are not allowed.

C. Blends of Solutia fibers are not allowed. Solutia LXI fibers alone are not allowed.

D. Durable stain inhibitor should be applied to the fiber during product manufacturing to resist fiber staining and soiling. Minimum average of three fluorine analyses of a single composite sample per CRI TM-102: 500 ppm.

E. Fiber to contain carbon-core filament for permanent static control. Topical treatments not allowed.

2.3 BACKING CHARACTERISTICS

A. Thermoplastic vinyl composite.

B. Primary Backing: Synthetic Non-Woven.

C. Pre-Coat (Fusion Coat): Sealant Vinyl

D. Secondary Backing: Closed-Cell, Vinyl Cushion backing system
1. Density (ASTM D-1667): 18.5 lbs/cu ft +/- 5%.
2. Compression Set (ASTM D-1667): Max 10%
3. Compression Deflection (ASTM D-1667): Min. 7 psi @ 25%; Max. 25 psi @ 25%
4 Impermeable to moisture and airflow.
5 Provide for a chemically welded seam that is also impermeable to moisture and airflow.
6 6 feet Width Roll Goods

E. Product to be installed with a mill-applied releasable "dry" adhesive system to securely attach product to sub-floor in compliance with ADA guidelines (Section 4 5.3) if available from Manufacturer. Free-lay, grid system, and stretch-in installations not allowed.

2.4 PERFORMANCE CHARACTERISTICS

A Test reports for the following performance assurance testing to be submitted upon request. Submitted results shall represent average results for production goods of the referenced style.

B. Requirements listed below must be met by all products.

1. Flooring Radiant Panel:
ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)

2 Federal Flammability:
CPSC FF 1-70: Passes.

3 Smoke Density:
ASTM E-662 / NFPA 258: < 450 Flaming Mode.

4. Electrostatic Propensity:
AATCC 134 (Step & Scuff): 3.0 kV or less.

5. Static Coefficient of Friction:
ASTM C-1028: Passes ADA Guidelines for Accessible Routes (Minimum 0.60).

6. Delamination of Secondary Backing of Pile Floor Coverings:
ASTM D-3936: No Delamination.

7 Lightfastness:
AATCC 16E: > 4 at 100 hours.

8. Vetterman Drum:
ASTM D-5417: Minimum 3 at 22,000 cycles.

9 Moisture Barrier:
Moisture Penetration by Impact at 10 psi: No Penetration of backing and seam after 10,000 impacts.

10. Air Flow Barrier:
Air Permeability of Textile Fabrics: No Air Flow (0.0 ft^3/min) through backing and seam.

11 Seam Integrity:
Seam to remain intact after 50,000 cycles per Phillips Chair Test.

12 VOC Chamber Testing:
ASTM D-5116: Product inclusive of "dry" adhesive system meets criteria established by the State of Washington Indoor Air Quality Specification for Carpet and/or Carpet & Rug Institute's (CRI) Indoor Air Quality Carpet Testing Program. If "dry" adhesive (2.02E) not available from manufacturer and "wet" adhesive is used to install the product, carpet and adhesive to meet CRI's Green Label requirements.

2.5 MANUFACTURING SPECIFICATIONS

A. Style: Odyssey Vinyl Cushion RS/ (Vinyl Cushion) - Mark I

1.	Color:	14520 – Ganymede
2.	Construction:	Loop
3.	Gauge:	1/13 inch
4.	Pile Units per Inch:	8.4
5.	Pile Height Average	0.117 inch
6.	Pile Yarn Weight	20.0 oz/sq yd
7.	Density Factor	10,000
8.	Yarn Size	1245/2
9.	Fiber System	75% TDX SDN 25% TDX Nylon with Static Control and Ensure
10.	Interliner	Spun Synthetic
11.	Powerbond Backing System	6 ft
	▪ Fusion Coat	Sealant Vinyl
	▪ Backing	Closed cell vinyl cushion
	▪ Weight	35.5 oz/sq yd
	▪ Density	18.5 lbs/cu ft
	▪ Thickness	0.156 inch
12.	Total Weight	81.0 oz/sq yd +/- 5 percent
13.	Electrostatic Propensity	1.4 K.V. or lower
14.	Flooring Radiant Panel Test	Mean average critical radiant flux: 0.45 w/sq cm or higher
15.	Smoke Density	Flaming: Mean average: 450 or lower
16.	Flammability	Passes
17.	Warranties	25 year wear, delamination, edge ravel, static, zippering, loss of resiliency

2.6 ACCESSORIES

A. Materials recommended by Manufacturer for patching, priming, chemically welding the seams, etc.

B Adhesives: Products to be supplied with a pre-cured, mill-applied or other "dry" adhesive system (2.02E) when available. Otherwise, adhesive should be full spread, extremely low VOC in compliance with CRI Indoor Air Quality Adhesive Testing Program requirements, compatible with materials being adhered, as recommended by the Manufacturer.

C Base, Carpet Edge, and Transition Strips: As specified in Section 09 65 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor is smooth and flat within specified tolerances and ready to receive carpet.

B. Verify that substrate surface is dust-free and free of substances that would impair bonding of product to the floor.

C. Verify that concrete surfaces are ready for installation by conducting moisture and pH testing. Results must be within limits recommended by Manufacturer.

D. There will be no exceptions to the provisions stated in the Manufacturer's installation instructions.

3.2 PREPARATION

A. Prepare sub-floor to comply with criteria established in Manufacturer's installation instructions. Use only preparation materials that are acceptable to the Manufacturer.
   1. Remove all deleterious substances from substrate(s) that would interfere with or be harmful to the installation. (i.e. floor wax)
   2. Remove sub-floor ridges and bumps. Fill cracks, joints, holes, and other defects.

3.3 INSTALLATION - GENERAL

A. Install product in accordance with Manufacturer's installation instructions.

B. Verify carpet match before cutting to ensure minimal variation between dye lots.

C. Layout carpet and locate seams in accordance with shop drawings.
   1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic. Minimize cross seams.
   2. Do not locate seams perpendicular through door openings.
   3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
   4. Locate change of color or pattern between rooms under door centerline.
   5. Provide monolithic color, pattern, and texture match within any one area.
   6. Check pattern repeat, if any, for matching during installation and possible waste factors in ordering required amounts.

D. Install carpet tight and flat on sub-floor, well-fastened at edges, with a uniform appearance.

E. Double-cut carpet seams with accurate pattern match. Make cuts straight, true, and unfrayed.

F. Chemically weld all seams with manufacturer's recommended seam sealer as stated in installation instructions. Make sure the seam is fully sealed.

G. Roll with appropriate roller for complete contact of carpet with mill-applied adhesive to sub-floor.

H. Trim carpet neatly at walls and around interruptions.

I. Completed carpet is to be smooth and free of bubbles, puckers, and other defects.

3.4 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Remove excess adhesive and/or seam sealer from floor and wall surfaces without damage.

C. Remove all rubbish, wrappings, debris, trimmings, etc. from site and dispose of properly.

D. Clean and vacuum carpet surfaces using a beater brush/bar commercial vacuum.

3.5 PROTECTION

A. After each area of carpet is installed, protect from soiling and damage by other trades

END OF SECTION

SECTION 09 84 00

ACOUSTICAL WALL TREATMENT

T3 INC.
FREMONT, CA
510 440-0157
SUBMITTAL # 24

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following types of panels as shown of drawings:
   1. Acoustical wall panels.
   2. Acoustical ceiling panels.
   3. Required exposed trim and support channels

1.2 REFERENCES

A. ASTM International:
   1. ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   2. ASTM E84 – Standard Test method for Surface Burning Characteristics of Building Materials.
   3. ASTM E1264 – Standard Classification for Acoustical Ceiling Products.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate schedule of sizes; interior elevations and reflected ceiling plans showing showing how panels are to laid out, details of trim members, and width of panels. Width of panels and vertical seams are critical.

C. Product Data: Manufacturer's technical data for each type of panel and baffle including fire-resistive characteristics, finishes, and details of installation.

D. Samples: Submit 2 samples minimum 8 inch by 8 inch in size, of each type of acoustical panel as shown on drawings. Submit 2 fabric selector cards from manufacturer's standard finishes, or designer specified finishes. Submit minimum 4 inch long samples of attachment method, including trim.

E. Certifications: Submit manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

F. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Requirements for submittals.

B. Operating and Maintenance Manual, including cleaning and maintenance instructions.

C. Material Safety Data Sheets (MSDS).

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical wall panel units and trim components by a single manufacturer

B. Fire Performance Characteristics: Indentify acoustical wall panels with appropriate markings of applicable testing and inspecting organization

1 Surface Burning Characteristics: As follows per ASTM E84 and complying with ASTM E1264 for Class A Products:

a. Flame Spread: 25 or less.

b. Smoke Developed: 50 or less.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETING

A. Section 01 31 19 – Project Meetings: Pre-installation meeting

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B Deliver materials in manufacturer's unopened packages; suitably store to protect against exposure to moisture, sunlight, surface contamination, and other unacceptable conditions.

C Prior to their installation, allow acoustical panel units to reach room temperature and have a stabilized moisture content within the acoustical panel unit manufacturer's recommended limitations.

D. Handle components to prevent panel edge damage or any other damage to components.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements: Environmental conditions affecting products on site.

B. Do not install when humidity or temperature conditions do not meet manufacturer's recommendations for installation.

C. Building shall be properly enclosed and under standard occupancy conditions (temperature of 60-85 degrees F and not more than 70 percent relative humidity) before installation begins.

1.10 FIELD MEASUREMENTS

A Verify field measurements prior to fabrication.

1.11 COORDINATION

A Coordinate acoustical wall panel work with installers of related work including, but not necessarily limited to, building insulation, gypsum drywall, finish carpentry, acoustical ceiling systems, mechanical systems, and electrical systems.

1.12 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Furnish manufacturer's 10 year warranty against warping and delamination of the wall material as a direct result of defects in material or factory workmanship. The warranty does not extend to any failure or defect of any adhesive or other component of any attachment system or accessory used in the installation of the product.

PART 2 - PRODUCTS

2.1 ACOUSTICAL WALL PANELS

A. Manufacturers:
1. Armstrong World Industries, Inc ; www.armstrong.com
2. illbruck Architectural Products, Inc ; www.illbruck-archprod.com.
3. USG; www.usg.com
4. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 COMPONENTS

A. Wall Acoustic Treatment: Armstrong Optima Acoustical Wall Panel, Item #3154 ✓ + ITEM #3152 (2x2)
1. Surface Texture: Smooth.
2. Composition: Fiberglass
3. Color: White.
4. Size: 48 inches x 96 inches x 1 inch.
5. Edge Profile: Square cut edge.
6. Noise Reduction Coefficient (NRC) :
   a. D mounting (On nominal 1x3 furring strips) – Optima (0 90).
7. Composite Flame Spread: Class A
8. Trim Accessories:
   1. "H" Channel, 1-5/8 inches x 8 feet x 1 inch, Item #3108. ✓
   2. "C" Channel, 1 inch x 8 feet x 1 inch, Item #3107.

B. Waffle Coffer Acoustic Treatment: Combination of Armstrong Optima 1-inch smooth faced glass fiberboard with Owens Corning 703 unfinished glass fiberboard.
1. Unfaced Fiberglass Panels (used with smooth-faced panel): Owens Corning 703.
   a. Density 3 lbs per cubic foot.
   b. Thickness: 2 inches.
   c. Accessories: Stick-clips with white protective caps and using 3M 77N contact adhesive.

2.3 ACCESSORIES

A. Adhesive: Non-toxic, water-based adhesive, for use with foam products
1. 3M 77N contact adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Examine substrate surfaces and conditions and verify their acceptance prior to installation of acoustical panels.

C. Do no proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prior to installing acoustical panels, make certain that surfaces to which adhesive will be applied are clean and free of dust, dirt, and other residues that would inhibit a proper bond.

3.3 INSTALLATION

A General Installation:

1. Coordinate with mechanical and electrical installers in locating and spacing fixtures, diffusers, and similar items located in ceiling.
2. Lay out pattern in compliance with reflected ceiling plans. Where not otherwise indicated, lay out in such manner that margins on opposite sides or rooms or bays are equal or greater than 1/2 tile in width.

B Acoustical Panels:

1. Refer to manufacturer's written installation instructions.
2. Apply adhesive to panels per manufacturer's recommended pattern and press panel firmly into place per manufacturer's installation requirements.
3. Install panels true to lines and plane indicated.

C. Trim and Furring Strips:

1. Attach "C" channels that will carry the weight of the panels using mechanical fasteners appropriate for the wall structure or furring strips. Adhesive may be used in conjunction with the mechanical fasteners, but should not be used as the sole means of support at the base of the installation.
2. Space horizontal furring strips at 12 inches on center when panels are installed below 5 feet from the finished floor, and 24 inches on center when installed above 5 feet from finished floor.
3. Field paint exposed edges of furring strips.
4. Install fasteners used to attach "C" and "H" channels at no more than 24 inches on center.
5. Install "H" Channels at locations where two panels butt against one another.
6. Install "C" Channels at the perimeters of the installation and to frame any openings that may have to be cut through a panel.

D. Fiberglass Ceiling and Waffle Panel Installation:

1. Install fiberglass panels to ceiling/roof structure with stick-on clips with white protective caps, using 3M 77N contact adhesive
2. Provide edge trim at perimeter of panels to fully conceal fiberglass core. Installation must not be visible at joints between adjacent panels.

3.4 ADJUSTING

A Remove and reinstall improperly installed material.

B. Remove damaged or discolored material, or material that cannot be properly cleaned, and install new material.

3.5 CLEANING

A Section 01 74 00 – Cleaning: Final cleaning.

B. Use a clean, dry, soft, white cloth to wipe off any dirt or greasy fingerprints. If this does not clean the panel, use a damp, clean, soft, white cloth or sponge with a mild detergent to wipe the panel.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

KOREEN BLDG. INC
1130 INDUSTRIAL DR. #4
PETALUMA, CA
707-762-0533
SUBMITTAL #3

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and field application of paints, stains, varnishes, and other coatings.

B. Related Sections:
1. Section 05 50 00 - Metal Fabrications: Shop primed items.
2. Section 06 20 00 - Finish Carpentry.
3. Section 08 12 14 - Standard Steel Frames.
4. Section 08 31 13 - Access Doors and Frames.
5. Section 09 21 16 - Gypsum Board Assemblies.
6. Section 23 00 00 - Basic HVAC Requirements.
7. Section 26 00 00 - Electrical General Requirements.

1.2 REFERENCES

A. Air Quality Management District:
1. AQMD – Air Quality Regulations.

B. ASTM International:
1. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.

C. Master Painters and Decorators Association:
1. MPI (APL) – Master Painters Institute Approved Products List; current edition, www.paintinfo.com.
2. MPI (APSM) – Master Painters Institute Architectural Painting Specification Manual; 2004.

D. Painting and Decorating Contractors of America:
1. PDCA - Architectural Painting Specification Manual.

E. South Coast Air Quality Management District:
1. SCAQMD Rule 1113 – Architectural Coatings.

F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.

G. U.S. Environmental Protection Agency:
1. 40 CFR 59, Subpart D – National Volatile Organic Compound Emission Standards for Architectural Coatings; current edition.

1.3 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's printed product data on all coatings specified, including preparation and application instructions.

C Certification by manufacturer that products comply with Contract Documents and are compatible with applicable substrates and with each other.

D Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

E. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified. GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.

F. Samples:
1. Submit two paper chip samples, 3 inch by 5 in size illustrating range of colors and textures available for each surface finishing product scheduled.
2. Submit two painted samples, illustrating selected colors and textures for each color and system selected. Submit on white card stock, 8 inch by 10 inch in size.

G. Manufacturer's Installation Instructions: Submit special surface preparation procedures, and substrate conditions requiring special attention.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Closeout procedures.

B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

B. Applicator: Company specializing in performing work of this Section with minimum three (3) years documented experience.

C. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local regulations.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F in ventilated area, and as required by manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 65 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 SEQUENCING

A. Sequence application to the following:
1. Do not apply finish coats until paintable sealant is applied.
2. Back prime wood trim before installation of trim.

1.11 EXTRA MATERIALS

A. Section 01 77 00 – Contract Closeout: Spare parts and maintenance products.

B. Supply 1 percent (1%) or a minimum of one (1) gallon of each color, type, and surface texture of paint installed. Store where directed.

C. Label each container with color, type, texture, and room locations, in addition to manufacturer's label.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Products listed in Schedule establish a standard of quality and are manufactured by Kelly Moore, which is the District Standard.

B. Substitutions: Not permitted.

2.2 COMPONENTS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings.

1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
2. For good flow and brushing properties.
3. Capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality

C. Patching Materials: Latex fillers as recommended by coatings manufacturer.

D. Fastener Head Cover Materials: Latex filler as recommended by coatings manufacturer

PART 3 - EXECUTION

3.1 SCOPE – SURFACES TO BE FINISHED

A. Paint all exposed surfaces except where indicated not to be painted or to remain natural; the term "exposed" includes areas visible through permanent and built-in fixtures when they are in place.

B. Paint the surfaces described in Article 3.9 and 3.10, indicated on the Drawings, and as follows:

1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
2. Paint surfaces behind movable equipment and furnishings the same as similar exposed surfaces.
3. Paint surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
4. Paint back sides of access panels and removable and hinged covers to match exposed surfaces.
5. Paint all insulated and exposed pipes; conduit; boxes; insulated and exposed ducts; angers, brackets, collars and supports; mechanical equipment; electrical equipment occurring in finished areas, to match background surfaces, unless otherwise indicated.
6. Paint equipment, piping, conduit, and exposed duct work.
   a. Refer to Division 22, Division 23 and Division 26 for schedule of color coding of equipment, duct work, piping, and conduit.
7. Paint all mechanical and electrical equipment, including that which is factory-finished, exposed to weather or to view on the roof or outdoors.
8. Paint shop-primed mechanical and electrical items occurring in finished areas.
9. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
10. Paint interior surfaces of air ducts with flat, nonspecular black paint where visible through registers, grilles, or louvers.
11. Paint dampers exposed behind louvers, grilles to match face panels.
12. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

B. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically noted; factory-primed items are not considered factory-finished.
2. Items indicated to receive other finish
3. Items indicated to remain naturally finished
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.

5. Anodized aluminum.
6. Polished and brushed stainless steel items.
7. Polished and brushed stainless steel, anodized aluminum, bronze, terne, and lead.
8. Acoustical materials
9. Concealed piping, ductwork, and conduit

3.2 EXAMINATION

A. Verify surfaces are ready to receive Work as instructed by product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.

C. Test shop applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
5. Concrete Floors: 8 percent.

E. Measure the pH factor of concrete, masonry, and mortar before starting any finishing process, using the method specified in the MPI Architectural Painting Manual.
1 Report results to Architect before starting work.
2 If results of tests indicates need for remedial action, provide written description of remedial action. If a different primer or paint system is required, state the total cost of the change. Do not proceed with remedial action without receiving written authorization from Architect.

3.3 PREPARATION

A. Remove or mask electrical plates, hardware, light fixture trim, and similar fittings prior to beginning painting operations.

B. Correct defects and clean surfaces affecting work of this section. Sand all gloss finishes to sheen. Remove existing coatings that are flaking or otherwise in unacceptable condition to receive paint. Preparation or removal of coatings containing lead must be performed in accordance with all EPA and OSHA guidelines.

C. Seal with shellac or other coating acceptable to paint manufacturer any marks or defects that might bleed through paint finishes.

D. Remove mildew from impervious surfaces by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow substrate to dry.

E. Concrete, Cement Plaster and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
1. Prepare concrete, concrete masonry block, cement plaster, and mineral fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove

glaze. If hardeners or sealers have been used to improve curing, use mechanical methods if recommended by paint manufacturer.

2. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
3. Determine alkalinity and moisture content of surfaces by performing appropriate tests as specified in the MPI Manual. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture is present.
4. Etch concrete as specified in MPI manual.

F. Concrete Floors to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

G. Asphalt Concrete Surfaces to be Painted: All surfaces must be cleaned free from grease, oil, dirt, mildew, stains and other contaminants that would cause adhesion problems. Remove loose, peeling or chalky paint by high-pressure washing or other appropriate methods. Surfaces must be completely dry before application.

H. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation by acid etching and solvent washing. Apply specified primer as soon as cleaned surfaces are dry.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

1. Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical or chemical methods as recommended as best practice by primer manufacturer.

J. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

1. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

L. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Interior Wood Items to Receive Transparent Finish: Sand wood to obtain a uniform appearance before immediately starting work. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

N. Exterior Wood to Receive Opaque Finish: Remove dirt and foreign matter. Patch knots, pitch pockets, and other surface imperfections with patching compound and seal with sealer recommended by paint manufacturer.

O. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.

P. Metal Doors to be Field-Finished: Prime metal door top and bottom edge surfaces.

3.4 EXISTING WORK

A. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.5 APPLICATION

A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.

C. Sand wood and metal surfaces lightly between coats to achieve required finish.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.

F. Prime concealed surfaces of interior and exterior woodwork with primer paint.

G. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.

H. Finishing Mechanical And Electrical Equipment:
1. Refer to Division 22, Division 23, and Division 26 for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
2. Paint shop primed equipment.
3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
5. Paint interior surfaces of air ducts (and convector and baseboard heating cabinets) visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles to match face panels.
6. Paint exposed conduit and electrical equipment occurring in finished areas.
7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
8. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
9. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.6 FIELD QUALITY CONTROL

A. Inspect and test questionable coated areas in accordance with MPI Architectural Painting Specification manual.

3.7 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

3.8 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

A. ~~Metal Fabrications - Section 05 50 00 and 05 12 00: Exposed structural steel.~~ REMOVED FROM SCOPE

3.9 SCHEDULE - EXTERIOR SURFACES

A. Cast-in-Place Concrete:
   1. Acrylic Latex, Satin:
      a. 247 Acry-Shield 100% Acrylic Masonry Primer.
      b. 1245 Acry-Shield 100% Acrylic Exterior Low Sheen Finish.
   2. Elastomeric Coating:
      a. 247 Acry-Shield 100% Acrylic Masonry Primer.
      b. 1128 Kel-Seal 100% Acrylic Elastomeric Coating, Smooth.

B. Ferrous Metals (Steel – Shop Primed):
   1. Industrial Alkyd Finish:
      a. 1710 Kel-Guard Alkyd Rust-Preventative Primer.
      b. 1700 Kel-Guard Alkyd Rust-Preventative Gloss Enamel.

C. Galvanized Metal:
   1. Industrial Gloss Alkyd Finish:
      a. 1725 Acry-Shield 100% Acrylic Metal Primer.
      b. 1700 Kel-Guard Alkyd Rust-Preventative Gloss Enamel.

D. Galvanized Metal:
   1. Industrial Urethane Finish:
      a. KM-15 Chemical Mastic High Build Epoxy.
      b. KM-375 High Build Gloss Polyurethane Enamel.

E. Aluminum, Brass, other non-ferrous metals:
   1. Acrylic Finish:
      a. 1725 Acry-Shield 100% Acrylic Metal Primer.
      b. 1680 Dura-Poxy+ 100% Acrylic Gloss Enamel.

F. Pipes, Boilers and Stacks:
   1. Heat Resistant Aluminum Coating (minimum 1000 degree F).
      a. Thurmalox 245C Primer.
      b. Thurmalox 280C Aluminum Air Dry VOC Compliant Silicone Coating.

3.10 SCHEDULE – INTERIOR SURFACES

A. Gypsum Board:
   1. Flat Acrylic Latex Finish:
      a. 971 Acry-Plex Interior PVA Primer/Sealer.

b. 550 Acry-Plex Interior Acrylic Flat Wall Paint

2. Low-Lustre Acrylic Latex Finish:
   a. 971 Acry-Plex Interior PVA Primer/Sealer
   b. 1010 KM Professional Int Acrylic Eggshell Enamel

3 Semi-Gloss Acrylic Latex Finish:
   a. 971 Acry-Plex Interior PVA Primer/Sealer
   b. 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel

B. Wood Doors and Trim (natural finish):
   1. Acrylic Varnish Finish
      a. 2094 Kel-Thane II Waterborne Interior Clear Semi-Gloss Finish
      b. 2094 Kel-Thane II Waterborne Interior Clear Semi-Gloss Finish.
      c 2094 Kel-Thane II Waterborne Interior Clear Semi-Gloss Finish.

C. Ferrous Metal (doors, frames and miscellaneous metal):
   1. Industrial Enamel
      a. 5725 DTM Acrylic Primer/Finish.
      b 5780 DTM Acrylic Gloss Enamel.

D. Ferrous Metal (exposed structural steel joists, beams and metal decks):
   1. Industrial Semi-Gloss Acrylic Enamel:
      a. KM-15 Chemical Mastic High Build Epoxy
      b. KM-375 High Build Gloss Polyurethane Enamel

E. Galvanized Metals Including Ductwork:
   1 Industrial Semi-Gloss Acrylic Enamel:
      a 5725 DTM Acrylic Primer/Finish.
      b 5785 DTM Acrylic Semi-Gloss Enamel.

3.10 SCHEDULE - COLORS

A. Paint colors to be from District standard color scheme. ✓
   1. Standard interior field paint color: Kelly Moore #27 Bone Semi-Gloss
   COLOR SCHEME CHANGED & PAINTED BY DISTRICT

B Scope includes 15 percent to 20 percent accent colors.

Canada College Interior Paint Color Palette					
Color Description	Name	Kelly-Moore ✓ Control #	Product	Sheen	Notes
White	Bone	OW-27	1685 Durapoxy	Eggshell	Wall field color
White	Bone	OW-27	1685 Durapoxy	Semi-Gloss	Wall field color
Light green	Khaki Green	06-439-SMT	1010-333	Eggshell	Accent color
Dusty orange	Terra Cotta	06-442-SMT	1010-333	Eggshell	Accent color
Medium Purple	Wisteria	99-1976-SSF	1686 Durapoxy	Eggshell	Accent color; no 333 base in 1686.
Light Gray	Putty	06-435-SMT	1686-222 Durapoxy	Eggshell	Accent color
Medium Yellow	Indian Corn	06-437-SMT	1010-333	Eggshell	Accent color
Dark Brown	Bronzetone		Rustoleum	Semi-gloss	Interior/exterior door trim, other metal surfaces as approved.

END OF SECTION

SECTION 10 11 1 6.53

ELECTRONIC WHITEBOARDS

SMART TECHNOLOGIES
1-403-223-5940
SUBMITTAL #-4

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electronic whiteboards.

B. Related Sections:
1. Section 26 00 00 – Basic Electrical Requirements

1.2 SUBMITTALS

A. Section 01 32 19 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:
1. Include types of units provided, location within each room, and length of each unit.
2. Include dimensioned elevation drawings of each board assembly and board mounting distances from floors.
3. Include cross-section details showing each type of product and components; trim, pen/chalk tray, face, core, backing materials and thickness, and key to elevations.
4. Show locations and quantities of accessories.
5. Show anchorage details and necessary grounds.
6. Show installation details.

C. Product Data: Submit data on electronic whiteboards, trim and accessories. Include Material Safety Data Sheets, when applicable.

D. Samples and color charts: Submit Manufacturer's color charts and composition samples of face, core, and backing to illustrate finish, color and texture of markerboards, tackboards, and tackboard surfacing, where required.
1. Aluminum Trim and Accessories: Samples of each finish type and color, on 6 inch long sections of extrusions and not less than 4 inch squares of sheet or plate, showing the full range of colors available.

E. Manufacturer's Instructions: Provide manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of installed electronic whiteboards.

C. Operation and Maintenance Data: Submit manufacturer's cleaning and maintenance instructions covering both routine (daily or weekly) and long-term (yearly or longer) operations.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum two years experience, approved by manufacturer.

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 – Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials in original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection:
1. Store factory-framed units vertically with packing materials between each unit to prevent damage.
2 Store materials in dry areas at temperatures above 55 degrees F.

1.7 PROJECT CONDITIONS

A. Comply with manufacturer's recommendations for climatizing area for interior moisture and temperature to approximate normal occupied conditions.

B. Install units only when building is enclosed and interior air and substrate temperatures are stable and approximate design conditions.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to preparation of shop drawings and fabrication to ensure proper fit.

1.9 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Furnish two-year manufacturer's equipment warranty for projector, control module and extended connection panel.

C. Furnish five-year manufacturer's equipment warranty for interactive whiteboard.

PART 2 - PRODUCTS

2.1 INTERACTIVE WHITE BOARDS

A. Manufacturers:
1. Smart Technologies; www.smarttech.com; Model 680i.
2. Substitutions: Section 01 60 00 - Product Requirements: Product options and substitutions.

B. Product Description: SMART Board 680i interactive whiteboard system including a SMART board 680 interactive whiteboard integrated with a Unifi 35 projector.

2.2 COMPONENTS

A. SMART Board™ 680 Interactive Whiteboard:
1. Physical Specifications:
   a. Size: 65-1/4 inches W x 49-1/2 inches H x 5-1/8 inches D.
   b. Active Screen Area: 61-5/8 inches W x 46-1/8 inches H; 77 inches diagonal.
   c Weight: 30 lbs.
2. Pen Tray: Optical sensors in the pen tray detect when you lift a pen or the eraser from the tray. LED's show the active tool.
3. Pens and Eraser: Black, blue, red and green pens and a rectangular eraser.
4. Resolution: Touch resolution is approximately 4000 x 4000.
5. Screen Surface: Hard coated polyester surface is tear proof, optimized for projection, compatible with dry erase markers and easily cleaned with whiteboard cleaner.
6. Digitizing Technology: analog resistive.
7. Frame Finish: Two-tone gray (approximates Pantone® Charcoal Gray 18-0601 TPX) and Ultrasonic Chrome (approximates metallic Pantone 877 C).
8. Wall-Mount Bracket: 32 inch wide with five screws and drywall anchors to support a wall-mounted interactive whiteboard.

B. Unifi™ 35 Projector:
1. Physical Specifications:
   a. Size: 25-7/8 inches W x 14-3/8 inches H x 48 inches D (Max).
   b. Extended Connection Panel: 7-5/8 inches W x 1-1/4 inches H x 1-3/8 inches D.
   c. Weight: 33 lbs.
2. On-Screen Interface: Includes interactive tools for controlling the projector, making notes over projected images and saving ScratchPad pages to a USB storage device.
3. Projector Head: Includes a focus ring and a side-mounted access door for changing the lamp.
4. Display Type: True XGA (1024 x 768) projector.
5. Display Technology: Projection engine does not require cleaning or filter replacement. The projection engine uses DLP® technology by Texas Instruments® and features Vikuiti™ Super Close Projection technology from 3M.
6. Brightness: 1500 ANSI lumens, typical.
7. Lamp Life: 2000 hours (Standard mode); 3000 hours (Economy mode).
8. Aspect Ratio: 4:3 native, with support for 16:9.
9. Contrast Ratio: 1000:1 (FO/FO) (minimum).
10. Video Compatibility: NTSC/PAL/SECAM/composite/S-Video/component (YPbPr/YCbCR)/SDTV; (480i, 576i)/EDTV; (480P,576P)/HDTV; (720P,1080i))VGA/SVGA/SGA/SXGA/MAC/(UXGA).
11. Synchronization: Auto image synchronization (auto tracking/frequency/position adjustment/source detect/phase detect).
12. Scanning Rate: H-sync 15 kHz-82kHz, V0sync 50 Hz-85 Hz.
13. Color: True color (16.7 million 24-bit colors).
14. Audio System: Integrated stereo amplifier and speakers (20 watts per channel).
15. Mounting Hardware: Hardware supplied for mounting the Unifi projector and the extended connection panel to framed and concrete walls.
16. Input/Output Connections:
   a. DVI-I jack: Analog or digital projector video input.
   b. HD-DB15 jack: RGB video from computer, linked to extended connection panel.
   c Two 3.5 mm stereo jacks: Audio inputs, one linked to extended connection panel
   d. 3 5 mm stereo jack: Audio output.

e. Mini DIN 4-pin connector: S-video input, linked to extended connection panel.
f. RCA jack: Composite video input, linked to extended connection panel.
g. Two RCA jacks: Stereo audio input, linked to extended connection panel.
h. Three RCA jacks: Component video input.
i. Two USB A receptacles: One for USB storage device, linked to extended connection panel -one for USB link to interactive whiteboard.
j. USB B receptacle: Computer data connection, linked to extended connection panel.
k. DB9F: Serial (RS-232) computer or external control system connection.
l. Power reset connector: Linked to extended connection panel Reset button.
m. AC power receptacle: Accepts standard IEG power cable or adapter.

17. Projector Noise: 34 dBA (Standard mode) / 32 dBA (Economy mode)
18. Power Requirements: 100V-240V AC 50/60 Hz, 450 W.
19. Power Switch: Master power control switch.
20. Power Cable: Three 14'-9" power cables provided.
21. External Control: RS-232 input configured to accept control codes from computer or room control system.
22. Power Consumption: 450 W maximum.
23. Remote Control: Provides an alternate method of controlling the 680i system's major features.

C. Extended Connection Panel Features:
1. Input/Output Connections:
a. HD-DB15 jack: RGB computer video input.
b. 3.5 mm stereo jack: Computer audio input.
c USB A receptacle: Connection for USB storage device.
d. RCA jack: Composite video input.
e. Two RCA jacks: Stereo audio inputs.
f. Mini DIN 4-pin connector: S-video input.
g. USB B receptacle: Computer data input.
2. Power Button: Turns the Unifi projector and interactive whiteboard on or off.

D. Controle Module Features:
1. Power Button: Large power button, with illuminated status ring, turns the system on or off.
2. Menu Button: Shows and hides the Unifi projector's on-screen interface.
3. Volume Control: Adjusts the integrated audio system's volume.

2.3 SMART BOARD SOFTWARE 9.7 COMPUTER REQUIREMENTS

A. Windows® Computers:
1. Pentium® II 450 MHz processor.
2. 256 MB of RAM (512 MB recommended).
3. 150 MB of free hard disk space for minimum installation (840 MB for full installation with Gallery collections).
4. Windows 2000, Windows XP or Windows Vista TM operating system.
5. Internet Explorer® internet browser 6.0 or later.
6. Adobe® Flash® player version 8.

B. Requirements for SMART Video Player:
1. Pentium 11450 MHz processor (700 MHz or faster recommended).
2. Windows 2000 operating system or later.
3. Microsoft® DirectX® technology 8.1 or later.

2.4 OPTIONAL ACCESSORIES

A. USB-XT: 16 feet USB active extension cable.

B. CAT5-XT: USB to Cat 5 cable extender set, includes two 6 feet USB cables.

C. USB-GW: GoWire™ SMART Board software auto-launch USB cable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify electrical power is available in the proper voltage, with outlet at the required height.

3.2 INSTALLATION

A. Install electronic whiteboards in accordance with manufacturer's written instructions.

3.3 MANUFACTURER'S FIELD SERVICES

A. Perform onsite System Assembly and configuration of SMART Board and Projector.

B. Run cabling and perform system test.

3.4 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of electronic whiteboards to Owner's personnel one week prior to date of Substantial Completion.

B. Demonstrate electronic whiteboards equipment, instructed by qualified manufacturer's representative who is knowledgeable about the Project.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. Required instruction time for each item of equipment and system is specified in individual sections.

END OF SECTION

SECTION 10 14 00

SIGNAGE

SNELCO INDUSTRIES
FRESNO, CA
559-233-3763
SUBMITTAL #17

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior signs.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act: Standards.

B. American National Standards Institute:
   1. ANSI A-117.1.

C. CBC - California Building Code, 2001 Edition:
   1. Section 1114B.1.4 – Signs.
   2. Section 1115B.5 – Identification Symbols.
   3. Section 1117B.5 – Signs and Identification.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Design Accessible Entrance Signs, Room Identification Signs, Toilet Room signs, Exit signs, and Miscellaneous Signs, as required by ADA and CBC.
   1. General: Comply with Section 1114B.1.4 for design and construction.
   2. International Symbol of Accessibility: Section 1117B.5.1 and sections as follows:
      a. Design: Section 1117B.5.8.1 and Figure 11B-6.
      b. Color of Symbol: Section 1117B.8.1.1.
   3. Braille Symbols: California Braille Grade 2, per Section 1117B.5.6.
   4. Proportions of Letters and Numbers: Section 1117B.5.3.
   5. Character Height: Section 1117B.5.4.
   6. Contrast and Finish of Symbols: Section 1117B.5.2.
   7. Raised Characters and Pictorial Symbol Signs: Section 1117B.5.5.
      a. Letter Type: Section 1117 B.5.5.1.
      b. Symbol Size: Section 1117B.5.5.2.
      c. Pictorial Symbol Signs (Pictograms Nongeometric): Section 1117B.5.5.3.
   8. Information Posted: Section 1117B.5.8.1.3.
   9. Mounting Location and Height (Where Permanent Identification is Provided or Where Signage is Required for Rooms and Spaces): Section 1117B.5.7.
   10. Doorways leading to Men's and Women's Sanitary Facilities: Provide signs that comply with applicable requirements of Sections 1115B.5; and 1117B.5.1 to 1117B.5.8.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with CBC and ADA requirements for signage, to include Braille.
   2. Provide signs at public toilet rooms with the following text: "UNISEX".

1.5 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
   1. Sign Location: Provide Graphic Schedule and location plans to identify and locate all signs. Item numbers listed in the Graphic Schedule shall be found on location plans and shall identify locations of specific sign items.

C. Samples: Submit two full size sample signs of type, style, and color specified. If approved, the samples may be installed as part of the Work.
   a. Submit supplier's standard color chart for selection purposes and selected colors for verification purposes for dimensional letters.
   b. Submit one each full size sample of cut metal dimensional letters and cast metal dimensional letters, in selected color and finish.

D. Product Data: Submit manufacturer's product data describing materials and signs.

E. Manufacturer's Installation Instructions: Submit installation template and attachment devices.

F. Operation and Maintenance: Provide the Owner with proper cleaning instructions required for continued maintenance of signs.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 31 19 Project Meetings: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

C. Pre-Installation Conferences: Sign locations shown on the location plans are for general information only. Prior to installation and as required, arrange meetings with the Architect at the site for final location for all sign items.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Package signs, labeled in name groups.

C. Store adhesive attachment tape at ambient room temperatures.

PART 2 - PRODUCTS

2.1 SIGNS

A. Manufacturers:
   1. Mohawk Sign Systems Inc. Model: Series 200A Sand-Carved®.
   2. ASI/Modulex. Model: InCast™ Plaque Sign System.
   3. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

2.2 GRAPHIC PROCESS

A. Manufacture signs using Graphic Process Series 200A – Sand Carved® using Format D.
   1. Tactile characters shall be raised 1/32 inch from sign face. Glue-on letters or etched backgrounds are not acceptable.
   2. Provide California Grade 2 Braille whenever Braille symbols are specifically required. Dot spacing: 1/10 inch on center within each cell with 2/10 inch space between cells. Dot height: raised 1/40 inch above background. Separate braille 1/2 inch from the corresponding raised characters or symbols. Signage manufacturer to provide Grade 2 braille translation. Refer to CBC Section 1117B.5.6.
   3. Perimeter borders: 3/8 inch.
   4. Letters, numbers and/or symbols shall contrast 70 percent minimum with their background, either light characters on a dark background or dark characters on a light background. Characters and background shall have a non-glare finish.

B. Plaque material: Melamine plastic laminate, approximately 1/8 inch thick with contrasting core color. The melamine shall be non-static, fire-retardant and self-extinguishing. The plastic laminate will be impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.
   1. Color: As selected by Architect.

C. Letterform: Myriad Roman where indicated, 3/4 inch high, minimum.

D. Size of letters and numbers as follows:
   1. Lettering for Room identification signs: 3/4 inch.
   2. Numbers for Room Number signs: 3/4 inch.
   3. Symbol size: 4 inches, International Style.

E. Copy Position:
   1. Room Identification Signs: Left Top – LT.
   2. Toilet Room Side Mounted Signs: Centered Bottom – CB.
   3. Other sign types: As shown on drawings.

2.3 TOILET ROOM DOOR SIGNS

A. General: Per CBC Section 1117.B.5.1; 1/4 inch thick with eased edges, with raised letters and T-24 braille.
   1. Unisex Toilets: Superimposed 12 inch triangle on 12 inch circle, with International Symbol of Accessibility.
   2. Product: Mohawk Series Unisex (Unisex).

B. ADA Regulatory Side Mounted Signs: Per CBC Section 1115B.5 and 1117B.5.
   1. Product: Mohawk ADA-4 Regulatory Symbol Signs.
   2. Dimensions: 8 inch by 6 inch, with a 4 inch gender symbol, and the verbal description placed directly below followed by contracted Grade 2 California braille.
   3. Corners: Square.

2.4 ACCESSIBLE ENTRY SIGNS

A. General: Per CBC Section 1117B.5.8.1.2; Typical 1/8 inch thick, with directional arrow, with text: "ACCESSIBLE ENTRANCE"; size as shown on drawings.

B. Product: Mohawk Series 200A – Sand Carved process.
   1. Dimensions: As shown on drawings.
   2. Corners: Radiused.
   3. Lettering: Helvetica, Uppercase, 3/4 inch height.

2.5 TACTILE EXIT SIGNS

A. General: Per CBC Section 1003.2.8.6.1; Typical 1/8 inch thick.

B. Size: As shown on drawings.

C. Text and Symbols: As shown on drawings.

2.6 ASSISTIVE LISTENING SYSTEM SIGNS

A. General: Per CBC Section 1117B.5.8.4 with eased edges; Typical 1.8 inch thick.

B. Size: As shown on drawings.

2.7 ACCESSORIES

A. Fasteners: As recommended by manufacturer; tamper-proof torx head screws; anchors where required.

B. Adhesives: As recommended by manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work

3.2 PREPARATION

A. Environmental Requirements: Do not install plastic signs when temperature is below 70 degrees F

B. Examination: Examine conditions of work in place before beginning work; report defects.

3.3 INSTALLATION

A. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

B. Locations: Install signs after doors and surfaces are finished, in locations indicated on Drawings, or as directed by Architect.

C. If sign must be affixed to glass, provide a back-up panel the same size as the sign and holder on the other side to hide adhesive.

D. Surface Mounted:
1. Toilet Room Signs: As directed, per CBC, Section 1117B.5.
2. Room Name Signs: As directed, per CBC, Section 1117B.5.
3. Tactile Exit Signs: As directed, per CBC, Section 1003.2.8.6.

E. Install with reviewed manufacturer's adhesive or mechanical fasteners after application of finish painting at heights noted

3.4 CLEANING

A. Section 01 77 00 – Contract Closeout: Requirements for final cleaning

B. General: Upon completion, thoroughly clean exposed surfaces per manufacturer's instructions.

C. 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 10 feet.

D. Remove temporary coverings and protection to adjacent work areas.

E. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1.

END OF SECTION

SECTION 10 26 23

PROTECTIVE WALL COVERING

NOT INSTALLED. DELETED FROM WORKSCOPE PER SCC'S CPE #23

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes rigid vinyl sheet protective wall covering and wall guards.
   1. Corner guards.

1.2 REFERENCES

A. ASTM International:
   1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
   3. ASTM D256 – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
   4. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

B. National Fire Protection Association (NFPA).

C. Society of Automotive Engineers (SAE):
   1. SAE J-1545.

D. Underwriters Laboratory (UL):
   1. UL 723 – Tests for Surface Burning Characteristics of Building Materials.

E. Uniform Building Code (UBC):
   1. UBC 52-4.

1.3 SYSTEM DESCRIPTION – PROTECTIVE WALL COVERING

A. Performance Requirements: Provide rigid vinyl sheet systems that conform to the following requirements of regulatory agencies and the quality control of IPC Door and Wall Protection Systems, InPro Corporation.
   1. Fire Performance Characteristics: Provide UL Classified Sanparrel Rigid Vinyl Sheet conforming with the NFPA Class A fire rating. Surface burning characteristics as determined by UL-723 (ASTM E-84), for Sanparrel Rigid Vinyl Sheet installed with 3M Fastbond 30, InPro Bond Adhesive, or Formulated Solutions, LLC "XT- 2000+" Adhesive shall be a maximum flame spread of 20 and a maximum smoke developed of 350 for 0.060 inch thick material.
   2. Self Extinguishing: Provide rigid vinyl sheet with a CC1 classification, as tested in accordance with the procedures specified in ASTM D635, as referenced in UBC 52-4.
   3. Impact Strength: Provide Sanparrel Rigid Vinyl Sheet that has an Impact Strength of 30.4 ft-lbs/ inch of thickness as tested in accordance with the procedures specified in ASTM D256.
   4. Chemical and Stain Resistance: Provide rigid vinyl sheet that show resistance to stain when tested in accordance with applicable provisions of ASTM D543.
   5. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G21

6. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

1.4 SYSTEM DESCRIPTION – WALL GUARDS

A. Performance Requirements: Provide wall guard systems that conform to the following requirements of regulatory agencies and the quality control of IPC Door and Wall Protection Systems, InPro Corporation.
1. Fire Performance Characteristics: Provide UL Classified wall guards conforming with NFPA Class A fire rating. Surface burning characteristics, as determined by UL-723 (ASTM E84), shall be flame spread of 10 and smoke development of 350 - 450.
2. Self Extinguishing: Provide wall guards with a CC1 classification, as tested in accordance with the procedures specified in ASTM D635, as referenced in UBC 52-4-1988.
3. Impact Strength: Provide rigid vinyl profile materials that have an Impact Strength of 30.2 ft-lbs/inch of thickness as tested in accordance with the procedures specified in ASTM D256.
4. Chemical and Stain Resistance: Provide wall guards that show resistance to stain when tested in accordance with applicable provisions of ASTM D543.
5. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G-21.
6. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

1.5 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product Data: Manufacturer's printed product data for each type of Sanparrel Rigid Vinyl Sheet and each type of wall guard specified.

C. Detail Drawings:
1. Rigid vinyl sheet: Mounting details with the appropriate adhesives for specific project substrates,
2. Wall guards: Mounting details with the appropriate fasteners for specific project substrates.

D. Samples:
1. Rigid vinyl sheet: Verification samples of Sanparrel Rigid Vinyl Sheet, 8 inch x 8 inch, of each type and color indicated.
2. Wall guards: Verification samples of wall guard, 8 inch long, in full size profiles of each type and color indicated.

E. Manufacturer's Installation Instruction: Printed installation instructions for Sanparrel Rigid Vinyl Sheet and wall guard.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 78 39 – Project Record Documents: Operation and Maintenance Manuals.

B. Submit manufacturer's maintenance instructions for protective wallcovering, corner guards, and wall guards.

C Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

1.7 QUALITY ASSURANCE

A Single Source Responsibility: Obtain protective wallcovering system components from a single source.

1.8 DELIVERY, STORAGE AND HANDLING

A Deliver materials in unopened factory packaging to the jobsite.

B Inspect materials at delivery to assure that specified products have been received.

C Store in original packaging in a climate controlled location away from direct sunlight.

1.9 PROJECT CONDITIONS

A Environmental Requirements: Products must be installed in an interior climate controlled environment.

1.10 WARRANTY

A Section 01 77 00 - Contract Closeout: Requirements for warranties.

B Furnish standard IPC Limited Lifetime Warranty against material and manufacturing defects.

1.11 EXTRA MATERIALS

A Furnish one 3 feet x 8 feet sheet; or minimum 2 percent of each type, color and pattern of wall surface protection materials and components. Include accessory components as required. Replacement materials shall be from the same production run as installed materials. Package with protective coverings and appropriate labels.

PART 2 - PRODUCTS

2.1 PROTECTIVE WALL COVERING AND WALL GUARDS

A Manufacturers:
1. IPC Door and Wall Protection Systems, InPro Corporation, www.inprocorp.com.
2. Koroseal Wall Protection Systems; www.korogard.com
3 Substitutions: Section 01 60 00 – Product Requirements: Product options and substitutions.

B Product Description and Basis of Design: InPro Corporation, Sanparrel Rigid Vinyl Sheet protective wall covering.

C Product Description and Basis of Design: InPro Corporation, 500 Wall Guard.

2.2 COMPONENTS

A Rigid Vinyl Sheet:

1 Sanparrel, Rigid Vinyl Sheet Options:

Item #	Dimensions	Thickness
305	3 feet x 8 feet	0.040 inch (1mm)

Also available:
a 3 feet x 10 feet sheets 0.040 inch (1mm).
b 3 feet x 120 feet rolls 0.040 inch (1mm).
2 Backing: Unbacked.
3 Accessories:
a Top Cap: #407.
1) Length: 8 feet, standard, 10 feet, available.
b Inside Corner: #409.
1) Length: 8 feet standard, 10 feet available.
c Outside Corner: 3448, 3496, 11248 or 11296.
e Color Matched Caulk: 580 Color matched VinylSeal.

B Wall Guards:
1 500 Wall Guard Profile: 3 inch height x 1 inch depth.

C Wall Guard Components:
1. 502 Series End caps, outside corners and brackets: Injection molded thermoplastics.
2. Fasteners: Provide all mounting system accessories appropriate for substrates indicated on the drawings.

2.3 MATERIALS

A. Vinyl: Sanparrel shall be manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).

B. Vinyl for Wall Guards: Snap on cover of 0.080 inch thickness, extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).

C. Aluminum: Continuous aluminum retainer of 0.080 inch thickness, fabricated from 6063-T5 aluminum, with a mill finish.

2.4 ACCESSORIES

A. Top caps, inside corners, and outside corners: Extruded PVC.

2.5 FINISHES – PROTECTIVE WALL COVERING

A Color: Clam Shell.
1. Surface Texture: Haircell texture.

B. Accessories: Top caps, inside corners, divider bars and outside corners shall be of a color matching the Sanparrel.

2.6 FINISHES – WALL GUARDS

A. Vinyl Covers Color: Clam Shell.
1 Surface Texture: Pebblette texture.

B. Molded Components: End caps, outside corners and brackets shall be of a color matching the wall guards.
1. Surface: Pebblette texture.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which the rigid vinyl sheet and wall guard systems will be installed.
   1. Complete all finishing operations, including painting, before beginning installation of rigid vinyl sheet materials and wall guard system materials.

B. Wall surface shall be dry and free from dirt, grease and loose paint.

3.2 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.3 INSTALLATION – RIGID VINYL SHEET

A. General: Locate the rigid vinyl sheet as indicated on the approved detail drawing for the appropriate substrate and in compliance with the IPC installation instructions. Install level and plumb at the height indicated on the drawings.

B. Installation of Sanparrel Rigid Vinyl Sheet with manufacturer's recommended adhesive:
   1. Adhere to substrate with InPro Bond, a freeze-thaw stable, nonflammable, high strength, water based adhesive that trowels on and allows approximately 20 minutes working time before firming.
   2. Adhere to substrate with XT-2000+, a freeze-thaw stable, nonflammable, high strength, water based adhesive that trowels on and allows approximately 20 minutes working time before firming.
   3. Adhere to substrate with Fastbond 30, a nonflammable, high strength, water-dispersed contact adhesive, with very little odor.
   4. Smooth roll surface.

C. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished work.

D. Install aluminum retainers, mounting brackets, and other accessories in strict accordance with the manufacturer's instructions.

E. Where splices occur in horizontal runs of over 20 feet, splice aluminum retainer and plastic cover at same locations along the run.

F. Install corner guards to walls securely in accordance with manufacturer's written instructions.

G. Install corner guards accurately in location, alignment, and elevation.

H. Install protective wallcovering to walls in accordance with manufacturer's written instructions.

I. Install protective wallcovering sheets with texture running in the same direction for uniform appearance.

J. Wainscot Joints: Butt joint panels, leaving a 1/16 inch gap between vinyl panels to allow for expansion. Seal joint with color matched VinylSeal.

3.4 INSTALLATION – WALL GUARDS

A. General: Locate the wall guard as indicated on the approved detail drawing for the appropriate substrate and in compliance with the IPC installation instructions. Install wall guard level and plumb at the height indicated on the drawings.

B. Installation of 500 Wall Guard:

1. Cut the aluminum retainer to the desired length, allowing 1-9/16 inch for each end cap, and 9/16 inch for each outside corner.
2. Using a 1/4-inch drill bit, drill holes in the centerline of the aluminum retainer 4 inches from each end and spaced evenly over the entire length (6 anchors per 12 feet length.
3. Position and level the aluminum retainer on the wall, allowing for end caps and outside corners, and transfer mounting holes to the wall with a marker. Drill 1/4-inch holes at each mark and position the ALLIGATOR anchors into the holes on the wall. Mount the retainer with #10 x 1-3/4" Phillips pan head screws and tighten the screws to secure the retainer.
4. Slide the end caps and outside corners onto the aluminum, leaving a 1/16-inch gap for adjustments, and secure them by using one 1-1/4 inch self-tapping screw per end cap or two per outside corner.
5. Cut the vinyl cover to the distance between the end caps/outside corners. NOTE: Trim all factory edges square before installation. Position the vinyl cover on the aluminum retainer starting at one end and working to the other end by pushing the cover over the aluminum until it snaps into place.

3.5 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for final cleaning

B. At completion of the installation, clean surfaces in accordance with the IPC clean-up and maintenance instructions.

END OF SECTION

SECTION 10 28 00

TOILET ACCESSORIES

SCHEMBRI CONSTRUCTION
S.F. CA
415 656-0300
SUBMITTAL #6

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes toilet accessories, and utility room accessories

B. Related Sections:
1. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board finishes.
2. Section 09 22 16 – Non-Load Bearing Metal Framing System: In-wall framing and plates.
3. Section 10 13 00 - Solid Color Reinforced Composite Toilet Compartments: Factory installed openings for toilet accessories.
4. Section 26 01 00 – Basic Materials and Methods: Electrical supply, conduit, wiring, boxes, and wiring devices for hand dryers.

1.2 REFERENCES

A. Americans with Disabilities Act:
1. ADA – Accessibility Guidelines.

B. International Code Council/American National Standards Institute:
1. ICC/ANSI A117 – Standard on Accessible and Useable Buildings and Facilities.

C. ASTM International:
1. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
2. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
3. ASTM A366 - Cold-Rolled Carbon Steel Sheets, Commercial Quality.
4. ASTM B456 - Electro deposited Coatings of Copper plus Nickel plus Chromium and Nickel plus Chromium.

C. Federal Specification Unit:
1. FS A-A-3002 – Mirrors, Glass.

D. CBC - California Building Code, 2001 edition.

1.3 NOT USED

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate methods of backing, installation and fastening.

C. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods. Include detailed description of hand dryer explaining operating protocol, drying method, and performance. Provide blocking diagram of basic components.

D. Electrical wiring diagrams for connection of hand dryers.

E. Manufacturer's Installation Instructions: Submit special procedures, and conditions requiring special attention.

F Test reports from independent company showing compliance with Article 1.3.

1.4 REGULATORY REQUIREMENTS

A. Comply with requirements of CBC Section 1109A.

1.5 QUALITY ASSURANCE

A Manufacturer: Company specializing in manufacturing electric hand dryers with 10 years minimum experience NOT SHOWN ON DRAWINGS

B Hand dryers shall be certified by Underwriters Laboratory (UL), Inc. and shall bear UL labels.

C Hand dryers shall be provided and installed in compliance with ICC/ANSI A117.1.

1.6 DELIVERY, STORAGE AND HANDLING

A. Section 01 60 00 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B Deliver products to site, store, handle and protect in accordance with manufacturer's instructions and recommendations.

C. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.

D. Pack accessories individually in a manner to protect accessory and its finish.

E. Deliver products in original containers with seals unbroken and labels intact until time of use. Label. with name of accessory, catalog number and finish.

F. Store delivered products in clean, secure and dry area.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on product data.

1.8 COORDINATION

A Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.9 WARRANTY

A. Section 01 77 00 – Contract Closeout: Product warranties.

B. Furnish manufacturer's standard warranty against silver spoilage in glass mirrors for a period of 15 years from date of Substantial Completion.

C. Furnish manufacturer's 5 year warranty for hand dryer to be free of defects.

PART 2 - PRODUCTS

2.1 TOILET ACCESSORIES

A. Manufacturers:
   1. Bobrick Washroom Equipment
   2. Bradley Corporation.
   3. American Specialties, Inc.
   4. Excel Dryer, Inc; www.exceldryer.com
   5. Substitutions: Section 01 60 00 ~ Product Requirements: Product Options and Substitutions.

2.2 MATERIALS

A. Sheet Steel: ASTM A366, cold rolled stretcher leveled; 125 oz/sq ft galvanized coating.

B. Stainless Steel Sheet: ASTM A167, Type 304.

C. Tubing: ASTM A269, stainless steel, seamless welded.

D. Adhesive; Epoxy type contact cement.

E. Fasteners:
   1. Accessories Mounted In or On Metal Framed Walls:
      a. Grab Bars Secured to Concealed Anchor Plates: Phillips round head machine screws; 1/4-20 x 1-1/2 inch; stainless steel.
      b. Other Accessories: Torx round head self-tapping sheet metal screws; minimum #10 by length sufficient to penetrate through framing minimum 3/8 inches; zinc plated steel at concealed locations, stainless steel at exposed locations.
   2. Accessories Mounted on Toilet Partitions:
      a. Grab Bars: Phillips panhead machine screws; 1/4 - 20 by 1/2 inch; stainless steel.
      b. Other Accessories:
         1) Screws: Torx pan head machine screws; #10-32 by 3/4 inch; zinc plated steel at concealed locations, stainless steel at exposed locations.
         2) Connectors: Internally threaded bolt; #10-32 by 3/4 inch; stainless steel.

2.3 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from one sheet of stock, free of joints. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

C. Fabricate grab bars of tubing free from visible joints. Return to wall with attachment flanges.

D. Hot dip galvanize ferrous metal anchors and fastening devices.

E. Shop assemble components and package complete with anchors and fittings.

F. Provide steel anchor plates, adapters, and anchor components for installation.

2.4 KEYING

A. Supply two keys for each accessory to District.

B. Key every accessory alike and to match existing toilet accessory locks

2.5 FINISHES

A. Chrome/Nickel Plating: ASTM B456, satin finish.

B. Stainless Steel: No.4 satin luster finish.

C. Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.

D. Enamel: Pre-treat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.

C. Verify that blocking has been provided for surface mounted units not specified to be furnished with anchor plates.

D. Verify that toilet compartments to receive accessories have been properly installed and correctly prepared.

E. Notify Architect in writing of conditions detrimental to installation or operation of accessories.

F. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough in measurements as required.

C. Verify with Architect exact location of accessories.

3.3 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturer's instructions and recommendations and in accordance with final reviewed shop drawings.

B. Conform to CBC Section 1115B for positioning requirements for persons with disabilities. Mount toilet accessories required to be accessible at heights according to CBC Section 1118B, as detailed on Drawings.

C. Toilet paper and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches from finished wall surface nor be located closer than 1-1/2 inches clear of the tangent point of the grab bar.

D. Install true, plumb, and level, securely and rigidly anchored to substrate.

E. Attach accessories securely with concealed fasteners unless otherwise noted. Ensure true alignment.
1. Secure wall mounted grab bars to concealed anchor plates with machine screws Tap anchor plates for machine screws
2. Secure other wall mounted accessories to metal framing or blocking with self-tapping sheet metal screws
3. Secure grab bars mounted to toilet partitions with ma- chine screws to internally threaded partition anchors.
4. Secure other accessories mounted to toilet partitions with internally threaded through bolted fasteners
5. Secure hand dryers to supporting substrate so that fixtures are level and aligned with each other. Use type and length of fastener as recommended by manufacturer for type of substrate

F. Install pipe wrap insulation at wheelchair accessible piping assemblies.

3.4 ADJUSTING

A. Adjust accessories for smooth and correct operation.

3.5 CLEANING

A. Section 01 74 00 – Cleaning: Final cleaning.

B. Clean toilet accessories in accordance with manufacturer's instructions and recommendations.

C. Ensure that cleaned portions *of* surfaces do not differ from uncleaned portions.

D. Leave areas designated to receive toilet accessories free of stains, blemishes and other foreign material.

3.6 PROTECTION

A. Protect toilet accessories and grab bars from damage or defacement until final acceptance.

3.7 SCHEDULE

A. Stainless Steel Grab Bars:
1. Product: Bobrick B-6806.99; x 36; x 42.
2. Grab Bar: 18-8 S, type 304, 18 gauge stainless steel tubing, satin finish with peened gripping surface. 1-1/2 inch outside diameter. Ends are heliarc welded to flanges. Clearance between grab bar and wall is 1-1/2 inch.
3. Flanges: 18-8 S, type 304, 1/8 inch thick stainless steel plate with satin finish. 3 inch diameter with three screw holes for attachment to wall.
4. Concealed Mounting Flange: 1/8 inch thick 18-8 alloy type 304 stainless steel; 3-1/8 inch outside diameter; heliarc welded to tubing with continuous concealed bead; two 3/8 inch diameter screw holes; 3 locking dimples.
5. Snap Flange Cover: 22 gauge 18-8 alloy type 304 stainless steel: 3-3/16 inch diameter. Each cover snaps over mounting flange to conceal mounting screws.
6. Wall Anchor: 1/8 inch thick steel plate; 4 inches wide; length to be determined according to specification of grab bar.
7. Partition Anchor: 1/8 inch thick 18-8 alloy type 304 stainless steel; 3 inch diameter; two 1/4-20 internally threaded studs welded to concealed side; #4 satin finish on exposed surfaces.

B Recessed, Toilet-Seat-Cover Dispenser, Sanitary Napkin Disposal, and Toilet Tissue Dispenser.

1. Product: Bobrick B-3574.
2. Cabinet: 18-8 S, type 304, heavy-gauge stainless steel. All welded construction. Exposed surfaces: Satin finish.
3. Flange: 18-8 S, type 304, 22-gauge stainless steel with satin finish. Drawn and beveled, one-piece, seamless construction.
4. Door: 18-8 S, type 304, 18-gauge stainless steel with satin finish. One-piece, seamless construction. Door is secured to cabinet with a full-length stainless steel piano-hinge and equipped with two tumbler locks keyed like other Bobrick washroom accessories.
5. Toilet Tissue Dispensers (2): 0.100 inch thick ABS., 18-8 S, type-304, 26-gauge stainless steel waste deflector attached to the top toilet tissue dispenser only. Continuous flow type dispenser. Equipped with two theft-resistant, high-impact polystyrene spindles, each with a heavy-duty internal spring and concealed locking mechanism.
6. Disposal Panel: 18-8, type 304, 22-gauge stainless steel with hemmed edges; exposed surface has satin finish. Secured to door with spring-loaded, full-length stainless steel piano hinge. Equipped with international graphic symbol identifying napkin disposal.
7. Waste Receptacle: Leak-proof molded polyethylene. Removable for servicing. Capacity: 0.8 gallons.

C. Recessed Combination Sanitary Napkin/Tampon Vendor:

1. Product: Bobrick Model B-3500 25, 25¢ single-coin operation.
2. Cabinet: 18-8 S, type-304, 22-gauge stainless steel. All-welded construction.
3. Door: 18-8 S, type-304, 18-gauge stainless steel with satin finish. 7/8 inch 90 degree return edges for maximum rigidity. Secured to cabinet with a concealed, full-length stainless steel piano hinge. Equipped with a stainless steel cable door-swing limiter and two tumbler locks keyed like other Bobrick washroom accessories. International graphic symbols identify product dispensed and coin denomination.
4. Coin Mechanisms (2): Impact-resistant ABS with satin-finish aluminum pull knobs. Coin mechanisms can be converted in the field to any standard coin denomination without having to purchase new coin mechanisms (no-coin, single-coin, or double-coin operation). Each coin box is equipped with a tumbler lock that open with different key than furnished for door locks. Coinage is designated by symbols on metal plate, which can be changed only from inside the door.

D. Recessed Paper Towel Dispenser and Waste Receptacle:

1. Product: Bobrick B-3944.
2. Cabinet: 18-8 S, type-304, heavy-gauge stainless steel. All-welded construction. Exposed surfaces have satin finish.
3. Flange: 18-8 S, type-304, 22-gauge stainless steel with satin finish. Drawn and beveled, one-piece, seamless construction.
4. Door: 18-8 S, type-304, 22-gauge stainless steel with satin finish. Double-pan back construction. Secured to cabinet with full-length stainless steel piano hinge and equipped with a concealed tumbler lock keyed like other Bobrick washroom accessories
5. Paper Towel Dispenser: 18-8 S, type-304, 22-gauge stainless steel with satin finish. Rounded towel tray has hemmed opening to dispense paper towels without tearing. Dispenses 600 C-fold or 800 multifold paper towels
6. Removable Waste Receptacle: 18-8 S, type-304, 22-gauge stainless steel with satin finish. Secured to cabinet with tumbler lock. Front and side edges of bottom and top edges hemmed for safe handling. Secured to cabinet with a tumbler lock keyed like other Bobrick washwroom accessories. Equipped with interior hooks for optional vinyl liner. Capacity: 12 gallons.

E. Soap Dispenser for Liquid and Lotion Soaps and Detergents:
1. Product: Bobrick B-40.
2. Valve: Grey, high-impact-resistant ABS push button and spout. Soap head-holding mushroom valve. Stainless steel spring. U-packing seal and duckbill.
3 Wall Bracket: Grey, high-impact-resistant ABS. Equipped with a concealed locking device to secure the lid and a removable plastic key to disengage locking device.
4. Container: Black, translucent ABS. Capacity: 40 fl oz.
5 Lid: Grey, high-impact-resistant ABS.
6. Dimensions: 5-13/16 inches wide by 6-7/8 inches high by 3-3/8 inches deep.

F. Mirror with Stainless Steel Channel Frame and Shelf:
1 Product: Bobrick B-166 Series.
2 One-piece stainless steel channel frame, 1/2 inch by 1/2 inch by 3/8 inch, with 90 degree mitered corners. All exposed surfaces have bright polished finish.
a. Shelf: Type 304, 22-gauge stainless steel with satin finish. 3/8 inch return edges on front and sides with front edge hemmed for additional safety. Shelf is welded to mirror frame and reinforced by concealed stainless steel brackets.
b. Mirror: No. 1 quality, 1/4-inch select float glass, selected for silvering, electrolytically copper-plated by the galvanic process. Guaranteed for 10 years against silver spoilage. Corners are protected by friction-absorbing filler strips and the back is protected by full-size, shock-absorbing, water-resistant, nonabrasive, 3/16 inch thick polyethylene padding.
c. Galvanized steel back has integral horizontal hanging brackets located near top for mounting on concealed wall hanger and near bottom to prevent the bottom of mirror from pulling away from wall when locking screws are not accessible.
3. Concealed Wall Hanger: 20-gauge galvanized steel. Incorporates lower support member, forming rigid rectangle, which engages lower backplate louvers to keep bottom of mirror against wall.
4. Dimensions: 18 inches wide by 30 inches tall.

G. Surface-Mounted Stainless Steel Shelf:
1. Product: Bobrick B-683
2. Flanges and Support Arms (2): 18-8 S, type-304, 22-gauge stainless steel. Each flange has a concealed, 16-gauge stainless steel mounting bracket. All-welded construction. Secured to wall plates with stainless steel setscrews.
3. Concealed Wall Plates (2): 18-8 S, type-304, 16-gauge stainless steel.
4. Shelf: 18-8 S, type-304, 22-gauge stainless steel with roll-formed edges.
5. Dimensions: 24 inches long by 5-3/4 inches deep.

H. Surface-Mounted Utility Hook:
1. Product: Bobrick Model B-670.
2. Flange and Support Arm: 1808 S, type-304, 22-gauge stainless steel. Concealed, 16-gauge stainless steel mounting bracket. All-welded construction, Secured to wall plate with a stainless steel setscrew.
3 Concealed Wall Plate: 18-8 S, type-304, 16-gauge stainless steel.
4. Cap: 18-8 S, type-304, 10-gague stainless steel. Welded to support arm.
5. Finish: Bright polished stainless steel.
6. Projection: 2 inches.
7. Install two wall-mounted hooks near sink area at singe stall restrooms.
8. Mount at 48 inches maximum above finish floor.

I. Pipe Insulation Wrap:
1 Product: Procar Products Inc., Kit C500R and Kit C500H (for offset P-trap) insulation wraps.

2. Burning Characteristics: In accordance with ASTM D635, no burn rates could be determined since the specimens extinguished prior to reaching the 100 mm mark.
3. Verify configurations prior to installation.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

SCHEMBRI CONSTRUCTION
SF, CA
415 656-0300
SUBMITTAL #5.1

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire extinguishers, fire extinguisher cabinets; and brackets for wall mounting.

B. Related Sections
1. Section 05 40 00 – Cold-Formed Metal Framing: Roughed-in wall openings.
2. Section 09 22 16 – Non-Structural Metal Framing System: Roughed-in wall openings.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act.
1. Maximum 4 inch cabinet projections for corridors.

B. American National Standards Institute:
1. ANSI/UL 711 – Rating and Fire Testing of Fire Extinguishers.

C. ASTM International:
1. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
2. ASTM E814 – Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

D. National Association of Architectural Metal Manufacturers
1. MFM - Metal Finishes Manual.

E. National Fire Protection Association:
1. NFPA 10 – Standard for Portable Fire Extinguishers.

F. Underwriters' Laboratories, Inc.
1. UL (FPED) – Fire Protection Equipment Directory.
2. UL 299 – Dry Chemical Fire Extinguishers.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, location, fire ratings, relationship of box and trim to surrounding construction, and signage.

C. Product Data. Submit manufacturer's product data for cabinets including door hardware, cabinet type and materials, trim style, door construction, panel style and materials.

D. Manufacturer's Installation Instructions: Submit special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify products meet or exceed specified products.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Closeout procedures.

B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

1.5 QUALITY ASSURANCE

A. Provide extinguishers conforming with ANSI/UL 711 and NFPA 10.

B. Provide fire extinguishers, cabinets and accessories by a single manufacturer.

1.6 REGULATORY REQUIREMENTS

A. Conform to ASNS/NFPA 10 for requirements for extinguishers.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

C. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purposes specified and indicated.

D. Conform to ADA on maximum cabinet projection of cabinet in corridors where necessary.

E. Conform to ASTM E814 for fire resistive wall performance.

F. Conform to ADAAG 4.25.4, 4.27.4 and CBC 1133B.2.5.2, CBC 1118B.5, CBC 1133B.8.6 and CBC 1118B.6 for the following:
   1. Latching and locking hardware to be operable with a single effort by lever-type hardware, panic bars, push-pull activating bars or other hardware designed so as not to require the ability to grasp the opening hardware and not require a force greater than 5 lbs. to open.
   2. Force required to activate controls shall not exceed 5 lbs.
   3. Mounted between 15-48 inches A.F.F. for forward approach.
   4. Mounted between 9-54 inches A.F.F. for side approach.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 – Product Requirements: Environmental conditions affecting products on site.

B. Do not install extinguishers when ambient temperatures are capable of freezing extinguisher ingredients.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Manufacturers:
   1. J.L. Industries, Inc.;
   2. Larsen's Manufacturing Co.
   3. Potter Roemer, Inc.
   4. Seton Identification Products. (Fire Extinguisher Signs).
   5. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

B. Fire Extinguishers:
1. Multipurpose under pressure, dry chemical type bearing UL rating of 2A-10B:C, 5 pounds nominal capacity, with valid certification tag attached, in enameled steel container, equivalent to J.L. Industries Cosmic Model 5E.

2.2 FIRE EXTINGUISHER CABINETS

A. Manufacturers:
1. J.L. Industries, Inc.; 1027
2. Larsen's Manufacturing Co.
3. Potter Roemer, Inc.
4. Substitutions: Section 01 60 00 – Product Requirements: Product Options and Substitutions.

B. Cabinets:
1. Tub: Semi-recessed 18 gauge steel box with electrostatic white epoxy primer finish. Weld joints and grind smooth. Miter and weld perimeter door frames.
   a. Inside Box Dimensions: 24 inches high by 10-1/2 inches wide by 6 inches deep.
2. Door /Frame Style: JL Industries "Academy" design, V – Vertical Duo with pull handle, ADA compliant in aluminum, #180 clear anodized aluminum finish
   a. 1-3/4 inch wide face trim on frame and door.
   b. Rolled edge construction on 3-inch return trim.
   c. U-shaped pull handle.
   d. 5 pound effort to open door (maximum).
   e. Door Hardware: Continuous hinge, zinc plated pull handle/roller latch.
3. Door Glazing: Laminated clear safety glass.

C. Fire Rated Cabinets: UL listed with UL listing mark with fire resistance rating of wall where it is installed.

D. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing and location.
1. Application Process: Silk screen.

2.3 ACCESSORIES

A. Mounting Brackets: For use with portable fire extinguishers when additional security is required due to vibration, and for wall mounting.
1. J.L. Industries, Model MB818 for Cosmic 5E.
2. Furnished with 16 gauge glossy polyester coated steel bracket with spring-type band and/or rubber strap.

B. Graphic Identification: Seton Identification Products, Model 65028
1. Heavy-duty 40-mil aluminum with mounting holes.
2. Red letters on white arrowhead on red background.
3. Overall Dimensions: 4 inch wide by 18 inches high.
4. Letters spell "FIRE EXTINGUISHER"

2.4 FINISHES FOR CABINETS, GENERAL

A. Comply with NAAMM MFM for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying temporary strippable protective covering prior to shipping

C. Extinguisher: Red enamel.

D. Cabinet Trim and Door: Aluminum, #180 clear anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for cabinets are correctly sized and located. Examine walls and partitions for thickness and framing for cabinets to verify cabinet depth and mounting prior to cabinet installation.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install cabinets plumb and level in wall openings at mounting height indicated or, if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Secure cabinets rigidly in place.

C. Install fire extinguishers on wall brackets typical, at each location shown. Fire extinguisher handle shall be +48 inches maximum above finish floor. Secure rigidly in place in accordance with manufacturer's instructions.

D. Position signage as required by authorities having jurisdiction.

3.3 SCHEDULE

A. Provide rated cabinets at all recessed locations in 1-hour rated walls. Reference floor plans for locations and wall ratings. Provide recessed non-rated cabinets at all other non-rated wall locations.

B. Provide Cosmic Model 5E fire extinguisher at all locations as shown on drawings.

END OF SECTION

SECTION 11 31 00

RESIDENTIAL EQUIPMENT

Schmeer Const
SF CA
415 626-0300
Submittal # 29.1

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes Kitchen appliances:
1. Range hood.

B. Related Sections:
1. Section 01 10 00 – Summary of Work: Owner furnished equipment
2. Section 26 01 00 – Basic Materials and Methods.

1.2 REFERENCES

A. Underwriters Laboratories:
1. UL EAUED - Electrical Appliance and Utilization Equipment Directory.

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Submittal procedures.

B. Product Data: Submit manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

C. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

D. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout: Requirements for submittals.

B. Operation and Maintenance Data: Submit relevant instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

1.6 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

PART 2 - PRODUCTS

2.1 KITCHEN APPLIANCES

A. Manufacturers:
1. GE Appliances; www.geappliances.com

2. Whirlpool Corp; www.whirlpool.com
3. Substitutions: Section 01 60 00 – Product Requirements: Product options and substitutions.

2.2 COMPONENTS

A. Cooking Exhaust Hood: Range Hood.
1. Manufacturer: General Electric. PROFILE
2. Model No: ~~JV338HWW~~ JV636HSS
3. Size: 30 inches wide by ~~5-1/2~~ inches high by ~~17-1/2~~ inches deep. 4-3/4 20"
4. Fan Controls: Rocker.
5. Fan Speed Control: 2-speed.
6. Sones Rating:
   a. Rear Exhaust: 5.5.
   b. Top Exhaust – Round: 7.0.
7. Filter Cleaning: Dishwasher safe
8. Rectangular Duct: 3-1/4 inches by 10 inches.
9. Rear Exhaust CFM: 180
10. Vertical Exhaust CFM (round duct): 170.
11. Power/Ratings: Current rating amps at 120V: 2.5 A.
12. Features:
    a. Cooktop light.
    b. Removable single mesh grease filter.
    c. Light controls: On/Off.
    d Damper included.
    d. 3-1/4 inch by 10 inch rectangular duct
13. Finish: White on White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings and utility rough-in services are ready to receive work and opening dimensions are as indicated on shop drawings, and as instructed by manufacturer.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set and adjust units level and plumb.

C. Connect to utilities and make units operational.

D. Activate units to confirm correct operation.

3.3 ADJUSTING

A. Adjust operating equipment to efficient operation.

3.4 CLEANING

A. Remove packing materials from equipment.

B. Wash and clean equipment

END OF SECTION

SECTION 12 24 13

SOLAR ROLLER SHADES

FULL LINE WINDOW COVERINGS
FAIRFIELD, CA
707-402-1008
SUBMITTAL #15

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sunscreen roller shades

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Flame Spread
2. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

B. Federal Specifications Unit:
1. FS CCC-C-521E - Fire Retardency

C. National Fire Protection Association:
1. NFPA 701 - Large Scale/Small Scale Requirements.

1.3 SYSTEM DESCRIPTION

A. Horizontal solar roller shades installed at window openings, manual control of raising and lowering by chain.

1.4 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product Data : Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
3. Storage and handling requirements and recommendations.
4. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

B. Anti-Microbial Characteristics: 'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.6 QUALIFICATIONS

A Manufacturer: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.8 PROJECT CONDITIONS

A Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Section 01 77 00 – Contract Closeout: Requirements for warranties.

B. Furnish manufacturer's standard non-depreciating 25 year warranty for roller shade hardware and chain.

C. Furnish manufacturer's standard 25 year warranty for roller shade fabric.

D. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 - PRODUCTS

2.1 SOLAR ROLLER SHADES

A. Manufacturers:
1. Mecho Shade Systems, Inc.; www.mechoshade.com
2. Levolor
3. Substitutions: Not permitted. Mecho Shade Systems, Inc. and Levelor are District standard.

2.2 ROLLER SHADE TYPES

A. Manually Operated Shades:
1. Mounting: Surface mounted with fascia.
2. Configuration: Single solar shadecloth.
3. Shade Fabric: MechoShade 1000 Series Dense Vertical Weave ShadeCloth with 2-3 percent Openness Factor.
   a. Elegant 1x4 twill weave of thin yarn.
   b. Clean uniform control of light and heat
   c. Color: 1004 Black/Brown "

2.3 SHADE CLOTH

A. Visually Transparent Shadecloth: MechoShade Systems, Inc., EuroTwill series: 0.010 diameter non-raveling vinyl/polyester yarn, fabric thickness 0.025 inches.

2.4 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
2. Shade Band and Shade Roller Attachment:
   a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades, and less than 2.55 inches for motorize shades are not acceptable.
   b. Provide for positive mechanical engagement with drive/brake mechanism.
   c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable/replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
   d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
   e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of

plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.6 COMPONENTS

A. Access and Material Requirements:
1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

B. Manual Operated Chain Drive Hardware and Brackets:
1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
   a. MechoShade Drive Bracket Model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, center supports and connectors for multi-banded shades.
   b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch steel pin.
   c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. in the stopped position.
   d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-

jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.

e The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.

f Drive Chain: #10 qualified stainless steel chain rated to 90 lb. minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
2. Fascia shall be able to be installed across two or more shade bands in one piece.
3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
5. Notching of Fascia for manual chain shall not be acceptable

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and window openings are ready to receive the work.

B. Do not commence fabrication until field measurements are confirmed.

C. Ensure head rail supports are correctly placed.

D. Beginning of installation means installer accepts existing surfaces.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

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

3.4 ADJUSTING

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

3.5 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for final cleaning.

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

3.6 DEMONSTRATION

A. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.7 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.8 SCHEDULE

A. Refer to Drawings for location of solar roller shades.

END OF SECTION

SECTION 12 48 13

ENTRANCE FLOOR MATS

KADEE INDUSTRIES, INC.
WALTON HILLS, OH
800-321-3827

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following types of entrance flooring systems:
1. Floor Mats and Frame Assemblies

1.2 REFERENCES

A. ASTM International.
1. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
2. ASTM D2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
3. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant heat Energy Source.

B. The Aluminum Association

C. The Carpet and Rug Institute (CRI).

D. The National Floor Safety Institute (NFSI).

1.3 SUBMITTALS

A. Section 01 32 19 – Submittal Procedures: Requirements for submittals.

B. Product data for each type of floor mat and frame specified including manufacturer's specifications and installation instructions.

C. Shop drawings in sufficient detail showing layout of mat and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.

D. Samples for verification purposes: Submit an assembled section of floor mat and frame members with selected tread insert showing each type of color for exposed floor mat, frame and accessories required.

E. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.4 QUALITY ASSURANCE

A. Flammability in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m^2.

B. Slip resistance in accordance with ASTM D2047, Coefficient of Friction, minimum 0 60 for accessible routes.

C. Standard rolling load performance is 1000 lb /wheel (load applied to a solid 5" x 2" wide polyurethane wheel, 1000 passes without damage).

D. Single Source Responsibility: Obtain floor mats and frames from one source of a single

manufacturer

E Utilize superior structural aluminum alloy 6063-T6 for rail connectors

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer

1.6 PROJECT CONDITIONS

A Field measurements: Check actual openings for mats by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

B. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS

A. Manufacturers:
1. Construction Specialties, Inc.; www.c-sgroup.com
2. Kadee Industries; www.KadeeIndustries.com
3. Substitutions: Section 01 60 00 – Product Requirements: Product options and substitutions.

B. Product Description and Basis of Design: C-S Group; M1 Pedimat. Drawings and specifications are based on manufacturer's literature from Construction Specialties, Inc. unless otherwise indicated. Other manufacturers must comply with the minimum levels of material and detailing indicated on the drawings and specified herein.

2.2 MATERIALS

A. Aluminum: ASTM B221, alloys 6063-T5, 6063-T6 for extrusions

B. Architectural Bronze: ASTM B455, copper/zinc alloy C38500 for extrusions.

C. Vinyl/Acrylic: High-impact PVC alloy

D Flexible and prime PVC extrusions.

E. Tread insert: Refer to Article 2.5.

2.3 FLOOR MATS

A. Model and Description - M1 Pedimat Exposed hinge rail connectors shall be extruded 6063-T6 aluminum, complete with perforations for drainage. Tread rails shall be manufactured from high-impact vinyl/acrylic, complete with co-extruded soft-durometer cushions. Supplied in mill finish

2.4 MAT FRAMES

A. SM - Tapered Vinyl Frame shall be 1-1/2-inch wide, with tapered lead-in edge for surface

mounted applications. Frame color: As selected by Architect, from one of 2 colors as offered by manufacturer.

2.5 TREAD INSERT

A. HD MonoTuft HD™ Carpet shall meet the Carpet and Rug Institute's standard for indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch and colorfast, solution-dyed nylon.
1. Color: ~~7325 Wrought Iron~~ NEAR BLACK
2. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths.
3. Anti-static carpet fiber shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling.
4. Carpet weight: 33-oz /yd².

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Manufacturer shall offer assistance and guidance to provide a template of irregular shaped mat assemblies to ensure a proper installation.

3.3 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations.
1. Securely fasten floor mats at exposed edges.

B. Set mat at height recommended by manufacturer for most effective cleaning action.

C. Coordinate top of mat surface with bottom of doors that swing across to provide ample clearance between door and mat.

3.4 CLEANING

A. Section 01 74 00 – Cleaning: Requirements for cleaning.

B. It is important to the life cycle of the entrance mat that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.5 PROTECTION

A. Defer installation of floor mats until time of substantial completion of project.

END OF SECTION

SECTION 22 00 00

PLUMBING REQUIREMENTS

AYOOB MECHANICAL
COLMA, CA
650-992-8281
SUBMITTAL #17

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Work included in 22 00 00 applies to Division 22 work to provide materials, labor, tools, permits and incidentals to provide and make ready for Owner's use plumbing systems for proposed project

B. Related Work Specified Elsewhere:
1. Contents of Section applies to Division 22 specifications
2. Requirements of Section are a minimum for Division 22 Sections, unless otherwise stated in each Section, in which case that Section's requirements take precedence

1.02 DEFINITIIONS

A. Following is a list of abbreviations generally used in Division 22:

1.	ADA	Americans with Disabilities Act
2.	AHJ	Authority Having Jurisdiction
3.	ANSI	American National Standards Institute
4.	ARI	Air-Conditioning & Refrigeration Institute
5	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
6	ASME	American Society of Mechanical Engineers
7.	ASTM	American Society for Testing and Materials
8	ASSE	American Society of Sanitary Engineering
9.	AWWA	American Water Works Association
10.	CBC	California Building Code
11.	CEC	California Electrical Code
12.	CMC	California Mechanical Code
13	CPC	California Plumbing Code
14	CISPI	Cast Iron Soil Pipe Institute
15.	CSA	Canadian Standards Association
16.	ETL	Electric Testing Laboratories
17.	FM	FM Global
18	HI	Hydraulic Institute Standards
19.	HVAC	Heating, Ventilating and Air Conditioning
20.	IBC	International Building Code, latest adopted version with State amendments as referenced in CBC
21	IFC	International Fire Code
22	IMC	International Mechanical Code
23	LEED	Leadership in Energy and Environmental Design in Association Green Building Council
24.	MSS	Manufacturers Standardization Society
25.	NEC	National Electric Code
26	NEMA	National Electrical Manufacturers Association
27	NFPA	National Fire Protection Association
28	NRCA	National Roofing Contractors Association
29	NSF	National Sanitation Foundation
30	OSHA	Occupational Safety and Health Administration
31	SMACNA	Sheet Metal and Air Conditioning Contractors' National Association, Inc

32.	TEMA	Tubular Exchanger Manufacturers Association
33.	TIMA	Thermal Insulation Manufacturers Association
34.	UL	Underwriters Laboratories Inc
35.	UPC	Uniform Plumbing Code

B. Provide: To furnish and install, complete and ready for the intended use.

C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.

D. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site as required to complete items of work furnished by others.

1.03 ADDITIONAL REQUIREMENTS TO DIVISION 01

A. Operation and Maintenance Documentation: Copies of certificates of code authority acceptance, test data, parts lists, maintenance information for equipment, valves, balancing reports, and other special guarantees, certificates of warranties, and the like, specified elsewhere herein or indicated on Drawings.

B. Shop Drawings: Provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

C. Close-out Documentation: Submit plumbing code authority certification of inspection.

D. Record Drawings:
1. Show changes and deviations from the Drawings. Include issued Addendum and change order items.
2. Make changes to the Drawings in a neat, clean, and legible manner.

E. Product Data:
1. Submit manufacturer's technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, supplied or provided. Refer to individual specification sections for specific items required in product data submittal. Submit at one time in 3-ring binder, tabbed and referenced to match the Contract Documents.
2. Maintain an updated product submittal package to be included in the final operation and maintenance documentation.

1.04 QUALITY ASSURANCE

A. Where Contract Documents are at variance with applicable codes governing work, code and local jurisdiction requirements take precedence, and include cost necessary for code compliance or local jurisdiction compliance in bid price. Machinery and equipment to comply with Occupational Safety and Health Act of 1970, as currently revised, as interpreted for equipment manufacturer requirements.

B. Plumbing Drawings: Drawings are intended to be diagrammatic and are based on one manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than basis of design, including but not limited to architectural, structural, electrical, HVAC, fire sprinkler, and plumbing.

C Requirements: As a minimum requirement, work in accordance with following rules and regulations and applicable laws:
1. NFPA.
2. OSHA.
3. Codes as published by ICBO:
   a. IBC.
   b. IFC.
   c. IMC.
   d. IPC.
4. UPC.
5. Related supplements and standards.
6. California State Energy Code.
7. CBC California Building Code
8. CMC California Mechanical Code
9. CPC California Plumbing Code
10. State of California and local jurisdictional requirements.

D Permits and Inspections:
1. Unless otherwise distinctly hereinafter specified, apply and pay for necessary permits, plans check, and inspections required by public AHJ.
2. Refer to General and Supplementary Conditions for payment of water and sewer service connection fees
3. Obtain certificates of inspection from AHJs and deliver to Owner before final acceptance.
4. Each trade to consult local building department and utility companies prior to commencement of work to ascertain existence and location of existing underground utilities. Protect existing service against damage and interruption of use, and reroute as may be necessary to accomplish new work. Include costs for materials and installation for rerouting as specified for new work in bid price

E Regulatory Requirements:
1. UL and CSA Compliance: Provide units which are UL and CSA listed.
2. ASME Compliance: Provide units which are ASME listed when water heaters and boilers which exceed 200,000 BTUH, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.
3. Provide safety controls required by National Boiler Code (CSD-1) for boilers and water heaters exceeding 400,000 BTUH.

1.05 SEQUENCING AND SCHEDULING

A For proper execution of work cooperate with other trades as needed.

B To avoid installation conflicts, thoroughly examine complete set of Contract Documents. Resolve conflicts with Architect prior to fabrication and installation.

C Prior to installation of equipment requiring electrical connections, examine manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that electrical characteristics indicated in Contract Documents are consistent with electrical characteristics of actual equipment being installed. When inconsistencies occur request clarification from Architect

1.06 COORDINATION DOCUMENTS

A. Prepare and submit coordinated layout drawings, prior to construction, to coordinate installation and location of ductwork, grilles, diffusers, piping, fire sprinklers, plumbing, lights, and electrical services. Composite Drawings show services on single sheet. Key Drawings to structural column identification system, and progressively number. Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including plumbing, HVAC, fire protection, electrical, ceiling suspension, and tile systems), and provide reasonable maintenance access requirements.

B. Prepare Drawings as follows:

1. Prepare Drawings to accurate scale of 1/4 inch = 1 foot or larger on Mylar sheets or AutoCAD. Drawings are to be same size as Contract Drawings and to indicate location, size and elevation above finished floor of plumbing equipment and piping. Drawings to also indicate proposed ceiling grid and lighting layout as shown on electrical drawings and reflected ceiling drawings.
2. Review and revise as necessary section cuts in Contract Drawings after verification of field conditions.
3. Indicate plumbing system piping including fittings, hangers, access panels, valves, and bottom of pipe elevations above finished floor.
4. Piping that must be graded to have right-of-way over more flexible items. Drawings also to indicate proposed ceiling grid and lighting layout as shown on electrical drawings and reflected ceiling drawings and HVAC equipment, ductwork and piping.
5. Drawings are to incorporate Addenda items and change orders.
6. Distribute drawings to trades and provide additional coordination as needed.

C. Advise Architect, in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

D. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.

E. Final coordination drawings with appropriate information added to be submitted as Record Drawings at completion of project.

1.07 EXISTING SOILS CONDITIONS

A. Understand existing soils conditions before submitting bid on work. No additional allowance will be granted due to lack of information for existing conditions of subsurface soils.

B. Submission of a bid will be considered acknowledgment of review/understanding of project geotechnical soils report.

PART 2 - PRODUCTS

2.01 HAZARDOUS MATERIALS

A. Do not use products containing asbestos, lead, arsenic, or any other material defined by EPA as hazardous to human or animal life.

2.02 MATERIALS

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, the latest products as listed in manufacturer's printed catalog data and are to be UL or CSA approved or acceptable by state, county, and city authorities. Equipment supplier is responsible for obtaining state, county, and city acceptance on equipment not UL approved or not listed for installation.

B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Install equipment having components requiring access (i.e., drain pans, drains, control operators, valves, motors, drives, and the like) so that they may be serviced, reset, replaced or recalibrated and the like, by service people with normal service tools and equipment. Notify Architect in writing if equipment or components are shown in such a position that above cannot be accomplished.

B. Install equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment, examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods and sequencing, in coordination with other trades and disciplines.

C. Earthwork:
   1. Refer to Division 31.
   2. Perform excavation and backfill for installation of plumbing work.

D. Firestopping:
   1. Coordinate with Drawings location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated, seal around piping, equipment, and the like, with approved firestopping material.
   2. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814.

3.02 NOISE AND VIBRATION

A. Install vibration isolators, flexible connectors, expansion joints, and measures required to prevent noise and vibration from being transmitted to occupied areas. Select equipment to operate within noise coefficient (NC) design level for particular type of installation in relation to its location.

B. After installation, make proper adjustments to reduce noise and vibration to acceptable levels as defined by Architect.

3.03 SEISMIC CONTROL

A. Provide per Section 22 05 48, Vibration and Seismic Controls for Plumbing Piping and Equipment

1. General:
   a. Earthquake resistant designs for plumbing equipment, i.e., water heaters, motors, and plumbing piping, to conform to regulations of IBC.
   b. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment piping and the like, to withstand a force in direction equal to value defined in IBC.
   c. Retain licensed structural engineer to provide shop drawings of seismic bracing and seismic movement assemblies for piping/equipment/water heaters, and the like. Engineer to design and provide stamped shop drawings for equipment, water heaters, piping seismic bracing, and the like. Submit shop drawings along with equipment submittals.
   d. Retain licensed structural engineer to provide shop drawings of seismic flexible joints for piping and the like crossing building expansion or seismic joints. Engineer to design and provide stamped shop drawings for piping flexible seismic joints. Coordinate actual design deflection or travel with project structural engineer. Submit shop drawings along with seismic bracing details. Coordinate exact design requirements from project structural engineer.
2. Piping:
   a. Use "Seismic Restraints Manual Guidelines for Plumbing Systems," published by SMACNA.
   b. Sway bracing is not required for pipes that are installed on very short individual hangers (12 inch or less).
   c. As approved by code authority, use a bracing system manufactured by Tolco, Superstrut, Mason, or Pipe Shields Inc. or approved.
3. Equipment:
   a. Provide a means to prohibit excessive motion of plumbing equipment during earthquake.
   b. Provide plumbing equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

3.04 REVIEW BY ENGINEER

A. Notify Architect/Engineer, in writing, at following stages of construction so that Architect/Engineer may, at their option, visit site for review and construction observation:

1. Underground piping installation prior to backfilling.
2. Prior to covering walls.
3. When ceiling installation is started.
4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

3.05 OPERATING DURING CHANGEOVER

A. During remodeling of existing structure, or addition of a structure to existing structure, while existing structure is occupied, present services to remain intact until new construction, facilities or equipment is installed.

B. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping, wiring, and the like, to point of connection.

C. Perform actual transfer to new service at off-peak time, as coordinated with Owner. Once changeover is started, pursue it to its completion, to keep interference to a minimum.

3.06 MUTILATION

A. Repair mutilation of building around pipes, fixtures, and the like.

3.07 DEMOLITION

A. Scope:

1. It is intent of these documents to provide necessary information and adjustments to plumbing system required to meet code, and accommodate installation of new work.
2. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas.
3. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

B. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of the demolition process are the Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.

C. Unless specifically indicated on the Drawings, remove unused piping. Cap piping and patch surfaces to match surrounding finish.

D. Unless specifically indicated on the Drawings, remove unused equipment, fixtures, fittings, rough-ins, connectors, etc. Removal is to be to a point behind finished surfaces (floors, walls, ceilings, etc.).

3.08 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize plumbing equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

3.09 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

B. Maintain design intent where equipment other than as shown in Contract Documents is provided. Where equipment requires piping arrangement, control diagrams, or sequencing different from that indicated in Contract Documents, provide electrical motors, wiring, controls, or other required electrical components at no additional cost to Owner.

3.10 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and equipment in a manner to prevent damage and deterioration. Store in original container which identifies manufacturer's name, brand and model number. Do not store indoor equipment outdoors unless provided with a waterproof protective cover.

B. Replacement: In event of damage, immediately make repairs and replacements necessary.

3.11 DEMONSTRATION

A. Upon completion of work and adjustment of equipment, test systems to demonstrate to Owner's Representative and Architect that equipment furnished and installed or connected under provisions of these Specifications functions mechanically in manner required.

B. Manufacturer's Field Services: Furnish services of a qualified person for a period of not less than eight hours, at a time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in a satisfactory manner and complies with requirements of other trades or Contractors that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.12 CLEANING

A. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated by this work.

3.13 INSTALLATION

A. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level, firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.

B. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
   1. Do not place equipment in sustained operation prior to initial balancing of plumbing systems.
   2. Furnish sufficient dry nitrogen for pressure testing under manufacturer's supervision.
   3. Provide and install pump impellers to obtain design capacities. Coordinate exact requirements with balancing firm.

3.14 PAINTING

A. Ferrous Metal: After completion of plumbing work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, and the like, with one coat of black asphalt varnish or black enamel suitable for hot surfaces.

B. Machinery:
1. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
2. See individual equipment Specifications for other painting.
3. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

C. Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

3.15 CUTTING AND PATCHING

A. Refer to Section 01 73 29 "Cutting and Patching "

3.16 ACCEPTANCE

A. System can not be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
1. Testing and balancing reports
2. Cleaning.
3. System balancing and balancing logs.
4. Operating and Maintenance Manuals.
5. Training of operating personnel.
6. Record Drawings.
7. Guaranty certificates
8. Start-up and test document.
9. Letter of conformance.

3.17 LETTER OF CONFORMANCE

A. Provide letter and copies of extended warranties with a statement in letter that Plumbing items were installed in accordance with manufacturer's recommendations. Include letter of conformance and warranties in operating and maintenance manuals.

B. Warranties to begin at date of substantial completion.

END OF SECTION

SECTION 22 05 12

PLUMBING PIPE AND FITTINGS

AYOOB MECHANICAL
LOLMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:
1. Materials, installation and testing of pipe, tubing and fittings.
2. Refer to Specification Sections for each system medium (i.e., plumbing, hydronics, gas, and the like), for pipe application.

1.02 QUALITY ASSURANCE

A. Qualifications:
1 Manufacturer's Qualifications: Firms regularly engaged in manufacture of piping products of types and sizes required.
2. Welding Qualification: Qualify welding procedures, welders and operators in accordance with ANSI B31.9 for shop and project site welding of piping work.

B. Manufacturer's Inspection: Inspect flanges, fittings and field applied welds in accordance with manufacturer's standard written quality control procedure in accordance with the following techniques:
1. Visual Method: Comply with MSS SP-55 except as otherwise indicated
2. Radiographic (X-Ray) Method: Employ wherever recommended or required for pressurized piping systems.

1.03 SUBMITTALS

A. Piping Materials List: Provide a typewritten list which schedules the piping materials to be used for each system as a function of applicable nominal pipe size ranges. Arrange schedule in outline form for each specific piping system, e.g., "Domestic Water System," "Soil, Waste, and Vent Piping System," and the like. Include ASTM, ANSI or other numbers and other data as necessary to demonstrate compliance with requirements.

B. Test Procedure: Submit a typewritten checklist type of testing procedure indicating testing medium (i.e., water, air, nitrogen, and the like), pipe service, pipe and fitting type and classification, test pressure, pass/fail criteria and any other pertinent data.

PART 2 - PRODUCTS

2.01 PIPING - GENERAL

A. Provide pipe, tube and fittings of the type, fitting requirements, grade, class, size and weight indicated or required for each service, as indicated in other Division 22 Specifications. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

2.02 STEEL PIPE

A. ASTM A53, Black Welded or Seamless, Grade B: Schedule as specified

B. ASTM A135, Electric Resistance Welded, Grade B: Black, unless otherwise indicated, schedule as specified.

2.03 COPPER TUBE

A. Temper: Annealed (hard drawn).

B. Water Service: ASTM B88, Type as indicated for each service.

C. Drain, Waste, and Vent (DWV): ASTM B306.

2.04 CAST IRON PIPE

A. ASTM A74, hub-and-spigot, service weight

B. ASTM A888/CISPI 301 hubless, including coupling assembly.

2.05 FITTINGS FOR STEEL PIPE

A. General: Flanges, fittings, unions and other products, mark in accordance with MSS SP-25.

B. Welding Fittings: Wrought carbon steel fittings, ASTM A234, ANSI B16.9, B16.28. Butt-welding type unless otherwise indicated to be socket welding type

C. Branch Connections: From mains or headers 2-1/2 inches or larger, welded tees or forged welding outlets

D. Welding Outlets: "Weldolets" or "Threadolets" equivalent to Bonney Forge. Use forged welding outlets wherever branch line is at least 1 nominal pipe size smaller than local main or header.

E. Threaded Fittings: ANSI B2.1, ASTM A47, 150 PSI rating, except where otherwise specified, prevailing codes or requirements or Specifications dictate use of 300 PSI rating. Fabricate from standard malleable iron with dimensions conforming to ANSI B16.3.
   1. Fitting requirements for galvanized steel piping systems to be the same as for black steel pipe except each to have galvanized coating.
   2. Fittings for waste, vent and drainage piping to be drainage pattern type.

F. Flanges: Carbon steel conforming to ASTM A105, ANSI B16.5, and factory forged in the USA. Flanges which have been machined, remade, painted, or are nondomestic origin are not acceptable. Provide raised or full face ends wherever indicated or required.

G. Unions: ANSI B16.39, ASTM A47, and be fabricated from malleable iron with bronze-to-iron ground joints rated at 150 percent design operating pressure. Threads: ANSI B2.1.

H. Fasteners: Semi-finished carbon steel bolts and hex nuts conforming to ASTM A307. Threads and Dimensions: ANSI B1.1 and B18.2.

I. Threaded Pipe Plugs: ANSI B16.14.

J. Thread Lubricant: RectorSeal No. 5 or Slic-tite Teflon Paste.

2.06 FITTINGS FOR COPPER TUBE

A. Wrought copper/bronze solder joint fittings complying with ANSI B16.22.

B DWV Service:
1. Cast Copper Solder Joint Drainage Fittings: ANSI B16.23.
2 Wrought Copper Solder Joint Drainage Fittings: ANSI B16.29.

2.07 FITTINGS FOR CAST IRON PIPE

A Hubless Cast Iron Drainage Pipe Fittings: CISPI 301 as manufactured by ABI, Charlotte or Tyler with stainless steel clamp assemblies.
1 Manufacturers for heavy-duty or below grade applications meeting FM-1680: Husky SD4000 or Clamp-All high torque couplings.
2. Manufacturers for standard duty applications: Anaco, Mission, or Tyler

B. Cast Iron Hub-and-Spigot Drainage Pipe Fittings: Match drainage pipe units, ASTM A74. Fitting joints: Positive seal compression type gaskets, ASTM C564.

2.08 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

A. Insulating (Dielectric) Unions: ~~Standard units recommended by manufacturer for use in the service indicated, which isolate ferrous from nonferrous piping, and prevent galvanic corrosion action. Minimum rated "flashover" voltage: 600 volts. Watts 3000 Series. Provide insulated flanges for flanged piping system connection to dissimilar metals.~~ **Under no circumstances shall dielectric unions or dielectric pipe nipples be used on heating hot water, domestic and chilled water on piping applications, exterior and interior. To isolate ferrous from nonferrous piping, and prevent galvanic corrosion action, high-grade brass nipples and brass unions at transition points.**

B. Welding Materials: Comply with Section 2-C of ASME Boiler Code, as applicable.

C. Tin-Antimony Soldering Materials: ASTM B13.

D Gaskets for Flanged Joints: ANSI B16.12; full faced for cast iron flanges; raised face for steel flanges, unless otherwise indicated or recommended by manufacturer. Gaskets: Minimum 1/8-inch thick fabricated from nonasbestos bases

E. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e g , "Phos-O" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping Installations conform to accepted published procedures, i.e , UPC Installation Standard 3-75 and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited

2.09 UNIONS

A Steel Pipe Union: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe

B. Copper Pipe Union: 200 PSI working pressure. Bronze body, solder or grooved ends. Pipes 2 inches and under use ground joint, pipes 2-1/2 inches and larger use flanged face or grooved ends

C Insulating Unions: 250 PSI working pressure. Pipe ends and material to match piping.

Electric current below 1 percent of galvanic current Gasket material as recommended by manufacturer. Epco or approved.

2.10 ESCUTCHEONS

A. Brass material, chrome plated finish Size sufficient to cover pipe openings through wall, floor or ceiling. Set screw or spring to secure to pipe. Coordinate opening sizes.

2.11 ACCESS PANELS

A. Provide flush mounting access panels as required for service of cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size) Wall access panels to be minimum 12x12 (or required and approved size).

B. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General Electrical Equipment Clearances: Do not route piping through electrical rooms, transformer vaults, elevator equipment rooms, and other electrical or electronic equipment spaces and enclosures. Within equipment rooms, provide minimum 3 feet lateral clearance from sides of electric switchgear panels. Do not route piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with electrical and coordinate exact pipe routing to provide proper clearance with such items.

B. Installation/Coordination:

1. General: Comply with basic requirements of Section 22 05 29, Hangers and Supports for Plumbing Piping and Equipment. Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each route with a minimum of joints and couplings, but with adequate and accessible unions or flanges for disassembly, maintenance, and replacement of valves and equipment. Reduce sizes by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance. Comply with ANSI B31.9 Code for Pressure Piping.
2. Installed piping not to interfere with maintenance of equipment, opening of doors or other moving parts nor be directly above or near any portion of electrical equipment.
3. Support piping such that connected equipment and flanges do not bear weight of piping
4. Adequately support vertical lines at their bases or by a suitable hanger placed in horizontal line near the riser or, preferably, by a base fitting set on a pedestal.
5. Piping not to be suspended or supported by pumps. Apply no force to pumps by connecting pipes. After final pipe adjustments and initial operational verification of the pumps, recheck alignment of pumps and realign as required
6. Piping systems are to be installed to drain. Provide properly sized drain valves at low points.
7. Ream pipes after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods for opening and closure.

8. Remake or replace defective, leaking or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

9. Install piping to prevent stresses and strains to piping and hangers and supports due to expansion or contraction and building settlement. Provide proper loops, guides, offsets, anchor points, or expansion joints. Verify with anticipated settlement or shrinkage of building. Verify construction phasing of project, type of building construction products and type for coordinating installation of piping systems. Include provisions for servicing and removal of equipment without dismantling piping.

10. Piping Systems Routing Within Unconditioned Spaces, Plenums, Chases, or Cavities:
    a. Unless absolutely unavoidable, route fluid filled and (or) pressurized piping systems on the "warm" side of local building wall, roof, or ceiling thermal insulation batts, boards, or blankets as near to heated space as practical.
    b. Whenever such routing as described above is entirely impractical or impossible, provide heat tracing systems to piping, wherever necessary. Inform Architect before proceeding.

11. Expansion and Flexibility: Install work with due regard for expansion, contraction, and building settlement to prevent damage to the piping, ductwork, equipment and the building and its contents. Provide piping offsets, loops, approved type expansion joints, anchors or other means to control pipe movement, to minimize pipe forces and effects of building settlement.

12. Corrosion Control:
    a. Underground Steel Piping Corrosion Protection: Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat." Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3 inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.
    b. Install hot water heating vessels with a stainless steel fitting at tank and a dielectric fitting on both supply and discharge sides of hot water tanks.

13. Pipe Sleeves:
    a. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.
    b. Floor Sleeves (Except DWV Piping at Slab on Grade): Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with nonshrinking grout or approved caulking compound. Provide "Link-Seal" Type S sleeve sealing system for slab on grade. Caulk/seal piping passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements.
    c. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping passing through fire-rated building assemblies with UL approved fire-rated assemblies. Provide fire-rated assemblies per local AHJ requirements.
    d. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Penetrations must be indicated on structural shop drawings. See Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam

penetrations prior to reinforced concrete and steel beam shop drawing submittal.

14. Conform with applicable codes and industry standards.

15. Install uninsulated piping so that unrestrained direct contact with the structure or other system installations is avoided. Where contact with or passage through building or structural features cannot be avoided; firmly anchor piping to, or isolated from, the structure to prevent noise transmission and occurrence of physical damage. Install piping to be insulated with adequate clearance around piping to allow for placement of full thickness insulating material.

C. Pressure Piping Routing:

1. Route piping, except as otherwise indicated, vertically and horizontally (sloped to drain). Avoid diagonal runs wherever possible. Orient horizontal routes parallel with walls and beam lines.

2. Install piping as shown or described by diagrams, details and notations on Drawings or, if not indicated, install piping to provide the shortest route which does not obstruct usable space or block access for servicing the building and its equipment.

3. Support piping adjacent to walls, overhead construction, columns and other structural and permanent enclosure elements of the building. Limit clearance to 1/2 inch wherever furring is indicated for concealment of piping. Allow for insulation thickness, if any. Locate insulated piping to provide minimum 1-inch clearance outside insulation.

4. Wherever possible in finished and occupied spaces, conceal piping from view by locating within column or beam enclosures, hollow wall construction, or above suspended ceilings. Do not encase horizontal routes in solid partitions, except where approved.

D. Preparation:

1. Cast Iron Soil Pipe: Conform with state plumbing code and standards, CISPI recommendations and applicable adopted code amendments.

2. Hubless Cast Iron Joints: Comply with CISPI HSN utilizing calibrated torque wrenches for tightening bands to manufacturer's recommended settings.

3. Unions:

   a. Insulating (Dielectric) Unions: Comply with manufacturer's instructions for installing unions wherever piping of dissimilar metals are adjoined. Install unions in manner which will prevent galvanic action and inhibit corrosion.

   b. Standard Unions: Install where indicated on Drawings and on each side of pieces of equipment to permit easy removal of equipment.

4. Copper Tubing:

   a. Remove burrs from and clean outer surface of tube ends and inner surface of fittings.

   b. Copper-Soldered: Make soldered joints for copper tubing and fittings with code approved solder alloys meeting ASTM and ANSI standards and listings. Solder-paste-flux combination fillers are not approved. Installations to conform to accepted published procedures, i.e., UPC IS 375, IS 21-80 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Apply flux as recommended by manufacturer. Allstate Silver Bearing Solder 430 or other approved solder alloys which do not contain lead or cadmium.

c. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e.g., "Phos-0" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping. Installations to conform to accepted published procedures, i.e., UPC IS 3-75 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Remove bonnets and nonmetallic seats on valves and cool body with damp cloth while soldering or brazing. Remove excess flux from completed joints in accordance with manufacturer's instructions and code standards.

d. Copper-Rolled Joints: Pipe ends clean and free from indentations, projections and roll marks in the area from pipe end to rolled area for proper sealing of gasket. Apply a thin uniform coat of nonpetroleum-based lubricant to the gasket, coupling or housing by brush or hand. Place the gasket over one pipe end, the pipe ends aligned and brought together, and the gasket positioned between rolled area and pipe ends. Assemble the coupling housing over the gasket with housing keys engaging both rolled areas. Insert the bolts and nuts started, uniformly tighten until the housing bolt pads are firmly together, metal to metal.

e. Pressurized Service:
   1) Unless otherwise indicated, wrought copper/bronze solder joint fittings complying with ANSI B16.22.1995.
   2) Copper Tube Unions: Standard products as recommended by manufacturer for use in the service. Rated at 150 percent design operating pressure.
   3) Mechanically Formed Tee Connections:
      a) Form mechanically extracted collars in a continuous operation consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. Fully adjustable collaring device to ensure roper tolerance and complete uniformity of the joint.
      b) Notch the branch to conform with the inner curve of the run tube and dimpled to ensure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube
      c) Braze joints in accordance with the Copper Development Association Copper Tube Handbook using B-cup series filler metal. Note: Soft soldered joints will not be permitted

E. Cross-Linked Polyethylene Tubing and Fittings:
   1. Tubing Installation Under Concrete Slab:
      a. Install tubing in excavated ditch below bottom of Concrete slab. Backfill/encase tubing with sand or pea gravel.
      b. When making 90 degree bends below the slab, use metallic 90 degree bend supports or 90 degree elbows (one size larger than nominal tubing.
   2. Tubing Installation Through Wall or Overhead:
      a. Allow tubing slack of 1/8 to 3/16 inch per lineal foot to accommodate thermal expansion. Do not pull tubing tight during installation.
      b. Do not rigidly anchor tubing.
      c. Protect tubing passing through hollow masonry walls or metal studs with sleeves or grommets
      d. Protect tubing from nail or screw damage with suitable steel plate protectors.

3. Tubing Supports:
   a. Use plastic pipe supports or supports designed for use with plastic tubing.
   b. Place horizontal support every 32 inches for 3/8-, 1/2-, 3/4- and 1-inch tubing.
   c. Provide vertical support at every floor with a mid-story guide placed between floors.
4. Joints and Connections:
   a. Square cut tubing ends, free of burrs or debris, before connection is made.
   b. Make fittings and connections in compliance with manufacturer's recommendations.
   c. Make transition joints with manufacturer approved fittings only.
5. Fire Wall, Floor or Ceiling Penetrations:
   a. Firestopping system shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 in a configuration that is representative of field conditions.
   b. Use firestop material compatible with tubing as specified herein.
6. Fixture Outlet Rough-In: Provide Type "L" copper tube stubout ells and copper stubout brackets.
7. Inspection and Testing: After completion of any section of the installation, there shall be no visible signs of leakage, cracks, gouges or excess debris.

F. CPVC (Chlorinated Polyvinyl Chloride) Pipe and Fittings
1. Visually inspect pipe and pipe ends before making a joint. Any damaged pipe ends should be removed. Discard at least 2 inches of pipe beyond any visible cracking.
2. Use an approved tool to cut pipe. Pipe must be cut square to provide maximum glue bonding area.
3. Deburr end of pipe.
4. Use two step glue process, primer and glue. Use an applicator that is approximately one-half the diameter of the pipe being joined. Apply a light, even coating of primer to end of pipe and fitting socket. Apply even coat of cement to end of pipe and fitting socket. Complete the joint by rotating pipe 1/4 to 1/2 turn while inserting the pipe into the fitting, hold in place 5 to 10 seconds. Provide installation per manufacturer's recommendations and code installation standards.
5. Plastic to Metal (Brass) Transitions: Use only brass threaded female adapters to plastic adapters. Do not over torque. Use Teflon tape as a sealant.
6. Hang strap pipe/tubing loosely to allow for thermal expansion. Do not use metal straps with sharp edges. Provide hanger/support spacing per manufacturer's recommendations and code installation standards.
7. Expansion/Contraction: Provide expansion and contraction compensation per manufacturer's recommendations and code installation standards.

3.02 FIELD QUALITY CONTROL

A. Inspection:
1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

3.03 ADJUSTING AND CLEANING

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of painting, insulation, or coatings, if any. Comply with the preparation requirements of Section 22 05 53, Identification for Plumbing Piping and Equipment, and Section 22 07 00, Plumbing Insulation, as applicable. Flush out water filled or drainage piping systems with clean water, and flush other piping systems with dry air or nitrogen after completing required tests. Inspect each segment of each system for completion of joints, supports, and accessory items.

B. Inspection: Inspect pressurized piping in accordance with the procedures of ANSI B31.9.

3.04 PROTECTION

A. Protect piping from damage. Replace damaged items with new.

3.05 ESCUTCHEONS

A. Install on exposed pipes passing through walls or floors, and on fixture stops and waste connections to wall.

3.06 ACCESS PANELS

A. Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

AVOOB MECHANICAL
ROMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, installation and testing of valves, including the following:
   1. Globe valves.
   2. Drain valves
   3. Ball valves.

B. Refer to Specification sections for each system medium (i e , plumbing, hydronics, gas, and the like), for valve application.

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves of types and sizes required.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of valve.

B. Maintenance Data: Submit maintenance data and parts list for each type valve. Include this data, product data, and certifications in maintenance manual.

PART 2 - PRODUCTS

2.01 VALVES - GENERAL

A. General:
   1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
   2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6 inches and smaller, and 4 inches and smaller for plug valves. Provide gear operators for quarter-turn valves 8 inches and larger and plug valves 5 inches and larger. Provide chain-operated sheaves and chains for overhead valves.
   3. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.

B. Service:
   1. Domestic Hot and Cold Water Shutoff and Isolation Valves:
      a. Pipe Sizes 2-1/2 Inches and Smaller: Ball valve
   2. Drain Service; All Pipe Sizes: Drain valves

C. Manufacturers: Crane, Fairbanks, Anvil, Jenkins, Kennedy, Walworth, Red/White (commercial grade), Mueller, Legend, Conbraco, Nibco, DeZurik, Hays, Powell, Stockham, Hammond, Watts, Milwaukee, or approved. Note: See individual sections for specialty valves (balancing valves, pressure regulators, relief valves, earthquake valves, gas valves)

2.02 DRAIN VALVES

A Class 125, bronze body, screw-in bonnet, rising stem, composition disc, 3/4-inch hose outlet Threaded: Nibco 73 Solder: Nibco 72

2.03 BALL VALVES

A 2-1/2 Inches and Smaller: 150 PSI, bronze body, full port, bronze trim, two or three-piece construction, TFE seats and seals Threaded: Nibco T-595-Y Soldered: Nibco S-595-Y

2.04 ACCESS PANELS

A Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size) Wall access panels to be minimum 12x12 (or required and approved size).

B Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping Locate valves so as to be accessible and so that separate support can be provided when necessary.

B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

C. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

D. Mechanical Actuators: Install with chain operators where indicated Extend chains to 5 feet above floor and hook to clips to clear aisle passage.

E. Stem Selection: Outside screw and yoke stems, except provide inside screw, nonrising stem where space prevents full opening of OS&Y valves.

F Seats: Renewable seats, except where otherwise indicated

G Installation of Check Valves:

1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to centerline of pipe Install for proper direction of flow
2. Rubber Flapper Check Valves: Install in piping line in horizontal or vertical upward flow position for proper direction of flow To be used exclusively for raw sewage, storm water, or sub-soil water applications For piping 1-1/2 inches or smaller, provide a swing check valve.

3.02 VALVE ADJUSTING AND CLEANING

A Inspect valves for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists

B Valve Identification. Tag valves per Section 22 05 53, Identification for Plumbing Piping and Equipment

3.03 ACCESS PANELS

A Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work

B Where access panels are for service of fire, fire/smoke, or smoke dampers, stencil the words "Fire Damper," "Fire/Smoke Damper," or "Smoke Damper" in 1/2-inch-high capital letters on the outside of the panels

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

AYOOB MECHANICAL
LOMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Material and installation of supports, anchors and sleeves including: horizontal piping hangers and supports; vertical piping clamps; hanger rod attachments; building attachments; saddles and shields; miscellaneous materials; equipment supports; anchors; equipment supports; wall and floor sleeves; and escutcheon plates

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of supports and anchors, of types and sizes required.

B. Regulatory Requirements:
1. Provide pipe hangers and supports whose materials, design and manufacture comply with MSS SP-58, "Pipe Hangers and Supports - Materials, Design and Manufacture," latest edition
2. Select and apply pipe hangers and supports complying with MSS SP-69, "Pipe Hangers and Supports - Selection and Application," latest edition.
3. A copy of the above-referenced standards on the construction site at all times.

C. Seismic: Provide per Section 22 05 48, Vibration and Seismic Controls for Plumbing Piping and Equipment

D. Manufacturers: B-Line, Elcen Metal Products Co , F&S Control, Globe, Kindorf, Kinline, Michigan, Superstrut, Unistrut, Power-Strut Note: See individual Sections for roof equipment support.

1.03 SUBMITTALS

A. Submit the following:
1. Manufacturer's technical product data, including installation instructions, for each type of support, anchor and sleeve. Include UL approval drawing from manufacturer for each different pre-engineered firestop assembly.
2. Assembly type shop drawings for each type of sleeve, indicating dimensions, weights, required clearances, and methods of assembly of components.
3. Shop drawings for each individual roof pipe curb assembly, indicating number and location of each pipe or conduit which is to pass through the curb Indicate pipe insulation requirements.

PART 2 - PRODUCTS

2.01 PIPING HANGERS AND SUPPORTS

A General:

1. Horizontal Piping Hangers and Supports-Horizontal and Vertical Piping, and Hanger Rod Attachments: Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for uninsulated copper piping systems.
2. Building Attachments: Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
3. Saddles and Shields: Factory fabricated saddles or shields under piping hangers and supports for insulated piping. Size saddles and shields for exact fit to mate with pipe insulation. 1/2 round, 18 gauge, minimum 12 inches in length (4-inch pipe and larger to be three times longer than pipe diameter).
4. Roller Hangers: Adjustable roller hanger. Black steel yoke, cast iron roller.
5. Concrete Inserts: Malleable iron body, black finish. Lateral adjustment.
6. Continuous Concrete Insert: Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.

B Pipe Hangers Size 2 Inches and Smaller: Adjustable swivel ring hanger, UL listed. Michigan 100 or 101.

C Pipe Hangers Size 2-1/2 Inches and Larger: Adjustable clevis type, UL listed. Michigan 400.

D Riser Clamps: Steel, UL listed. Michigan 510 or 511. Copper coated; Michigan 368.

E Plumbers Tape: Not permitted as pipe hangers or pipe straps.

F Michigan numbers are indicated for type and quality. Comparable products manufactured by Globe, Elcen, B-Line, Kindorf, Kinline, Unistrut, Anvil, Super Strut, Tolco, PHD, Power-Strut, or approved.

2.02 WALL AND FLOOR SLEEVES

A General:

1. "Link-Seal" Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal. Provide Type S unless otherwise noted. Thunderline Corporation, or approved.
2. Pre-Engineered Firestop Pipe Penetration Systems: UL listed assemblies for maintaining fire rating of piping penetrations through fire-rated assemblies. Comply with ASTM E814.
3. Insulating Caulking: Eagle, Pitcher Super 66 high temperature cement, or approved.
4. Fabricated Accessories:
   a. Steel Pipe Sleeves: Fabricate from Schedule 40 black or galvanized steel pipe. Remove end burrs by grinding.

b Sheet Metal Pipe Sleeves: Fabricate from G-90 galvanized sheets closed with lock-seam joints Provide the following minimum gauges for the sizes indicated:
1) Sleeve Size 4 Inches in Diameter and Smaller: 18 gauge
2) Sleeve Sizes 5 to 6 Inches: 16 gauge
3) Sleeve Sizes 7 Inches and Larger: 14 gauge

c Fire-Rated Safing Material:
1) Rockwool Insulation: Complying with FS-HH-I-558, Form A, Class IV, 6 lbs./cu ft density with melting point of 1985F and K value of 0 24 at 75F
2) Calcium Silicate Insulation: Noncombustible, complying with FS-HH-I-523, Type II, suitable for 100F to 1200F service with K value of 0 40 at 150F

2.03 ANCHORS

A General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer

B Manufacturers: Anchor-It, Hilti Hit System, Epcon System, or Power Fast System

PART 3 - EXECUTION

3.01 PREPARATION

A Examine the Drawings and coordinate for verification of exact locations of fire and smoke rated walls, partitions, floors and other assemblies Indicate, by shading and labeling on Record Drawings such locations and label as "1-Hour Wall," "2-Hour Fire/Smoke Barrier," and the like. Determine proper locations for piping penetrations. Set sleeves in place in new floors, walls or roofs prior to concrete pour or grouting

B Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate proper placement of inserts, anchors and other building structural attachments

3.02 INSTALLATION

A Building Attachments: Install within concrete or on structural steel or wood. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert secure to forms. Where concrete with compressive strength less than 2500 PSI is indicated, install reinforcing bars through openings at top in inserts

B. Hangers and Supports:
1. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers Maximum spacings: MSS SP-69 Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe Do not support piping from other piping
2. Support fire protection piping independently of other piping.
3. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated
4. Allow controlled movement of piping systems to permit freedom of movement between pipe anchors and to facilitate action of expansion joints, expansion loops, expansion bends and similar units

5. Piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
6. Insulated Piping: Provide protection saddles where insulation without vapor barrier is indicated. Provide protection shields on insulated piping where insulation with a vapor barrier is indicated.
7. Electrical Equipment Clearances: Do not route piping through electrical rooms, transformer vaults, elevator equipment rooms, and other electrical or electronic equipment spaces and enclosures. Within equipment rooms, provide minimum 3 feet lateral clearance from all sides of electric switchgear panels. Do not route piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with Electrical and coordinate exact pipe routing to provide proper clearance with such items.
8. Hanger Spacing:
   a. Cast Iron Soil Pipe: Within 1 foot of each side of joints and at intervals not to exceed 8 feet.
   b. Steel Pipe 1 Inch and Smaller: 6 feet.
   c. Steel Pipe 1-1/4 Inches and Larger: 10 feet.
   d. Copper Tubing 1-1/2 Inches and Smaller: 6 feet.
   e. Copper Tubing 2 Inches and Larger: 10 feet.
   f. 90 Degree Offsets: Within 2 feet, both sides of offsets.

C. Anchors: Install at ends of principal pipe runs where indicated on Drawings. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

D. Equipment Curbs, and Pipe Curb Assemblies:
1. Provide prefabricated units for roof membrane and insulation penetrations related to plumbing equipment. Coordinate with roofing system. Set supports on the structural deck. Do not set supports on insulation or roofing. Provide level supports by prefabricated pitch built into the curb.
2. Pipe Curb Assemblies: Provide for piping and electrical conduit which penetrates the structural roof deck to service equipment above the roof level (i.e., piping, electrical power and control wiring).
3. Piping above roof to be supported with freestanding roof pipe supports unless detailed otherwise.

E. Escutcheon Plates: Install around horizontal and vertical piping at visible penetrations through walls, partitions, floors, or ceilings, including penetrations through closets, through below ceiling corridor walls, and through equipment room walls and floors.

F. "Link-Seal" Pipe Sleeves: Install at exterior wall piping penetrations. For penetrations below grade provide Schedule 40 steel sleeve with 1-inch, continuously welded, "weep ring" centered on length of sleeve.

G. Fabricated Pipe Sleeves:
1. Provide either steel or sheet metal pipe sleeves accurately centered around pipe routes. Size such that piping and insulation, if any, will have free movement within the sleeve, including allowance for thermal expansion. Sleeves not to be more than 1 pipe size larger than piping or piping plus insulation size.
2. Length: Equal to thickness of construction penetrated, except extend floor sleeves 1/4 inch above floor finish and, where floor surface drains to a floor drain, extend floor sleeve 3/4 inch above floor finish.
3. Provide temporary support of sleeves during placement in concrete and other work around sleeves. Provide temporary end closures to prevent concrete and other materials from entering pipe sleeves.
4. Seal each end airtight with a resilient nonhardening sealer.

H Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:
1 Install fabricated pipe sleeve
2 After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve I.D. with specified material.

I. Piping penetrations through fire-rated (1 to 3 hour) assemblies: Select and install pre-engineered pipe penetration system in accordance with the UL listing and manufacturer's recommendation

3.03 ADJUSTING AND PAINTING

A. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping and equipment to proper level and elevations.

B. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted

3.04 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E84.

B. Manufacturers: Hilti, Proset, or approved

END OF SECTION

SECTION 22 05 48

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

SUBMITTED PER SECTION 22 05 29
AYOOB MECHANICAL
COLMA, CA
650-992-2291
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials and installation of seismic restraint devices and related items Provide complete vibration isolation systems in proper working order

1.02 SEISMIC CONTROL AND RESTRAINT

A. Plumbing Equipment:
1. Brace or anchor plumbing equipment to resist a horizontal force acting in any direction using CBC Seismic Restraint requirements.
2. Vibration Isolated Equipment: Provide factory fabricated seismic restrained vibration isolating components. Earthquake resistant designs for plumbing equipment, i e., water heaters, motors, and plumbing piping, to conform to the regulations of the CBC Seismic Restraint requirements. Where standard factory fabricated components are not available, provide properly designed custom components which meet the requirements herein.
3. Provide any restraints noted on Drawings for Division 22 work.

B. Anchorage:
1. Where anchorage details are not shown on Drawings, the field installation subject to approval of the project structural engineer.
2. In other cases, retain a professional structural engineer licensed in the state in which the work will be done to provide shop drawings of seismic bracing for ductwork/equipment/water heaters. Professional engineer to design and provide wet stamped (sealed) shop drawings for equipment, water heaters, and piping seismic bracing. Submit shop drawings and calculations along with equipment submittals
3. The restraints which are used to prevent disruption of the function of the piece of equipment because of the application of the horizontal force to be such that the forces are carried to the frame of the structure in such a way that the frame will not be deflected when the apparatus is attached to a mounting base and equipment pad, or to the structure in the normal way, utilizing the attachments provided. Secure equipment to withstand a force in any direction

C. Specify the seismic bracing and anchorage of piping in Section 22 05 29, Hangers and Supports for Plumbing Piping and Equipment

D. Provide earthquake bumpers to prevent excessive motion during starting and stopping of equipment and for earthquake bracing. Install bumpers after equipment is in operation to allow proper placement and alignment and ensure that bumpers are not engaged during normal system operation.

1.03 QUALITY ASSURANCE

A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with building systems. Coordinate plan dimensions of final selections and plumbing equipment with size of housekeeping pads

B. Supply and install any incidental materials needed to meet the requirements stated herein.

1.04 SUBMITTALS

A. Provide a complete description of products to be supplied including product data, dimensions and specifications. Provide installation instructions for each product.

B. Provide a complete tabulation showing for each piece of vibration isolator supporting equipment the following:
1. The equipment identification mark
2. The isolator type with rated load.
3. The actual load per isolator.

C. Provide fabrication/shop drawings of steel rails, inertia bases, steel base frames, reinforcing, vibration isolator mounting attachment method, unitary straps and location of equipment attachment bolts.

D. Provide structural calculations for isolator seismic restraint for plumbing equipment including, but not limited to boilers, roof curbs, fuel storage tanks, pumps, water heaters, storage tanks, sealed by a professional structural engineer, registered in the state of California.

PART 2 - PRODUCTS

2.01 SEISMIC RESTRAINTS FOR PIPING

A. Use the document "*Seismic Restraints Manual Guidelines for Mechanical Systems*" Secure piping, ductwork, and the like to withstand a force in any direction

B. Sway bracing is not required for pipes that are installed on very short hangers (12 inches or less).

C. Secure HVAC and plumbing piping bracing at every fourth hanger transversely and every eighth hanger longitudinally.

D. As approved by code authority, use a bracing system manufactured by Superstrut, Mason, or Pipe Shields Inc., or approved.

2.02 RESILIENT NONHARDENING SEALANT

A. Sealants for Acoustical Purposes: DAP acoustical sealant.

B. Manufacturers: Pecra, Tremco, USG, or approved.

2.03 ACCESS PANELS

A. Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size) Wall access panels to be minimum 12x12 (or required and approved size)

B. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 APPLICATION

A. General:

1. Set floor-mounted major equipment on 4-inch-high housekeeping type concrete pads, as detailed. Extend pad 6 inches beyond footprint of equipment in each direction.
2. Install flexible pipe connections (FPC) at pipe connections to vibration isolated equipment. Included, but not be limited to, pumps, emergency generators, commercial washer/dryers, and the like.
3. Isolate miscellaneous pieces of plumbing equipment, i.e., storage tanks and expansion tanks from the building structure by NP or HN isolators.
4. Provide mounts for equipment installed outdoors for wind loads of 30 lbs psf applied to any exposed surface of the isolated equipment.
5. Under no circumstances destroy isolation efficiency by bolting the isolators to the roof or floor or equipment. If bolting is necessary, provide rubber grommets and washers to isolate the bolt from the base plate.
6. Building Penetrations: Isolate water piping penetrating wall, ceilings, floors or shafts from the structure by piping isolator or by 3/8-inch thick foamed rubber insulation. Install units flush with finished structure face, using one for each side as required. Cut units to length if longer than structure thickness. Caulk around pipe or duct at equipment room wall.
7. Hot and Cold Plumbing Pipes: Isolate hot and cold water piping in plumbing chases and walls behind plumbing fixtures, which are adjacent to occupied areas, from the structure by a piping isolator, Cush-A-Strip S-716, or a 6-inch section of 3/8-inch thick foamed plastic between the hanger and pipe. Contractor's Option: Acousto-Plumb System using plastic bushings.
8. Pipe Hangers in Mechanical Rooms: Support water, gas piping, and the like, connected to rotating equipment within the mechanical rooms on spring and neoprene hangers. The first three hangers from a piece of vibrating equipment to have a minimum of 1/2 the static deflection of that of the equipment isolators. Other isolators should have a minimum of 1/4 the static deflection of that of the equipment.

B. Drain Service Piping Connected to Vibration Isolated Equipment: Do not contact the building structure or other nonisolated system unless it is resiliently mounted as described above.

3.02 ADJUSTING AND CLEANING

A. Clean each vibration isolator. Verify that each is working freely, and that there is no debris in the immediate vicinity of the unit that could short circuit unit isolation.

3.03 ACCESS PANELS

A. Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

A1008 MECHANICAL, INC
COLMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials and installation of plumbing systems identification

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.

B. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices, unless otherwise indicated

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.

B. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2- by 11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses by special "flags" in margin of schedule. In addition to mounted copies, furnish extra copies for maintenance manuals.

PART 2 - PRODUCTS

2.01 PLUMBING IDENTIFICATION MATERIALS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 22 sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Manufacturers: ~~Allen Systems, Inc., W. H. Brady Co., Signmark Division, Industrial Safety Supply Co., Inc., Seton Name Plate Corporation, or approved~~ CALPICO, INC

2.02 PLASTIC PIPE MARKERS

A. Provide one of the following:
   1. Snap-on Type: Manufacturer's standard preprinted, semi-rigid snap-on, color-coded pipe markers.
   2. Pressure-Sensitive Type: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure sensitive, vinyl pipe markers.

B. Small Pipes: For external diameters less than 6 inches (including insulation, if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
   1. Snap-on application of pretensioned semi-rigid plastic pipe marker.
   2. Adhesive lap joint in pipe marker overlap
   3. Laminated or bonded application of pipe marker to pipe (or insulation)

4. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4 inch wide; full circle at both ends of pipe marker, tape lapped 1-1/2 inches

C. Large Pipes: For external diameters of 6 inches and larger (including insulation, if any), provide either full-band or strip-type pipe markers, but not narrower than three times letter height (and of required length), fastened by one of the following methods:
1. Laminated or bonded application of pipe marker to pipe (or insulation).
2. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2 inches wide; full circle at both ends of pipe marker, tape lapped 3 inches.
3. Strapped-to-pipe (or insulation) application of semi-rigid type, with manufacturer's standard stainless steel bands.

D. Lettering: Comply with piping system nomenclature as specified, scheduled or shown, and abbreviate only as necessary for each application length.

E. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.03 VALVE TAGS

A. Brass Valve Tags: Polished brass valve tags with stamp-engraved piping system abbreviation in 1/4-inch high letters and sequenced valve numbers 1/2 inch high, and with hole for fastener. 1-1/2-inch diameter tags, except as otherwise indicated. Valve designations to be coordinated with *existing* valve identifications to ensure no repetitive designations are utilized.

B. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

C. Access Panel Markers: Manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include center hole to allow attachment.

2.04 PLASTIC EQUIPMENT MARKERS

A. General: Manufacturer's standard laminated plastic, color-coded equipment markers. Conform to the following color code:
1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.

B. Nomenclature: Match terminology used on drawing schedules as closely as possible.

C. Size: Provide approximate 2-1/2- by 4-inch markers for control devices, dampers, and valves; and 4-1/2- by 6-inch markers for equipment.

2.05 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in plumbing identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of plumbing systems and equipment.

B. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Boiler No 3, Circulation Pump No 42, Cold water riser No 12, and the like).

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished plumbing spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.02 PIPING SYSTEM IDENTIFICATION

A. Install pipe markers on each system and include arrows to show normal direction of flow.

B. Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels and plenums), and exterior nonconcealed locations, in locations as follows:

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
3. Near locations where pipes pass through walls or floors/ceilings, or enter nonaccessible enclosures.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing of 20 feet along each piping run, except reduce spacing to 10 feet in congested areas of piping and equipment, i.e., mechanical rooms.

3.03 VALVE IDENTIFICATION

A. General: Provide valve tag on every valve, cock and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibbs, shutoff valves at plumbing fixtures, and similar rough-in connections of end use fixtures. List each tagged valve in valve schedule for each piping system.

B. Install mounted valve schedule in each mechanical room.

3.04 PLUMBING EQUIPMENT IDENTIFICATION

A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each item of plumbing equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices: Pumps, compressors, and similar motor driven units, water heaters, tanks and pressure vessels, filters, water treatment systems and similar equipment.

3.05 ADJUSTING AND CLEANING

A. Adjusting: Relocate any plumbing identification device which has become visually blocked

B. Cleaning: Clean face of identification devices, and glass frames of valve charts

END OF SECTION

SECTION 22 07 00

PLUMBING SYSTEMS INSULATION

AYDOB MECHANICAL
CELMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Piping and Equipment Insulation: Materials and installation of insulation, jackets and accessories for the following applications:
1. Hot and cold domestic water piping systems.
2. Condensate piping systems.
3. ADA accessible lavatory/sink P-trap and supplies/stops.

1.02 QUALITY ASSURANCE

A. Qualification of Workers: Use proficient journeyman insulators and supervisors in the execution of this portion of the work to ensure proper and adequate installation of insulation throughout. A firm with at least 5 years successful installation experience on projects with installations similar to that required for this project.

B. Compliance with Specifications:
1. Whenever required during progress of the work, furnish proof acceptable to the Owner that items installed are equal to or exceed requirements specified for this work.
2. In the event such proof is not available, or is not acceptable to the Owner, the Owner may require the Contractor to remove the item or items and replace with material meeting the specified requirements and to repair damage caused in the removal and replacement, at no additional cost to the Owner.
3. Install per manufacturer's written instructions.
4. As a minimum, comply with appropriate state energy code or other applicable codes.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of insulation, jacket, glue, paint, fitting cover, and accessory. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each piping, equipment and duct system requiring insulation.

1.04 PRODUCT HANDLING

A. Protection: Use means necessary to protect insulation materials before, during and after installation.

B. Replacements: In the event of damage, immediately make repairs and replacements necessary.

1.05 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a flame spread of 25, fuel contributed of 50 and smoke developed of 50 as tested by ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with the requirements of UL "Pipe and Equipment Coverings R5583 400 8 15."

C. Test duct insulation in accordance with ASTM E84 and bear the UL label.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Piping: Armacell LLC Armaflex, Certainteed, Imcoa, Johns Manville, Knauf, Nomaco, Owens-Corning, PPG, or approved.

2.02 TYPE 1, FIBERGLASS PIPE INSULATION

A. Glass Fiber: ASTM C547; rigid molded, noncombustible
1. Thermal Conductivity Value: 0.27 at 75F
2. Maximum Service Temperature: 850F
3. Vapor Retarder Jacket: White Kraft paper reinforced with glass fiber and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed.

2.03 TYPE 2, FLEXIBLE ELASTOMERIC INSULATION

A. Elastomeric Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet
1. Thermal Conductivity Value: 0.27 at 75F.
2. Maximum Service Temperature of 220F.
3. Maximum Flame Spread: 25.
4. Maximum Smoke Developed: 50 (3/4 inch thick and below).
5. Connection: Waterproof vapor retarder adhesive as needed.
6. UV Protection: UV outdoor protective coating as needed.

B. Glue Used in Cementing Rubber Insulation: Contact adhesive specifically manufactured for cementing flexible elastomeric foam. Armacell LLC Armaflex 520 adhesive, or Halstead.

C. Paint Used to Cover Rubber Insulation: Nonhardening high elasticity type, specifically manufactured as a protective covering of flexible elastomeric foam insulation for the prevention of degradation due to exposure to sunlight and weather. Armacell LLC Armaflex, or Halstead.

2.04 TYPE 6, FIBERGLASS EQUIPMENT INSULATION

A. Flexible Fiberglass Blanket: ASTM C612; flexible.
1. Thermal Conductivity Value: 0.24 at 75F.
2. Maximum Service Temperature: 450F.

2.05 TYPE 7, ADA ACCESSIBLE LAVATORY/SINK INSULATION KIT

A. P-traps, hot water and cold water insulating guards. Molded closed cell vinyl with nylon fasteners, paintable. Thermal conductivity; K = 1.17 (BTU/in)/ (hr/sq ft./deg. F) at 75F mean temperature. Provide accessories as required for complete installation. Color white. Truebro Inc. Model 102. McGuire, ProWrap, Brocar Trap Wrap, or approved.

2.06 JACKETING

A. PVC Plastic Fitting Covers: Schuller Zeston 2000. One-piece molded type fitting covers and jacketing material, gloss white. Connections: Tacks; pressure sensitive color matching vinyl tape.

B Canvas Jacket: UL listed fabric, 6 oz/sq yd , plain weave cotton treated with dilute fire retardant lagging adhesive

C Aluminum Jacket: 0 016-inch-thick sheet, (smooth/embossed) finish, with longitudinal slip joints and 2-inch laps, die-shaped fitting covers with factory attached protective liner

D Stainless Steel Jacket: Type 304 stainless steel, 0 010 inch, (smooth/corrugated) finish

2.07 ACCESSORIES

A Equipment Insulation Jacketing: Presized glass cloth, not less than 7 8 ounces/sq yd , except as otherwise indicated Coat with gypsum based cement

B Equipment Insulation Compounds: Provide adhesives, cement, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated

C General: Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated Accessories, i e , adhesives, mastics, cements and tape to have the same flame and smoke component ratings as the insulation materials with which they are used. Shipping cartons to bear a label indicating that flame and smoke ratings do not exceed those listed above. Provide permanent treatment of jackets or facings to impart flame and smoke safety. Provide nonwater soluble treatments

2.08 PIPE FITTING INSULATION COVERS

A PVC preformed molded insulation covers Zeston, or approved

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

A Do not apply insulation until pressure testing of the ducts has been completed Do not apply insulation until the duct has been inspected

B Examine areas and conditions under which duct insulation will be installed Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A Clean and dry surfaces to be insulated

3.03 INSTALLATION

A Insulation: Continuous through walls, floors, partitions except where noted otherwise

B Piping and Equipment:

1 Install insulation over clean, dry surfaces with adjoining sections firmly butted together and covering surfaces Fill voids and holes Seal raw edges Install insulation in a manner such that the insulation may be split, removed, and reinstalled with vapor barrier tape on strainer caps and unions Do not install insulation until the piping has been leak tested and has passed such tests Do not insulate chiller manholes, equipment manufacturer's nameplates, handholes, and ASME stamps. Provide beveled edge at such insulation interruptions Repair voids or tears

2 Cover insulation on pipes above ground, outside of buildings, with aluminum jacketing. Position seam on bottom of pipe.

3.04 PROTECTION AND REPLACEMENT

A. Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

3.05 FIBERGLASS INSULATION

A Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate the vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.

B Apply insulation to pipe and seal with self-sealing lap. Use self-sealing butt strips to seal butt joints. Insulate fittings, valves and unions with single or multiple layers of insulation and cover to match pipe or use preformed PVC molded insulation covers.

3.06 LABELING AND MARKING

A Provide labels, arrows and color coding on piping per Section 22 05 53, Identification for Plumbing Piping and Equipment. Attach labels and arrows to the jacketing.

3.07 PIPING SURFACES TO BE INSULATED

Item to be Insulated:	System Insulation Type:	Pipe Size:	Insulation Thickness:
Domestic hot water and hot water circulation piping above grade.	1	Runouts up to 2" Mains =<2" Mains >2"	1" 1" 1-1/2"
Domestic cold water except minor branch piping within walls serving fixtures.	1	=<2" >2"	1/2" 1"
ADA accessible lavatory/sink.	7	All	as listed
Condensate drain piping.	1	All	1/2"

Note: Insulation thickness shown is a minimum. If state codes or AHJ require additional thickness, provide insulation thickness per code and AHJ requirements.

3.08 ADA ACCESSIBLE LAVATORIES/SINKS

A. Install lavatory/sink insulation kit.

3.09 STORAGE TANKS

A Cover with hydrous calcium silicate, 2-inches thick. Finish with canvas jacket and adhesive. Overlap joints minimum of 4 inches. Apply two coats latex paint; color selected by Architect.

3.10 INSULATION SHIELDS

A Provide full size diameter hangers and shields (18 gauge minimum) for cold piping. Hot water piping hangers may penetrate insulation to contact pipe directly. Provide 18-inch long, noncompressible insulation section at insulation shields for lines 2 inches and larger (steam and cold piping).

3.11 FOAMED PLASTIC EQUIPMENT INSULATION

A Apply insulation and accessories to roof drain/overflow underbodies per manufacturer's recommendations

END OF SECTION

SECTION 22 11 13

GENERAL PLUMBING PIPING SYSTEMS

AYOOB MECHANICAL
COLMA, CA
650-992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work includes but is not limited to:
1. Aboveground soil, waste and vent piping within buildings, including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
2. Domestic cold water piping.
3. Domestic hot water piping.
4. Domestic circulating hot water piping.
5. Plumbing fixtures: See Section 22 40 00, Plumbing Fixtures and schedule for types.
6. Condensate drain and water piping system for plumbing equipment.
7. Flashing and counterflashing of roof and wall penetrations, fixtures and the like and wall penetrations, fixtures and the like by installation of work of this Section.
8. Furnishing and installation of access doors required for work furnished by this Section.
9. Furnishing and installing of sleeves, inserts and anchorage required for the installation, which are embedded in work of other trades. Sleeve, wrap and seal piping in concrete.

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of plumbing system products, of types, materials, and sizes required.

B. Regulatory Requirements:
1. Codes: Comply with UPC pertaining to plumbing materials, construction and installation of products. Comply with local and state regulations.
2. ANSI Compliance: Comply with applicable American National Standards Institute Standards pertaining to products and installation.
3. PDI Compliance: Comply with applicable Plumbing and Drainage Institute standards pertaining to products and installation.

PART 2 - PRODUCTS

2.01 SOIL, WASTE, VENT AND DRAINAGE PIPING

A. Underground Piping to 5 Feet Outside Building Line: "No-Hub" cast iron soil pipe and fittings with heavy-duty stainless steel couplings and neoprene gaskets.

B. Aboveground Piping: "No-Hub" cast iron soil pipe and fittings with standard-duty stainless steel couplings and neoprene gaskets.

2.02 DOMESTIC WATER PIPING

A. Above Ground: Type "L" copper tubing. Wrought copper or cast bronze sweat fittings.
1. Piping 3 Inches and Above: Brazed or rolled grooved joint.
2. Piping 2-1/2 Inches and Smaller: Soldered (95/5 solder) joints or rolled grooved to 2 inches.

3. Approved Fillers:
   a. Pressure Range 81 to 150 PSI and Temperatures 151F to 200F: 95/5 tin-antimony or silver-bearing solders, i.e., Allstate 430, Harris Stay Brite 5 or 8.
   b. Use appropriate flux per manufacturer's recommendations. Use of corrosive fluxes is prohibited.

B. Below Ground: Type "K" copper tubing with brazed joints. Approved Fillers: "Phos-0," "Silfos 5," "Aircosil 15," "Braze 450(DE)." Use appropriate flux per manufacturer's recommendations.

2.03 PRIMER PIPING

A. Above Ground: Type "L" hard-drawn copper tubing with wrought sweat fittings and soldered joints.

B. Below Ground: Type "L" soft annealed copper tubing with wrought sweat fittings and brazed joints.

2.04 CONDENSATE DRAIN PIPING

A. Type "M" copper tubing and wrought copper or cast bronze sweat fittings. 95/5 soldered joints. On sizes 1-1/4 inches and larger, provide "DWV" pattern drainage fittings.

2.05 PUMP PRESSURE PIPING

A. Above Grade: Type "L" copper with solder joints.

B. Below Grade: Type "L" copper with brazed joints.

2.06 CLEANOUTS

A. General: Locate cleanouts as shown on Drawings and as required by local code. Cleanouts same size as pipe except that greater than 4 inches will not be required. Plastic components not allowed, except unless specifically noted.

B. Types:
   1. Tile Floor Cleanouts: J. R. Smith 4020-U with round heavy-duty nickel bronze top, taper thread, ABS plug and vandalproof screws.
   2. Carpeted Floor Cleanout: J. R. Smith 4020-U-X with carpet clamping frame with round heavy-duty nickel bronze top, taper thread, ABS plug, carpet clamping device and vandalproof screws.
   3. Concrete Floor Cleanout (General): J. R. Smith 4020 with round heavy-duty nickel bronze top, taper thread and ABS plug with vandalproof screws.
   4. Concrete Floor Cleanout (Heavy Load): Same as for "General" locations, Item 3 above, except J. R. Smith 4100.
   5. Wall Cleanout: J. R. Smith 4472-U, countersunk bronze taper thread plug, stainless steel shallow cover and vandalproof screws.
   6. Outside Area Walks and Drives: J. R. Smith 4023-U with round heavy-duty nickel bronze top, taper thread, ABS plug and top secured with vandalproof screws. Install in 18- by 18- by 6-inch deep concrete pad flush with grade.

C. Manufacturers: J. R. Smith, Zurn, Wade, Watts, or approved. J. R. Smith model numbers used as a basis of selection.

2.07 VALVES

A. General:
1. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.
2. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe sizes.
3. Refer to Section 22 05 23, General-Duty Valves for Plumbing for detailed valve specifications

B. Service:
1 Domestic Hot and Cold Water Shutoff and Isolation Valves: Pipe Sizes 2-1/2 Inches and Smaller: Ball valve
2 Drain Service; All Pipe Sizes: Drain valves

2.08 WATER HAMMER ARRESTORS (SHOCK ABSORBERS)

A. Bellows-type, stainless steel casing and bellows, pressure rated, tested and certified in accordance with PDI WH-201. Manufacturers: Amtrol, Inc., J. R. Smith, Wade, Zurn, or approved

B. Piston-type, copper, brass or stainless steel with O-ring piston, pressure rated, tested and certified in accordance with PDI WH-201. Manufacturers: PPP, Sioux Chief, or approved

2.09 FLASHING FLANGES

A. Cast iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.]

2.10 VENT FLASHING SLEEVES

A. Cast iron caulking type roof coupling for cast iron stacks, cast iron threaded type roof coupling for steel stacks, and cast bronze stack flashing sleeve for copper tubing.]

2.11 TRAP PRIMERS

A. Trap seal primer valve with integral automatic antisiphon protection. Code approval required. Wade, Zurn, J. R. Smith, PPP, or approved

2.12 PREMANUFACTURED COUNTERFLASHINGS

A. Factory-fabricated counterflashing constructed from Schedule 40 galvanized steel or galvanized malleable iron pipe coupling with tapered threads and 3 lb. lead sheet lead formed and soldered to coupling to produce counterflashing minimum of 4-inch overlap over roof flashings. Provide for pipe sizes as required. Manufacturers: A&B Sheetmetal, 503-254-5581

2.13 ACCESS PANELS

A. Provide flush-mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size). Wall access panels to be minimum 12x12 (or required and approved size). Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 DRAIN PIPING

A. General: Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous materials as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Coordinate installation of piping below with structural components and other system installations.

B. Install piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent). Where this slope is impractical, slope at 1/4 inch per foot for pipes below 4-inch size, and 1/8 inch per foot (1 percent) for piping 4 inches and larger, with the approval of the local code authority having jurisdiction.

C. Condensate Drain Piping at HVAC-Units: Trap condensate drain for HVAC units in accordance with Detail on Plumbing Drawings

3.02 CLEANOUTS

A. Install in aboveground piping and building drain piping as indicated, as required by code; at each change in direction of piping greater than 135 degrees; at minimum intervals of 100 feet; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping. Select type to match adjacent building finish. Coordinate locations and types of cleanouts with Architect prior to installation.

3.03 FLASHING FLANGES

A. Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes]

3.04 VENT FLASHING SLEEVE

A. Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions. Coordinate with roofing system]

3.05 DOMESTIC WATER DISTRIBUTION PIPING

A. Water Service Piping: Provide sleeve in foundation wall for water service entry; make entry watertight. Provide shutoff valve at water service entry inside building; pressure gauge, test tee with valve

B Water Hammer Arrestors: Install in upright position, in locations and of sizes in accordance with PDI WH-201, and elsewhere as indicated

C Group piping installations and valves where possible to obtain maximum practical use of available space

D Arrange locations of valves, unions, drains and other components to provide for ease of cleaning, operation, repair or service Size access panels and locate to provide both acceptable proximity and working space for such devices

E Provide valves and shock arrestors where required by code and where otherwise indicated in Specifications and on Drawings

F Provide protection plates for piping installed in wood stud walls and other building substructures as required by code

G Wherever piping is installed in exterior walls, route on warm side of insulation and as close to inside wall finish as possible, as detailed

H Provide low point drains and shutoff valves as required by local AHJ Provide valve boxes, access panels, and the like, for complete installation

3.06 VALVES

A Backwater Valves: Provide rectangular concrete valve box with cast iron hinged locking access cover, labeled "Backwater Valve" Provide size adequate for depth, maintenance accessibility for valve assembly, and the like Provide extensions as required Set flush with finish grade

3.07 PIPE INSTALLATION

A Seismic Restraint: Brace plumbing piping and plumbing equipment against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Mechanical Systems" as published by SMACNA

B Rough-in Piping: Provide temporary caps or plugs at piping shown on Drawings to be roughed-in for future connections by others

C Sanitary Waste and Storm Drain Piping: Slope at uniform grade of 1/4 inch per foot unless noted otherwise Make changes in size with reducing and wye fittings Run exposed piping parallel or perpendicular to building structure

D Vent Piping:

1 General: Horizontal runs free of drops and sloped to drainage system

2 Vents-Through-Roof (VTRs): Provide 3 lb flashing with counterflashing at vent penetrations through roof, as detailed Wherever vents run up near or inside of exterior walls, offset pipe at underside of roof deck to obtain minimum 5 foot clearance between parapet and roof penetration Provide code required clearances between vent-through-roof and HVAC equipment on roof VTR counterflashings to have a manufactured rolled return bend with minimum 1-inch overlap; crimping by hand tools will not be allowed On single ply vinyl or plastic type roofs, provide flashings as required by roof installer and manufacturer On raised rib steel roofs, provide flashings as required by roof installer and manufacturer

3.08 TESTING

A. General:

1. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.
2. Notify Architect and local Plumbing Inspector 2 days before tests.
3. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to a water pressure of a minimum of 5 PSI head. System to hold water without a water level drop greater than 1/2 pipe diameter of largest nominal pipe size within a 24-hour period. Test system in sections if minimum head cannot be maintained in each section. The 5 PSI head to be the minimum pressure at the highest joint.
4. Water Piping: Eliminate air from system. Fill and test at 125 PSIG or minimum 1-1/2 times static pressure at connection to serving utility main for a period of two hours with no loss in pressure.
5. Send test results to Architect for review and approval.

B. Testing of Pressurized Systems:

1. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.
2. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.

C. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at a hydrostatic pressure of 125 PSIG.

3.09 WATER HAMMER ARRESTORS (SHOCK ABSORBERS)

A. Locate shock absorbers in supply pipe in accordance with recommendations of Plumbing and Drainage Institute PDI-WH201. Install ahead of solenoid operated valves. Determine size of absorber by fixture unit value of fixture supplied, using PDI symbols to designate sizes. Provide access panel for each shock absorber.

3.10 ADJUSTING AND CLEANING

A. Piping: Clean piping exterior surfaces. Comply with Section 22 07 00, Plumbing Insulation, as applicable. Flush out water-filled or drainage piping systems with clean water.

3.11 HOSE BIBB PIPING

A. Provide each hose bibb with an individual accessible shutoff valve (ball type). Locate where shown on Drawings.

3.12 CHLORINATION

A. General: Upon completion of tests and necessary replacements, thoroughly flush and disinfect domestic water piping.

B. Method: After thoroughly flushing system with water to remove sediment, fill system with a solution containing 50 parts per million of chlorine for not less than 24 hours or 200 parts per million of chlorine for not less than 3 hours. After retention, drain, reflush and return system to service.

C. Certification: Provide copy of domestic water chlorination certificate in each operations and maintenance manual.

3.13 PROTECTION

A. Keep pipe openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of the work.

3.14 ACCESS PANELS

A. Install ceiling or wall access panels to provide access to concealed valves, motors, shock arrestors, and other plumbing items needing service. Provide access panels at locations required or as specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

AYOOB MECHANICAL, INC
COLMA, CA
650-992-8281
SUBMITTAL # 19

PART 1 - GENERAL

1.01 SUMMARY

A. Provide labor, materials, equipment and services necessary to furnish and install a complete plumbing system as shown on the Drawings and specified herein. The work includes, but is not necessarily limited to:

1. Plumbing fixtures and trim, including rims for sinks and lavatories in casework or counters, chair carriers (as required), drinking fountain, drains, cleanouts, floor sinks, and related fixtures shown on the Drawings.
2. Rough-in and final connection to equipment and fixtures, relocated or provided under other sections or under other divisions of the work.
3. Standards and supports for equipment requiring them.
4. Instructions and maintenance manuals for equipment furnished by this Section.
5. Electrical: For plumbing trim/fixtures (sensor type faucets/flushometers, and the like) provide, from the 120-volt connection by Division 26 to the plumbing equipment, low voltage electrical connections and wiring as required for complete and operable system. Includes, but is not limited to low voltage electrical raceway, wiring and accessories, such as step-down transformers as necessary for function of sensors and automatic valve and faucet controls. Supply step-down transformers and size wiring as recommended by manufacturer of plumbing equipment requiring low voltage electrical connection.

1.02 SUBMITTALS

A. Product Data in Accordance with Division 01: Manufacturer's specifications, installation and startup instructions, capacity and ratings, with selection indicated. Provide pump performance curves with selection points indicated. Provide specialties and accessories required for a complete and operable installation.

B. Shop Drawings:

1. Assembly type shop drawings indicating dimensions, weights, required clearances, and methods of assembly of components and anchorages.
2. Submit For:
   a. Fixtures, see Plumbing Fixture Schedule.
   b. Floor and roof drains.
   c. Trench drains.

C. Wiring Diagrams: Ladder type wiring diagrams for components, indicating required field electrical connections.

D. Maintenance Data: Submit maintenance data and parts list for each item. Include "troubleshooting" maintenance guides. Include this data in maintenance manual.

1.03 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated on the Plumbing Fixture Schedule on the Drawings. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is installer's option; but, fixtures of same type must be furnished by a single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

1. Fixtures: Complete with fittings, supports, fastening devices, faucets, valves, traps, stops and appurtenances required.
2. Exposed IPS Piping and Tubing: Brass, chrome plated.
3. Escutcheons: Brass, chrome plated.
4. Fixture Locations: As shown on Drawings.
5. Stops: Stops installed in each supply pipe at each fixture accessibly located with wall escutcheons.
6. Public Lavatories: Provide with flow control device to prevent flow over 0.5 GPM.
7. Interior Faucets except Public Lavatories: Provide with flow control device to prevent flow over 2.5 GPM.

1.04 DELIVERY, HANDLING AND STORAGE

A. Fixtures: Deliver plumbing fixtures individually wrapped in factory fabricated containers. Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

1.05 ACCESSIBILITY

A. Coordinate height of accessible fixtures with construction drawings to meet ADA requirements.

B. Force to activate controls of fixtures shall not be greater than 5lbs.

C. For lever operated, push-type and electronically controlled faucets, controls shall be operated by one-hand without tight grasping or twisting of the wrist.

D. Faucet shall remain open for a minimum of 10 seconds when self closing valves are used.

E. Insulation for hot water and drain pipes beneath accessible sinks and lavatories.

PART 2 - EXECUTION

2.01 VERIFICATION OF CONDITIONS

A. Fixtures: Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.

2.02 FIXTURES INSTALLATION

A. General:
1. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes.
2. Set and connect to soil, waste, vent and water piping in neat, finished and uniform manner. Connections to be equal height, plumb and set at right angles to floor, wall or both unless otherwise required or specified.
3. Seal fixtures mounted on floors and walls at abutting joints with approved sealant compounds as directed by Architect.
4. For ADA accessible toilets, provide with actuator at wide portion of stall.
5. Lavatories: Set mixing valves to limit outlet temperature to 110F.

B. Fixture Locations: As shown on Drawings. Center water closets and urinals between privacy partitions unless noted otherwise.

C. Stops: Stops installed in each supply pipe at each fixture accessibly located with stops of loose key type. Concealed stops to be screwdriver or loose key type with wall escutcheons.

D. Fixture Supports:
1. Support wall hung water closets, urinals and lavatories on heavy duty, full size, concealed, commercial grade carriers mounted to floor structure. Refer to Plumbing Fixture Connection Schedule on Drawings.
2. Support other fixtures mounted on stud partitions on heavy concealed wall brackets bolted to a 1/4-inch thick by 5-inch high steel plate anchored firmly to studs with bolts (or welded to metal studs). Plate to extend one stud each way beyond fixture mounting point width.

E. Flush Valves: Provide "drop-ear" ells or couplings in wall at water supply outlets to flush valves; anchor firmly to structure.

F. After fixtures are set in place and secured to walls, caulk all around between fixtures and wall with white silicone caulking compound. Dow Corning 780, General Electric Construction Sealant, or approved.

G. Set countertop lavatories and stainless steel sink rims in waterproof sealant made for application.

H. Adjust self-closing faucets to provide minimum of 10 seconds of waterflow, and maximum of 15 seconds.

I. After fixture installation is complete, cover and protect rims, fronts and exposed parts until completion of construction phase. Contractor responsible for damage to fixtures and assumes related fixture repair or replacement costs.

J. At ADA accessible drinking fountains/water coolers, set at heights required for ADA compliance. See Architectural Drawings for bi-level fixtures. Provide right/left high/low orientation to match installation. Provide apron/skirt as required.

2.03 FLOOR DRAINS AND FLOOR SINKS

A. General: Install drains in accordance with manufacturer's written instructions and in locations indicated.

B. Coordinate with piping as necessary to interface drains with drainage piping systems.

C. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of floor drains flush with finished floor Set floor sinks as required by local codes.

D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

E. Position drains so that they are accessible and easy to maintain.

F. Coordinate drain flashing, flanges and strainer types and depths with floor substrate and topping configuration.

G. Primers:
1. Prime drains. Refer to Drawings and coordinate location with Architect. Coordinate with local AHJ for exact requirements.

2. Primer Locations:
   a. Drains in Food Areas: PPP-type trap-priming. Do not install primer valves above ceiling. Coordinate trap primer locations with Architect/Engineer. If installed in wall, provide access panel and coordinate exact panel location.
   b. Public Restrooms: Primer connection at water closet flush valve tailpiece connects to rear of pipe using chrome-plated piping at exposed locations.
   c. All Other Areas: PPP-type trap-priming valve. Do not install primer valves above ceiling. Coordinate trap primer locations with Architect/Engineer. If installed in wall, provide access panel and coordinate exact panel location with Architect.

2.04 HOSE BIBBS (INSIDE)

A. Install on exposed piping where indicated, with vacuum breaker.

2.05 ADJUSTING AND CLEANING

A. Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.

2.06 FIELD QUALITY CONTROL

A. Inspection:
   1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
   2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

2.07 OWNER-FURNISHED EQUIPMENT

A. Some equipment is to be furnished under another Contract and is indicated as such on Drawings. Rough-in for such equipment, receive, uncrate, install and connect plumbing equipment, faucets, and fixtures as furnished by others. Furnish and install stops, traps, strainers, backflow preventers, valves and other appurtenances not furnished by others in order to provide a complete operating system. Obtain list of such equipment from Contractor.

B. Comply with paragraph on Plumbing Fixtures Installation, this Section, for installation procedures.

C. Refer to Plumbing Fixture Connection Schedule on Drawings.

2.08 PROTECTION

A. Protect fixtures and equipment from damage. Replace damaged items with new.

END OF SECTION

SECTION 23 00 00

BASIC HVAC REQUIREMENTS

JMS MECHANICAL, INC
ROHNERT PARK, CA
707 - 585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Work Included: Work included in 23 00 00 applies to Division 23 work to provide materials, labor, tools, permits and incidentals to provide and make ready for Owner's use heating, ventilation, and air conditioning systems for proposed project.

B Related Work Specified Elsewhere:

1. Contents of Section applies to Division 23 specifications.
2. Requirements of Section are a minimum for Division 23 Sections, unless otherwise stated in each Section, in which case that Section's requirements take precedence.

1.02 DEFINITIONS

A. Following is a list of abbreviations generally used in Division 23:

1. ADA Americans with Disabilities Act
2. AHJ Authority Having Jurisdiction.
3. ANSI American National Standards Institute.
4. ARI Air-Conditioning & Refrigeration Institute
5. ASHRAEAmerican Society of Heating, Refrigerating and Air-Conditioning Engineers.
6. ASMEAmerican Society of Mechanical Engineers.
7. ASTMAmerican Society for Testing and Materials.
8. ASSE American Society of Sanitary Engineering.
9. AWWA American Water Works Association.
10. CBC California Building Code.
11. CEC California Electrical Code.
12. CGA Canadian Gas Association.
13. CMC California Mechanical Code.
14. CISPI Cast Iron Soil Pipe Institute.
15. CSA Canadian Standards Association.
16. ETL Electric Testing Laboratories.
17. FM FM Global.
18. HI Hydraulic Institute Standards.
19. HVAC Heating, Ventilating and Air Conditioning
20. MSS Manufacturers Standardization Society.
21. NEC National Electric Code
22. NEMANational Electrical Manufacturers Association.
23. NFGC National Fuel Gas Code.
24. NFPA National Fire Protection Association.
25. NRCA National Roofing Contractors Association.
26. NSF National Sanitation Foundation.
27. OSHAOccupational Safety and Health Administration.
28. SMACNASheet Metal and Air Conditioning Contractors' National Association, Inc.
29. TEMATubular Exchanger Manufacturers Association.
30. TIMAThermal Insulation Manufacturers Association.
31. UL Underwriters Laboratories Inc.

B Provide: To furnish and install, complete and ready for the intended use

C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.

D. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site as required to complete items of work furnished by others.

1.03 ADDITIONAL REQUIREMENTS TO DIVISION 01

A. Operation and Maintenance Documentation: Copies of certificates of code authority acceptance, test data, parts lists, maintenance information for equipment, valves, balancing reports, and other special guarantees, certificates of warranties, and the like, specified elsewhere herein or indicated on Drawings.

B. Shop Drawings: Provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

C. Close-out Documentation: Submit mechanical code authority certification of inspection.

D. Record Drawings:
1. Show changes and deviations from the Drawings. Include issued Addendum and change order items.
2. Make changes to the Drawings in a neat, clean, and legible manner.

E. Product Data:
1. Submit manufacturer's technical data, installation instructions and dimensioned drawings for products, equipment and devices installed, supplied or provided. Refer to individual specification sections for specific items required in product data submittal. Submit at one time in 3-ring binder, tabbed and referenced to match the Contract Documents.
2. Maintain an updated product submittal package to be included in the final operation and maintenance documentation.

1.04 QUALITY ASSURANCE

A. Where Contract Documents are at variance with applicable codes governing work, code and local jurisdiction requirements take precedence, and include cost necessary for code compliance or local jurisdiction compliance in bid price. Machinery and equipment to comply with Occupational Safety and Health Act of 1970, as currently revised, as interpreted for equipment manufacturer requirements.

B. Mechanical Drawings: Drawings are intended to be diagrammatic and are based on one manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., ducts and piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than basis of design, including but not limited to architectural, structural, electrical, fire sprinkler, and HVAC.

C. Requirements: As a minimum requirement, work in accordance with following rules and regulations and applicable laws:
1. NFPA.
2. OSHA.
3. Related supplements and standards.
4. California State Energy Code.
5. California Building Code.

6 California Mechanical Code
7 California Plumbing Code
8 California Fire Code
9 State of California and local jurisdictional requirements

D Permits and Inspections:
1 Unless otherwise distinctly hereinafter specified, apply and pay for necessary permits, plans check, and inspections required by public AHJ
2 Refer to General and Supplementary Conditions for payment of water and sewer service connection fees
3 Obtain certificates of inspection from AHJs and deliver to Owner before final acceptance
4 Each trade to consult local building department and utility companies prior to commencement of work to ascertain existence and location of existing underground utilities Protect existing service against damage and interruption of use, and reroute as may be necessary to accomplish new work Include costs for materials and installation for rerouting as specified for new work in bid price

E Regulatory Requirements:
1 UL and CSA Compliance: Provide units which are UL, ETL, and CSA listed
2 ASME Compliance: Provide units which are ASME listed when boilers which exceed 200,000 BTUH, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction

1.05 SEQUENCING AND SCHEDULING

A For proper execution of work cooperate with other trades as needed

B To avoid installation conflicts, thoroughly examine complete set of Contract Documents Resolve conflicts with Architect prior to fabrication and installation

C Prior to installation of equipment requiring electrical connections, examine manufacturer's shop drawings, wiring diagrams, product data, and installation instructions Verify that electrical characteristics indicated in Contract Documents are consistent with electrical characteristics of actual equipment being installed When inconsistencies occur request clarification from Architect

1.06 COORDINATION DOCUMENTS

A Prepare and submit coordinated layout drawings, prior to construction, to coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, fire sprinklers, lights, and electrical services Composite Drawings show services on single sheet Key Drawings to structural column identification system, and progressively number Prior to completion of Drawings, coordinate proposed installation with architectural and structural requirements, and other trades (including electrical, ceiling suspension, and tile systems), and provide reasonable maintenance access requirements

B Prepare Drawings as follows:
1 Prepare Drawings to accurate scale of 1/4 inch = 1 foot or larger on Mylar sheets or AutoCAD Drawings are to be same size as Contract Drawings and to indicate location, size and elevation above finished floor of HVAC equipment, ductwork, and piping Drawings to also indicate proposed ceiling grid and lighting layout as shown on electrical drawings and reflected ceiling drawings
2 Review and revise as necessary section cuts in Contract Drawings after verification of field conditions

3. Indicate system piping including fittings, hangers, access panels, valves, and bottom of pipe elevations above finished floor.
4. Piping that must be graded to have right-of-way over more flexible items.
5. Drawings are to incorporate Addenda items and change orders.
6. Distribute drawings to trades and provide additional coordination as needed.

C. Advise Architect, in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

D. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise Architect of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.

E. Final coordination drawings with appropriate information added to be submitted as Record Drawings at completion of project.

1.07 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, lights, and electrical services with architectural and structural requirements, and other trades (including electrical, ceiling suspension, and tile systems), and provide reasonable maintenance access requirements.

1.08 EXISTING SOILS CONDITIONS

A. Understand existing soils conditions before submitting bid on work. No additional allowance will be granted due to lack of information for existing conditions of subsurface soils.

B. Submission of a bid will be considered acknowledgment of review/understanding of project geotechnical soils report.

PART 2 - PRODUCTS

2.01 HAZARDOUS MATERIALS

A. Do not use products containing asbestos, lead, arsenic, or any other material defined by EPA as hazardous to human or animal life.

2.02 MATERIALS

A. Base contract upon furnishing materials as specified. Materials and equipment used for construction are to be new, the latest products as listed in manufacturer's printed catalog data and are to be UL or CSA approved or acceptable by state, county, and city authorities. Equipment supplier is responsible for obtaining state, county, and city acceptance on equipment not UL approved or not listed for installation.

B. Articles and equipment of a kind to be standard product of one manufacturer.

C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Install equipment having components requiring access (i.e., drain pans, drains, fire dampers, control dampers, control operators, valves, motors, drives, and the like) so that they may be serviced, reset, replaced or recalibrated and the like, by service people with normal service tools and equipment. Notify Architect in writing if equipment or components are shown in such a position that above cannot be accomplished.

B. Install equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment, examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods and sequencing, in coordination with other trades and disciplines.

C. Earthwork:
1. Refer to Division 31.
2. Perform excavation and backfill for installation of mechanical work.

D. Firestopping:
1. Coordinate with Drawings location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated, seal around piping, ductwork, equipment, and the like, with approved firestopping material.
2. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814.

3.02 SEISMIC CONTROL

A. Provide per Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

3.03 REVIEW BY ENGINEER

A. Notify Architect/Engineer, in writing, at following stages of construction so that Architect/Engineer may, at their option, visit site for review and construction observation:
1. Underground piping installation prior to backfilling.
2. Prior to covering walls.
3. When ceiling installation is started.
4. When main systems, or portions of, are being tested and ready for inspection by AHJ.
5. When ductwork installation starts.
6. When installation starts for each different major type of equipment.
7. When lines or ducts are to be permanently concealed by construction or insulation systems.
8. When balancing and testing is started.

3.04 OPERATING DURING CHANGEOVER

A. During remodeling of existing structure, or addition of a structure to existing structure, while existing structure is occupied, present services to remain intact until new construction, facilities or equipment is installed.

B Prior to changing over to new service, verify that every item is thoroughly prepared. Install new piping, wiring, and the like, to point of connection.

C Perform actual transfer to new service at off-peak time, as coordinated with Owner. Once changeover is started, pursue it to its completion, to keep interference to a minimum.

3.05 MUTILATION

A Repair mutilation of building around pipes, ducts, and the like.

3.06 DEMOLITION

A Scope:

1. It is intent of these documents to provide necessary information and adjustments to mechanical system required to meet code, and accommodate installation of new work.
2. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas.
3. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

B Equipment: Unless otherwise directed, equipment or fittings being removed as part of the demolition process are the Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.

C Unless specifically indicated on the Drawings, remove exposed, unused piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap piping and patch surfaces to match surrounding finish.

D Unless specifically indicated on the Drawings, remove unused equipment, fittings, rough-ins, connectors, etc. Removal is to be to a point behind finished surfaces (floors, walls, ceilings, etc.).

3.07 ELECTRICAL INTERLOCKS

A Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize mechanical equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

3.08 EQUIPMENT SELECTION AND SERVICEABILITY

A Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

B Maintain design intent where equipment other than as shown in Contract Documents is provided. Where equipment requires piping arrangement, control diagrams, or sequencing different from that indicated in Contract Documents, provide electrical motors, wiring, controls, or other required electrical components at no additional cost to Owner.

3.09 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and equipment in a manner to prevent damage and deterioration. Store in original container which identifies manufacturer's name, brand and model number. Do not store indoor equipment outdoors unless provided with a waterproof protective cover.

B Replacement: In event of damage, immediately make repairs and replacements necessary.

3.10 DEMONSTRATION

A. Upon completion of work and adjustment of equipment, test systems to demonstrate to Owner's Representative and Architect that equipment furnished and installed or connected under provisions of these Specifications functions mechanically in manner required.

B Manufacturer's Field Services: Furnish services of a qualified person for a period of not less than sixteen hours, at a time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in a satisfactory manner and complies with requirements of other trades or Contractors that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.11 CLEANING

A Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated by this work.

3.12 INSTALLATION

A. Install equipment in accordance with manufacturer's installation instructions, plumb and level, firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.

B Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

1. Do not place equipment in sustained operation prior to initial balancing of mechanical systems.
2. Furnish sufficient refrigerant and dry nitrogen for pressure testing under manufacturer's supervision.
3. Provide and install additional fan sheaves to obtain design capacities. Coordinate exact requirements with balancing firm.

3.13 PAINTING

A Ferrous Metal: After completion of mechanical work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, and the like, with one coat of black asphalt varnish or black enamel suitable for hot surfaces.

B Machinery:
1. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect
2. See individual equipment Specifications for other painting.
3. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original

C Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect

3.14 CUTTING AND PATCHING

A Refer to Section 01 73 29 "Cutting and Patching."

3.15 ACCEPTANCE

A System can not be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
1. Testing and balancing reports.
2. Cleaning
3. System balancing and balancing logs.
4. Operating and Maintenance Manuals.
5. Training of operating personnel
6. Record Drawings.
7. Guaranty certificates.
8. Start-up and test document

3.16 LETTER OF CONFORMANCE

A Provide letter and copies of extended warranties with a statement in letter that mechanical items were installed in accordance with manufacturer's recommendations Include letter of conformance and warranties in operating and maintenance manuals.

B. Warranties to begin at date of substantial completion.

END OF SECTION

SECTION 23 00 40

ACCEPTANCE TESTING AND DOCUMENTATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section describes the Acceptance Testing and documentation of the mechanical system(s) and outlines the duties and responsibilities of the contracting team for Acceptance Testing.

B. Apply the Acceptance requirements to products, equipment and systems provided under this Division, where indicated on plans, and where required by California Title 24 requirements.

C. Engage the services of a firm specializing in commissioning of mechanical systems or shall submit contractor qualifications for review by architect where testing and documentation is to be performed by contractor. Where duct pressure testing validation is required, submit name and qualification for HERS Certified testing agency.

1.02 THE COMMISSIONING TEAM

A. Form the Commissioning Team of:
1. Mechanical contractor's representative
2. DDC Controls contractor's representative
3. HERS Certified Testing Agency where required
4. Inspector of record
5. Owner's staff representative

PART 2 - PRODUCTS

2.01 DUTIES OF THE TEAM

A. The duties of the Team are as outlined in the Title 24 Requirements and summarized below:
1. Plan, organize and implement the Acceptance Testing process and within 1 month of the award of the contract, submit the names and addresses of the Testing team member(s).
2. The Acceptance testing team shall submit a complete description of the testing procedures and systems to be tested to the architect for review.
3. The Acceptance testing team shall coordinate tests of systems and equipment and assemble documentation related to tests. Submit documentation relative to tests and proposed procedures to design engineer for review prior to submitting documentation to Authority having Jurisdiction (AHJ.) Team responsible for performing data analysis, calculation of performance indices and crosschecking of results with the requirements of Title 24 and the Contract documents. The installing contractor or agent responsible for testing and documentation shall record their State of California Contractor's license number or their State of California Professional Registration License number on each Certificate of Acceptance for submittal.

4 Responsible for submitting Certificate of Acceptance including paper and electronic copies of measurements and monitoring results and supporting documentation to the AHJ. Where AHJ questions results or requires additional testing, complete additional testing and provide required documentation at no additional cost to the Owner.

2.02 TIME SCHEDULE

A. Determine the time period of the commissioning of the systems by the general contractor and Acceptance testing team. It is important to note that AHJ will not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the Title 24 standards.

2.03 ACCEPTANCE TESTING – PHASE I - DOCUMENTATION

A. Team shall assemble documentation showing thermostat and sensor locations, control device locations, control sequences and notes.

B. Per Title 24 requirements, team shall provide record drawings to building owner within 90 days of receiving a final occupancy permit (refer to other specification sections for requirements on record drawings.)

C. Per Title 24 requirements, team shall provide operating and maintenance manuals to the building owner (refer to other specification sections for requirements on operation and maintenance manuals.)

2.04 ACCEPTANCE TESTING – PHASE II -- INSPECTION AND TESTING

A. Team shall review the installation, perform acceptance testing and document results for the following systems:

1. Variable Air Volume Systems
2. Constant Volume Systems
3. Package Systems
4. Air Distribution Systems
5. Economizers
6. Ventilation Systems
7. Variable Frequency Drive Fan Systems
8. Hydronic Control Systems
9. System Programming

B. Review of installation shall confirm mechanical equipment and devices are properly located, identified, calibrated, and set points and schedules programmed per contract document requirements.

2.05 ACCEPTANCE TESTING - PHASE III - CERTIFICATION

A. Team shall document operating and maintenance information, complete installation certificate, and indicate test results on the Certificate of Acceptance, and submit the Certificate to the AHJ prior to receiving final occupancy permit. Team shall submit forms MECH-1-A through MECH-9-A as required by Title 24 requirements.

PART 3 - EXECUTION

3.01 ACCEPTANCE TESTS AND DOCUMENTATION

A. Refer to California Title 24, Non-residential manual for specific testing procedures and documentation requirements. The detailed requirements can be found at http://www.energy.ca.gov/title 24/2005standards/index.html. Contractor is responsible for reviewing and complying with these standards

END OF SECTION

SECTION 23 05 10

HYDRONIC PIPING

JMS MECHANICAL, INC.
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:
1. Materials, installation and testing of pipe, tubing and fittings.
2. Refer to Specification Sections for each system medium (i.e., plumbing, hydronics, gas, and the like), for pipe application.

1.02 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of piping products of types and sizes required.
2. Welding Qualification: Qualify welding procedures, welders and operators in accordance with ANSI B31.9 for shop and project site welding of piping work.

B. Manufacturer's Inspection: Inspect flanges, fittings and field applied welds in accordance with manufacturer's standard written quality control procedure in accordance with the following techniques:
1. Visual Method: Comply with MSS SP-55 except as otherwise indicated.
2. Radiographic (X-Ray) Method: Employ wherever recommended or required for pressurized piping systems.

1.03 SUBMITTALS

A. Piping Materials List: Provide a typewritten list which schedules the piping materials to be used for each system as a function of applicable nominal pipe size ranges. Arrange schedule in outline form for each specific piping system, e.g., "Chilled Water System," "Heating Water System," and the like. Include ASTM, ANSI or other numbers and other data as necessary to demonstrate compliance with requirements.

B. Test Procedure: Submit a typewritten checklist type of testing procedure indicating testing medium (i.e., water, air, nitrogen, and the like), pipe service, pipe and fitting type and classification, test pressure, pass/fail criteria and any other pertinent data.

PART 2 - PRODUCTS

2.01 PIPING - GENERAL

A. Provide pipe, tube and fittings of the type, fitting requirements, grade, class, size and weight indicated or required for each service, as indicated in other Division 23 Specifications. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

2.02 STEEL PIPE

A. ASTM A53, Hot Dipped, Zinc Coated Welded or Seamless, Grade B: Black, unless otherwise indicated, schedule as specified.

B. ASTM A135, Electric Resistance Welded, Grade B: Black, unless otherwise indicated, schedule as specified.

2.03 COPPER TUBE

A. Temper: Annealed (hard drawn).

B. Water Service: ASTM B88, Type as indicated for each service.

C. Drain, Waste, and Vent (DWV): ASTM B306.

2.04 FITTINGS FOR STEEL PIPE

A. General: Flanges, fittings, unions and other products, mark in accordance with MSS SP-25.

B. Welding Fittings: Wrought carbon steel fittings, ASTM A234, ANSI B16.9, B16.28. Butt-welding type unless otherwise indicated to be socket welding type.

C. Branch Connections: From mains or headers 2-1/2 inches or larger, welded tees or forged welding outlets.

D. Welding Outlets: "Weldolets" or "Threadolets" equivalent to Bonney Forge. Use forged welding outlets wherever branch line is at least 1 nominal pipe size smaller than local main or header.

E. Threaded Fittings: ANSI B2.1, ASTM A47, 150 PSI rating, except where otherwise specified, prevailing codes or requirements or Specifications dictate use of 300 PSI rating. Fabricate from standard malleable iron with dimensions conforming to ANSI B16.3.
   1. Fitting requirements for galvanized steel piping systems to be the same as for black steel pipe except each to have galvanized coating.
   2. Fittings for waste, vent and drainage piping to be drainage pattern type.

F. Flanges: Carbon steel conforming to ASTM A105, ANSI B16.5, and factory forged in the USA. Flanges which have been machined, remade, painted, or are nondomestic origin are not acceptable. Provide raised or full face ends wherever indicated or required.

G. Unions: ANSI B16.39, ASTM A47, and be fabricated from malleable iron with bronze-to-iron ground joints rated at 150 percent design operating pressure. Threads: ANSI B2.1.

H. Fasteners: Semi-finished carbon steel bolts and hex nuts conforming to ASTM A307. Threads and Dimensions: ANSI B1.1 and B18.2.

I. Threaded Pipe Plugs: ANSI B16.14.

J. Thread Lubricant: RectorSeal No. 5 or Slic-tite Teflon Paste.

K. Mechanical Couplings (For Chilled Water Systems Only Not on Heating Hot Water Systems):
   1. Manufacturers: Victaulic, Gruvlok, or approved.
   2. Coupling Housings: Malleable iron ASTM A47 or ductile iron ASTM A536.
   3. Coupling Housing Description: Grooved or rolled mechanical type, which engages grooved or rolled shouldered pipe ends, encasing an elastomeric gasket which bridges pipe ends to create seal. Cast in two or more parts, secured together during assembly with nuts and bolts. Permit degree of contraction and expansion as specified in manufacturer's published literature

4. Gaskets: Mechanical grooved or rolled coupling design, pressure responsive so that internal pressure serves to increase seal's tightness, constructed of elastomers having properties as designated by ASTM D2000. Water Services: EDPM Grade E, with green color code identification.
5. Bolts and Nuts: Heat treated carbon steel, ASTM A183, minimum tensile 110,000 PSI.
6. Branch Stub-Ins: Upper housing with full locating collar for rigid positioning engaging machine-cut hole in pipe, encasing elastomeric gasket conforming to pipe outside diameter around hole, and lower housing with positioning lugs, secured together during assembly with nuts and bolts.
7. Fittings: Grooved or rolled shouldered end design to accept grooved or rolled mechanical couplings.
   a. Malleable Iron: ASTM A47.
   b. Ductile Iron: ASTM A536.
   c. Fabricated Steel: ASTM A53, Type F for 3/4 to 1-1/2 inches; Type E or S, Grade B for 2 to 20 inches.
   d. Steel: ASTM A234.
8. Flanges: Class 125 cast iron and Class 150 steel bolt hole alignment.
   a. Malleable Iron: ASTM A47.
   b. Ductile Iron: ASTM A536.
9. Pipe/Grooved: Carbon steel, A-53B/A-106B/A135 Schedule 40. Roll or cut grooved-ends as appropriate to pipe material, wall thickness, pressures, size and method of joining. Pipe ends to be grooved or rolled in accordance with current listed standards conforming to ANSI/AWWA C-606.

L. Pressfit System:
1. Manufacturers: Victaulic or approved.
2. Carbon steel Pressfit system for 2 inches and under Schedule 5, 0.065 wall pipe conforming to ASTM A235, A795 or A53, having a maximum yield strength of 45,000 PSI and a maximum hardness of Rb70. Water, air, chemical, oil and vacuum systems with working pressures to 300 PSI. UL/FM approved to 175 PSI.

2.05 FITTINGS FOR COPPER TUBE

A. Wrought copper/bronze solder joint fittings complying with ANSI B16.22.

B. DWV Service:
1. Cast Copper Solder Joint Drainage Fittings: ANSI B16.23.
2. Wrought Copper Solder Joint Drainage Fittings: ANSI B16.29.

C. Wrought or cast copper/bronze rolled joint fittings complying with ANSI B16.22.

2.06 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

A. Insulating (Dielectric) Unions: ~~Standard units recommended by manufacturer for use in the service indicated, which isolate ferrous from nonferrous piping, and prevent galvanic corrosion action. Minimum rated "flashover" voltage: 600 volts. Watts 3000 Series. Provide insulated flanges for flanged piping system connection to dissimilar metals.~~ **Under no circumstances shall dielectric unions or dielectric pipe nipples be used on heating hot water, domestic and chilled water on piping applications, exterior and interior. To isolate ferrous from nonferrous piping, and prevent galvanic corrosion action, high-grade brass nipples and brass unions at transition points.**

B. Welding Materials: Comply with Section 2-C of ASME Boiler Code, as applicable.

C. Tin-Antimony Soldering Materials: ASTM B13.

D. Gaskets for Flanged Joints: ANSI B16.12; full faced for cast iron flanges; raised face for steel flanges, unless otherwise indicated or recommended by manufacturer. Gaskets: Minimum 1/8-inch thick fabricated from nonasbestos bases.

E. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e.g., "Phos-O" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping. Installations conform to accepted published procedures, i.e , UPC Installation Standard 3-75 and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited.

2.07 PREINSULATED PIPING SYSTEM

A. Manufacturers: Rovanco, Thermacore, PERMA-PIPE or approved.

B. Factory preinsulated piping system, consisting of an inner media carrier pipe, insulation around the carrier pipe, and a water/vapor seal jacket over the insulation.

C. Carrier Pipe Material: Schedule 40 black steel pipe with 150 PSI malleable screwed fittings. Type "K" copper with brazed fittings approved.

D. Insulation: Rigid closed cell polyurethane, average density of at least 2 lb./ft.3, conforming to ASTM C552, Type II, Class 1, K factor of not more than 0.14 (BTU/in)/(hr/sq.ft./deg. F) at 50F.

E. Outer Casing:
1. PVC pipe of minimum 60 mils thickness.
2. Each factory prefabricated section provides complete sealing of the insulation at each end of the conduit section by one of the methods listed below. Provide a permanent water and vapor seal.
3. Carry over the outer casing and extend it to the carrier pipe.
4. Use prefabricated caps specifically designed for end seal of prefabricated insulation systems. Fabricate caps of the same material as the outer casing.

2.08 UNIONS

A. Steel Pipe Union: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe.

B. Copper Pipe Union: 200 PSI working pressure. Bronze body, solder or grooved ends. Pipes 2 inches and under use ground joint, pipes 2-1/2 inches and larger use flanged face or grooved ends.

C. Insulating Unions: 250 PSI working pressure. Pipe ends and material to match piping. Electric current below 1 percent of galvanic current. Gasket material as recommended by manufacturer. Epco or approved.

2.09 ESCUTCHEONS

A. Brass material, chrome plated finish. Size sufficient to cover pipe openings through wall, floor or ceiling. Set screw or spring to secure to pipe. Coordinate opening sizes.

2.10 ACCESS PANELS

A. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

B Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size). Wall access panels to be minimum 12x12 (or required and approved size).

PART 3 - EXECUTION

3.01 INSTALLATION

A General Electrical Equipment Clearances: Do not route piping through electrical rooms, transformer vaults, elevator equipment rooms, and other electrical or electronic equipment spaces and enclosures. Within equipment rooms, provide minimum 3 feet lateral clearance from sides of electric switchgear panels. Do not route piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with electrical and coordinate exact pipe routing to provide proper clearance with such items.

B. Installation/Coordination:

1 General: Comply with basic requirements of Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment. Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each route with a minimum of joints and couplings, but with adequate and accessible unions or flanges for disassembly, maintenance, and replacement of valves and equipment. Reduce sizes by use of reducing fittings. Align piping accurately at connections, within 1/16-inch misalignment tolerance. Comply with ANSI B31.9 Code for Pressure Piping.

2. Installed piping not to interfere with maintenance of equipment, opening of doors or other moving parts nor be directly above or near any portion of electrical equipment.

3 Support piping such that connected equipment and flanges do not bear weight of piping

4. Adequately support vertical lines at their bases or by a suitable hanger placed in horizontal line near the riser or, preferably, by a base fitting set on a pedestal.

5 Piping systems are to be installed to drain. Provide properly sized drain valves at low points.

6. Ream pipes after cutting to full bore. Remove foreign matter from inside of pipe before installing. Keep installed piping free from dirt and scale and protect open ends from foreign matter. Use temporary plugs or other approved methods for opening and closure.

7. Remake or replace defective, leaking or otherwise unsatisfactory joints or material. Peening, caulking, or doping of piping is not permitted.

8. Install piping to prevent stresses and strains to piping and hangers and supports due to expansion or contraction and building settlement. Provide proper loops, guides, offsets, anchor points, or expansion joints. Verify with anticipated settlement or shrinkage of building. Verify construction phasing of project, type of building construction products and type for coordinating installation of piping systems. Include provisions for servicing and removal of equipment without dismantling piping.

9 Piping Systems Routing Within Unconditioned Spaces, Plenums, Chases, or Cavities:

a Unless absolutely unavoidable, route fluid filled and (or) pressurized piping systems on the "warm" side of local building wall, roof, or ceiling thermal insulation batts, boards, or blankets as near to heated space as practical.

b. Whenever such routing as described above is entirely impractical or impossible, provide heat tracing systems to piping, wherever necessary. Inform Architect before proceeding.

10. Corrosion Control:

a. Underground Steel Piping Corrosion Protection: Factory wrap uninsulated underground steel piping systems with protective coating composed of a coal-tar saturated wrapping tape over a 20 mil thick coal-tar epoxy coating, equivalent to "Republic X-Tru-Coat". Wrap joints spirally with a minimum overlap of 1/2 tape width. Extend wrap not less than 3 inches above grade. Provide tinker test to check for holidays. Provide cathodic protection to meet requirements of NACE Standard RP0169-2002.

11. Pipe Sleeves:

a. Lay out work in advance of pouring concrete and furnish and set sleeves necessary to complete work.

b. Floor Sleeves and Exterior Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with nonshrinking grout or approved caulking compound. Provide "Link-Seal" Type S sleeve sealing system for slab on grade and exterior walls. Caulk/seal piping and ductwork passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements.

c. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with nonshrinking caulking compound. Caulk/seal piping and ducts passing through fire-rated building assemblies with UL approved fire-rated assemblies. Provide fire-rated assemblies per local AHJ requirements.

12. Conform with applicable codes and industry standards.

13. Install uninsulated piping so that unrestrained direct contact with the structure or other system installations is avoided. Where contact with or passage through building or structural features cannot be avoided; firmly anchor piping to, or isolated from, the structure to prevent noise transmission and occurrence of physical damage. Install piping to be insulated with adequate clearance around piping to allow for placement of full thickness insulating material.

C. Pressure Piping Routing:
1. Route piping, except as otherwise indicated, vertically and horizontally (sloped to drain). Avoid diagonal runs wherever possible. Orient horizontal routes parallel with walls and beam lines.
2. Install piping as shown or described by diagrams, details and notations on Drawings or, if not indicated, install piping to provide the shortest route which does not obstruct usable space or block access for servicing the building and its equipment.
3 Support piping adjacent to walls, overhead construction, columns and other structural and permanent enclosure elements of the building. Limit clearance to 1/2 inch wherever furring is indicated for concealment of piping. Allow for insulation thickness, if any. Locate insulated piping to provide minimum 1-inch clearance outside insulation.
4. Wherever possible in finished and occupied spaces, conceal piping from view by locating within column or beam enclosures, hollow wall construction, or above suspended ceilings. Do not encase horizontal routes in solid partitions, except where approved.

D. Preparation:
1. Unions:
a. Insulating (Dielectric) Unions: Comply with manufacturer's instructions for installing unions wherever piping of dissimilar metals are adjoined. Install unions in manner which will prevent galvanic action and inhibit corrosion.
b. Standard Unions: Install where indicated on Drawings and on each side of pieces of equipment to permit easy removal of equipment.
2. Copper Tubing:
a. Remove burrs from and clean outer surface of tube ends and inner surface of fittings.
b. Copper-Soldered: Make soldered joints for copper tubing and fittings with code approved solder alloys meeting ASTM and ANSI standards and listings. Solder-paste-flux combination fillers are not approved. Installations to conform to accepted published procedures, i.e., UPC IS 375, IS 21-80 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Apply flux as recommended by manufacturer. Allstate Silver Bearing Solder 430 or other approved solder alloys which do not contain lead or cadmium.
c. Copper-Brazed: Make brazed joints for copper tubing and fittings with code approved brazing filler alloys meeting ASTM and AWS standards and listings. Filler alloys of BCuP2 classification (e.g., "Phos-0" or "Fos-Copper") may not be used to make joints between copper tubing and cast brass or bronze fittings. Filler alloys containing cadmium are not approved for use in potable water piping. Installations to conform to accepted published procedures, i.e., UPC IS 3-75 standards and CDA Publications. Use of steel wool for cleaning tube and fittings is prohibited. Remove bonnets and nonmetallic seats on valves and cool body with damp cloth while soldering or brazing. Remove excess flux from completed joints in accordance with manufacturer's instructions and code standards.

d. Copper-Rolled Joints: Pipe ends clean and free from indentations, projections and roll marks in the area from pipe end to rolled area for proper sealing of gasket. Apply a thin uniform coat of nonpetroleum-based lubricant to the gasket, coupling or housing by brush or hand. Place the gasket over one pipe end, the pipe ends aligned and brought together, and the gasket positioned between rolled area and pipe ends. Assemble the coupling housing over the gasket with housing keys engaging both rolled areas. Insert the bolts and nuts started, uniformly tighten until the housing bolt pads are firmly together, metal to metal.

e. Pressurized Service:

1) Unless otherwise indicated, wrought copper/bronze solder joint fittings complying with ANSI B16.22.1995.

2) Copper Tube Unions: Standard products as recommended by manufacturer for use in the service. Rated at 150 percent design operating pressure.

3) Mechanically Formed Tee Connections:

a) Form mechanically extracted collars in a continuous operation consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. Fully adjustable collaring device to ensure roper tolerance and complete uniformity of the joint.

b) Notch the branch to conform with the inner curve of the run tube and dimpled to ensure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube.

c) Braze joints in accordance with the Copper Development Association Copper Tube Handbook using B-cup series filler metal. Note: Soft soldered joints will not be permitted.

3.02 FIELD QUALITY CONTROL

A. Inspection:

1. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
2. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

3.03 ADJUSTING AND CLEANING

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of painting, insulation, or coatings, if any. Comply with the preparation requirements of Section 23 05 53, Identification for HVAC Piping and Equipment, and Section 23 07 00, HVAC Insulation, as applicable. Flush out water filled or drainage piping systems with clean water, and flush other piping systems with dry air or nitrogen after completing required tests. Inspect each segment of each system for completion of joints, supports, and accessory items.

B. Inspection: Inspect pressurized piping in accordance with the procedures of ANSI B31.9.

3.04 PROTECTION

A. Protect piping from damage. Replace damaged items with new.

3.05 ESCUTCHEONS

A. Install on exposed pipes passing through walls or floors.

3.06 PIPE TEST

A. General:
1. Make tests in presence of Architect or authorized representative.
2. Make test before pipes are concealed.
3. Fill system and remove air from system at least 24 hours before test begins.
4. Correct leaks in screwed fittings by remaking the joint. Cut out leaks in welded joints and reweld; caulking is not permitted.

B. Water piping: Apply test pressure of 125 PSI and maintain for 1 hour with no visible leaks and no appreciable drop after the test pump has been disconnected.

3.07 ACCESS PANELS

A. Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SAN MATEO COUNTY COMMUNITY COLLEGE DISTRICT

CAN B8 Admin Renovation - RFI - 020

RFI

DSA #:	
RFI #:	000357RFI00023
Contractor Ref. #:	020
Rev.No:	
Scheduled Task Name:	SUP1406
Start Date of Scheduled Task:	9/2/2008
Response Criticality:	Critical
Spec Section Name:	23 Heating, Ventilation & Air Conditioning
Sheet Detail:	
Date Required:	9/9/2008
Subject:	Below grade chilled water piping
Created By:	Richard Giannini, Schembri Construction Company 9/8/2008 9:57:01 AM Pacific Time (US)
Last Modified By:	Linda Rizzoli, Swinerton Management & Consulting 9/8/2008 11:49:52 AM Pacific Time (US)
Information Requested:	Specification section 23 21 05 is absent of a specification for below grade chilled water pipe. In addition, please provide a penetration seal detail where the pipes enter the building. Also, please provide a core detail showing the size of the opening and spacing between the two cores. Are there any structural concerns with coring this wall?
Contractor's Suggested Solution:	
Cost Impact:	TBD
Schedule Impact-Number of Days:	

AE Response

Response Date:	9/11/08 - Omar Hawit - Interface Engineering
Response By:	Please find the attached sketch of the insulated piping wall penetration below grade detail. Refer to structural response for coring. Below grade chilled water insulated piping should match the existing piping; the district standard for this piping is attached as well.
Official Response:	

Discussion

From	To	Message with File(s)	Date Responded	Reply
Richard Giannini	Linda Rizzoli		9/8/2008 9:57:02 AM Pacific Time (US)	
Linda Rizzoli	Sandrine Hitchcock		9/8/2008 11:49:52 AM Pacific Time (US)	

Actions

	Status
Forward	

FILE NO. 41-C1
APPL.NO. 01-109554

DIVISION 23 05 10 SAN MATEO COUNTY COMMUNITY COLLEGE DISTRICT VERSION 2.2008.0708

PRE-INSULATED UNDERGROUND PIPING SYSTEMS:
FACTORY PRE-INSULATED PIPING SYSTEM, CONSISTING OF AN INNER MEDIA CARRIER PIPE, INSULATION AROUND THE CARRIER PIPE, AND A WATER/VAPOR SEAL JACKET OVER THE INSULATION
CARRIER PIPE MATERIAL: SCHEDULE 40 BLACK STEEL PIPE WITH 150 PSI MALLEABLE SCREWED FITTINGS
INSULATION: RIGID CLOSED CELL POLYURETHANE, AVERAGE DENSITY OF AT LEAST 2 LB./FT.3, CONFORMING TO ASTM C552, TYPE II, CLASS 1, K FACTOR OF NOT MORE THAN 0.14 (BTU/IN)/(HR/SQ.FT./DEG. F) AT 50F
OUTER CASING: PVC PIPE OF MINIMUM 60 MILS THICKNESS. EACH FACTORY PREFABRICATED SECTION PROVIDES COMPLETE SEALING OF THE INSULATION AT EACH END OF THE CONDUIT SECTION. PROVIDE PERMANENT WATER AND VAPOR SEAL. CARRY OVER THE OUTER CASING AND EXTEND IT TO THE CARRIER PIPE. USE PREFABRICATED CAPS SPECIFICALLY DESIGNED FOR END SEAL OF PREFABRICATED INSULATION SYSTEMS. FABRICATE CAPS OF THE SAME MATERIAL AS THE OUTER CASING
INCLUDES: EXPANSION LOOPS, ELLS, WELDED FITTING AND ELBOWS, MOISTURE BARRIER AND END SEALS, ANCHORS, THRUST BLOCKS.
AFTER ANCHOR BLOCKS ARE POURED AND CURED, A HYDROSTATIC TEST OF 150 PSIG OR 1-1/2 TIMES OPERATING PRESSURE, WHICHEVER IS GREATER, REQUIRED FOR A PERIOD OF 4 HOURS
FITTINGS FOR STEEL PIPE:
FLANGES, FITTINGS, UNIONS AND OTHER PRODUCTS, MARK IN ACCORDANCE WITH MSS SP-25
WELDING FITTINGS: WROUGHT CARBON STEEL FITTINGS, ASTM A234, ANSI B16.9, B16.28.
BUTT-WELDING TYPE UNLESS OTHERWISE INDICATED TO BE SOCKET WELDING TYPE
BRANCH CONNECTIONS: FROM MAINS OR HEADERS 2-1/2 INCHES OR LARGER, WELDED TEES OR FORGED WELDING OUTLETS
WELDING OUTLETS: "WELDOLETS" OR "THREADOLETS" EQUIVALENT TO BONNEY FORGE. USE FORGED WELDING OUTLETS WHEREVER BRANCH LINE IS AT LEAST 1 NOMINAL PIPE SIZE SMALLER THAN LOCAL MAIN OR HEADER
THREADED FITTINGS: ANSI B2.1, ASTM A47, 150 PSI RATING, EXCEPT WHERE OTHERWISE SPECIFIED, PREVAILING CODES OR REQUIREMENTS OR SPECIFICATIONS DICTATE USE OF 300 PSI RATING. FABRICATE FROM STANDARD MALLEABLE IRON WITH DIMENSIONS CONFORMING TO ANSI B16.3
FLANGES: CARBON STEEL CONFORMING TO ASTM A105, ANSI B16.5, AND FACTORY FORGED IN THE USA. FLANGES WHICH HAVE BEEN MACHINED, REMADE, PAINTED, OR ARE OF NON-DOMESTIC ORIGIN ARE NOT ACCEPTABLE. PROVIDE RAISED OR FULL FACE ENDS WHEREVER INDICATED OR REQUIRED
UNIONS: ANSI B16.39, ASTM A47, AND BE FABRICATED FROM MALLEABLE IRON WITH BRONZE-TO-IRON GROUND JOINTS RATED AT 150 PERCENT DESIGN OPERATING PRESSURE. THREADS: ANSI B2.1
FASTENERS: SEMI-FINISHED CARBON STEEL BOLTS AND HEX NUTS CONFORMING TO ASTM A307.
THREADS AND DIMENSIONS: ANSI B1.1 AND B18.2
THREADED PIPE PLUGS: ANSI B16.14
PROVIDE THREAD LUBRICANT

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Contact
Omar Hawit
Project
2007-0730
INTERFACE ENGINEERING
214 GRANT AVE., SUITE 450, SAN FRANCISCO, CA 94108
PHONE 415.489.7240 FAX 415.489.7289

Title:
DIVISION 23 05 10
UNDERGROUND CHILLED WATER SPECIFICATION

Revision:

ASI No.:-

Project Name:
CAÑADA COLLEGE
BLDG 8 PHASE 2 RENOVATION
4200 Farm Hill Blvd.
Redwood City, CA 94061
FILE NO. 41-C1 APPL. 01-109554

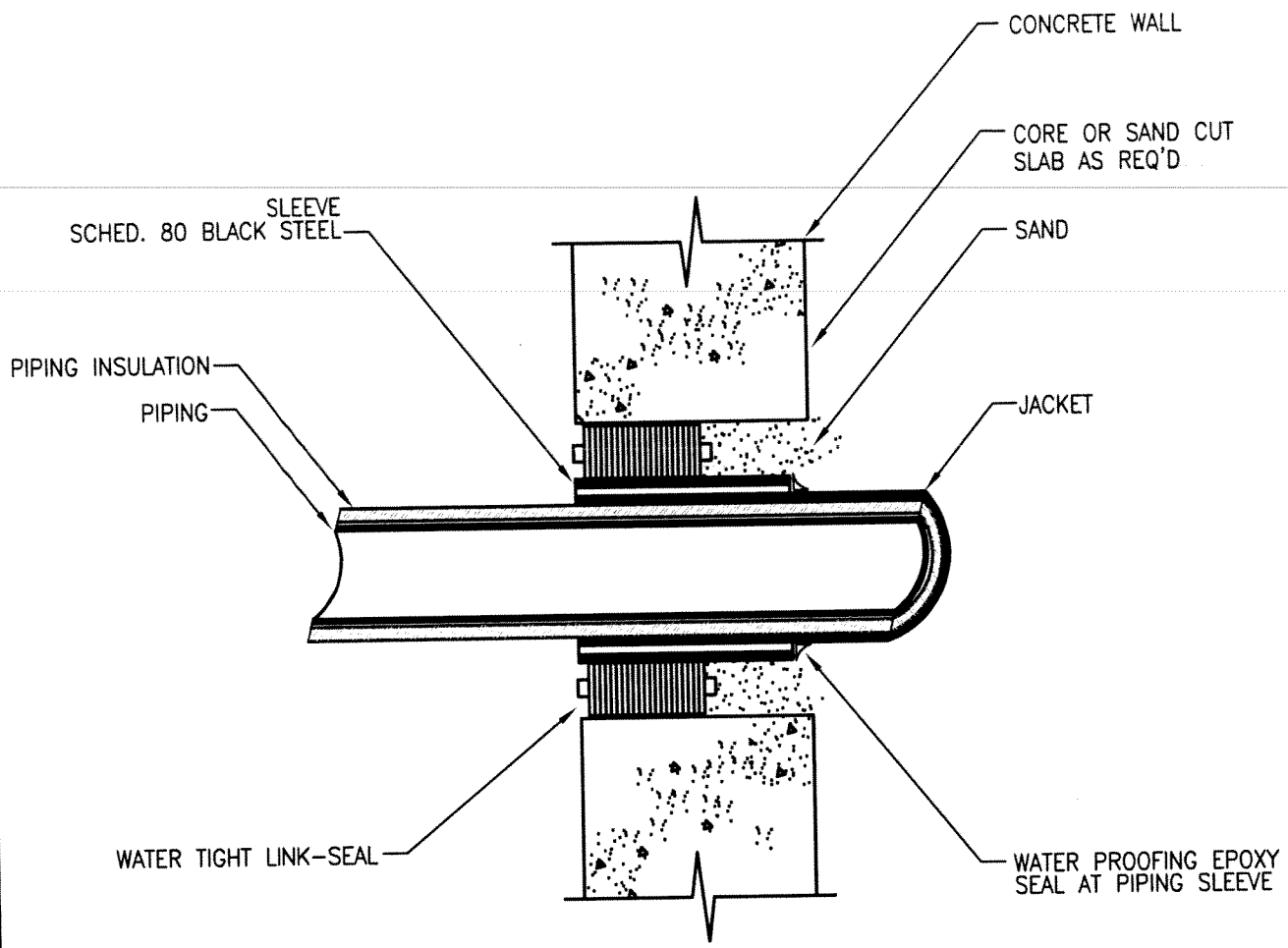
Date
06/12/08

Scale
AS NOTED

Project Number
07014

Drawing Number
PSK-A

FILE NO. 41-C1
APPL.NO. 01-109554



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INTERFACE ENGINEERING
214 GRANT AVE., SUITE 450, SAN FRANCISCO, CA 94108
PHONE 415.489.7240 FAX 415.489.7289

Title:
PIPING THRU WALL BELOW GRADE

Project Name:
CAÑADA COLLEGE
BLDG 8 PHASE 2 RENOVATION
4200 Farm Hill Blvd.
Redwood City, CA 94061
FILE NO. 41-C1 APPL. 01-109554

Revision:

ASI No.:-

Date
06/12/08

Scale
AS NOTED

Project Number
07014

Drawing Number
PSK-B

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

JMS MECHANICAL, INC
ROHNERT PARK, CA
707 - 585 - 0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, installation and testing of motors and starters.

B. Refer to Specification sections for each system medium (i.e., hydronics, gas, and the like), for motor/starter application.

1.02 QUALITY ASSURANCE

A. Motor Manufacturers:
1. General Electric, Westinghouse, U S Motors, Wagner, Century/Gould, Louis-Allis, Reliance, Marathon, or approved.
2. Standards: ANSI/IEEE 112 and NEMA MG-1

B. Starter Manufacturers:
1. Allen Bradley, Square D, General Electric, Siemens, Furnas, Eaton Electrical, or approved
2. Manufacturer is certified ISO 9002 facility 3, UL listed

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, motor efficiency, installation instructions, and dimensioned drawings for each type of motor or starter.

B. Maintenance Data: Submit maintenance data and parts list for each type. Include this data, product data, and certifications in maintenance manual.

PART 2 - PRODUCTS

2.01 ELECTRIC MOTORS

A. Motors: Energy efficient, suitable for nonoverloading operation, and capable of continuous operation at full nameplate rating. Motors 1 HP and larger must meet Energy Policy act of 1992. Motors to be high efficient type similar to Century/Gould E-plus.

B. Take NEMA standards as minimum requirements for motor design and performance. Motors suitable for load, duty, voltage, frequency, hazard and for service and location intended. Motors, unless specified otherwise, to be general purpose open dripproof type, ball bearing equipped, 40C temperature rise; and rated for continuous duty under full load. Motors to have name plate giving manufacturer's name, shop number, HP, RPM and current characteristics.

C. Motors smaller than 1/2 horsepower, 1 phase; and motors 1/2 horsepower and larger, 3 phase and voltage as indicated on Drawings. Maximum motor speed of 1750 RPM, unless otherwise noted. One phase motors to have internal thermal overload protection with automatic reset

D. Motors for belt drive to have adjustable bases with set screw to maintain belt tension Motor horsepowers indicated on the Equipment Schedule on Drawings are the minimum size acceptable

E. Provide two-speed motors where indicated on schedule or in sequence

F. Provide inverter rated motors per NEMA MG1-31 where variable frequency drives are applied or soft start starters.

2.02 STARTERS

A. Single Phase Motors:
1. Manual across-the-line starting switch having toggle-operated switch pilot running light and built-in thermal overload device with heating element rated not more than 115 percent motor full load current indicated on name plate of motor to be protected. Surface mount starters. Provide NEMA-1 enclosure.
2. Overload relays to be melting alloy type with a replaceable control circuit module. Thermal units to be interchangeable. Starter to be nonoperative if thermal unit is removed.
3. Single phase motors with automatic controls. Provide motor rated relay with coils rated for control voltage.

B. Starters up to size 8 to be suitable for the addition of a minimum of three external auxiliary contacts (normally open or normally closed). Contactor, coils, and relays to perform the control functions of the associated equipment and control sequence.

C. Three phase motors up to and including 15 HP:
1. Provide enclosed type magnetic across-the-line starter with thermal overload and under voltage protection.
2. Operator: "Start-Stop" pushbutton, except where automatic control is indicated on Drawings or specified. Then provide "Hand-Off-Auto" selector switch.
3. Starters for 3 phase motors to have overload protection in each of the three legs, with external manual reset.
4. Unless indicated on Drawings or in Specifications, furnish motor starters with a neon pilot light. Neon lights are required for all exhaust fan switches.
5. Equip starters with integral transformer and coil for control circuit. Coordinate coil voltage with control voltage.

D. For 3 phase motors greater than 15 HP:
1. Provide combination starter and fused safety disconnect integral in the same enclosure. Utilize Type 'RK' or 'L' fuses. Provide fuse block with rejection type fuse holders. Size fuses per motor manufacturer's recommendations.
2. Provide a solid-state reduced voltage starter, consisting of power section, one-piece removable printed circuit logic board and field wiring interface terminals. Logic board uses quick disconnect plug-in connectors for current transformers inputs, line-and-load voltage inputs, SCR gate firing output circuits and status panel. Three phase current sensing via current transformers. Class 10 electronic overload protection
3. Motor starters to include the following protections:
   a. Inverse time running overcurrent protection
   b. 250 percent to 500 percent current limit adjustment
   c. Minimum and maximum voltage adjustments
   d. Voltage stability adjustment
   e. Single-phase protection with built-in short-time delay.
   f. Undervoltage protection with built-in short time delay.

g MOV surge suppression protection of SCRs rated 10 percent above the rated voltage
h Phase sequence protection

4 Display: Door-mounted status LCD alphanumeric or LED display indicating run, undervoltage, phase loss, phase current unbalance, overcurrent trip, overtemperature, current limit, end of ramp, and incorrect phase rotation
5 Enclosure: NEMA 12. Operator: "Start-Stop" pushbutton, except where automatic control is required, then provide "Hand-Off-Auto" selector switch
6 Input/Output Relays: Provide relays as required to provide the control sequence.
7 UL 508 listed

E Motor starters for equipment not installed in Division 26, Section 26 24 19 "Motor Control" to be furnished and installed by Division 23.

F Shaft Grounding:
1 Provide shaft grounding assembly on all motors controlled by variable frequency drive. Shaft grounding device to be in the form of brush that resides on the motor shaft. Brush assembly shall be capable of tolerating misalignment and maintaining rotating contact throughout the motor's life.
2 Material: Material used in the grounding assembly shall be stable material commonly used within industry that is not believed to constitute a hazardous material under Office of Safety and Health Act (OSHA regulations.
3 Brushes: Specifically developed carbon compounds of sustained performance with sear life expectancy of 3 years minimum
4 Seals: In wet or severe environment applications, brush contact area shall be sealed type to keep contaminants from entering the shaft grounding system.
5 For clean room air handling systems, the shaft grounding assembly shall be of the type that contains the wear products within a special enclosure within the shaft grounding system.
6 Shaft grounding assembly installation shall not affect the motor manufacturer warranty. Where the severe environment conditions require application of the shaft grounding types that are screwed into the motor shaft, the installation of the shaft grounding system shall be performed either by the motor manufacturer or by the motor manufacturer authorized facility.
7. Manufacturer: Shaft Grounding Inc or approved.
8. Bond the brush to the closest ground point using code sized green insulated stranded copper conductor per manufacturer instructions.
9. Test and verify the performance of the assembly to ensure that under no conditions the shaft exceeds 3 volts.

2.03 DISCONNECTS

A Provided by Division 26 unless otherwise specified.

PART 3 - EXECUTION

3.01 INSTALLATION

A Install a soft start per the manufacturer's specifications with a minimum clearance of 4 inches on each side of the enclosure

B Include a standard wiring diagram for making the appropriate electrical connections.

3.02 START UP

A For soft starters provide the services of a qualified technician to program, test, and start up soft starts furnished under this Specification.

END OF SECTION

SECTION 23 05 23

GENERAL-DUTY VALVES FOR HVAC PIPING

AYOUB MECHANICAL
COLMA, CA
(650) 992-8281
SUBMITTAL #19

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, installation and testing of valves, including the following:
1. Globe valves.
2. Drain valves
3. Ball valves.
4. Balancing valves
5. Butterfly valves.

B. Refer to Specification sections for each system medium (i.e., hydronics, and the like), for valve application.

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves of types and sizes required

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of valve.

B. Maintenance Data: Submit maintenance data and parts list for each type valve. Include this data, product data, and certifications in maintenance manual.

PART 2 - PRODUCTS

2.01 VALVES - GENERAL

A. General:
1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6 inches and smaller, and 4 inches and smaller for plug valves. Provide gear operators for quarter-turn valves 8 inches and larger. Provide chain-operated sheaves and chains for overhead valves.
3. End Connections: Mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.

B. Service:
1. Water Shutoff and Isolation Valves:
   a. Pipe Sizes 2-1/2 Inches and Smaller: Ball valve.
   b. Pipe Sizes 3 Inches and Larger: Butterfly valve.
2. Drain Service; All Pipe Sizes: Drain valves.

C Manufacturers: Crane, Fairbanks, Anvil, Jenkins, Kennedy, Walworth, Red/White (commercial grade), Mueller, Legend, Conbraco, Nibco, DeZurik, Hays, Powell, Stockham, Hammond, Watts, Milwaukee, Victaulic, or approved. Note: See individual sections for specialty valves (balancing valves, pressure regulators, relief valves, earthquake valves, gas valves)

2.02 GLOBE VALVES

A. 2 Inches and Smaller: Class 125, bronze body, screw-in bonnet, integral seat, renewable disc, straight body, Nibco 211. Angle body, Nibco 311.

B. 2-1/2 Inches and Larger: Class 125, iron body, bolted bonnet, flanged ends, renewable seat and disc, bronze mounted. Straight Body: Nibco F-718-B. Angle Body: Nibco F-818-B.

2.03 DRAIN VALVES

A. Class 125, bronze body, screw-in bonnet, rising stem, composition disc, 3/4-inch hose outlet. Threaded: Nibco 73. Solder: Nibco 72.

2.04 BALANCING VALVES

A. Bronze with a machined orifice flow restriction, multi-turn globe type valve, internal O-rings, rated working pressure of at least 240 PSIG (175 PSI iron construction, 2-1/2 inches and larger), flow setting indicating pointer and calibrated nameplate, memory stops, and pressure readout port with integral check valve on each side of the orifice. Bell & Gossett, Armstrong, Nibco, Wheatley, Tour & Anderson, or Illinois.

B. Combination check valve/balancing valve not allowed, 1/4 turn plug type allowed on 8 inches and larger pipe only.

2.05 BALL VALVES

A. 2-1/2 Inches and Smaller: 150 PSI, bronze body, full port, bronze trim, three-piece construction, TFE seats and seals. Threaded: Nibco T-595-Y. Soldered: Nibco S-595-Y.

B. 3 Inches and Larger: 150 PSI, cast iron body, full port, two-piece body, TFE seats with stainless steel ball. FDA rated for potable water. Flanged Connection: Watts G4000.

C. Victaulic Series 721 Standard Port Ball Valve: 2- to 4-inch ductile iron, ASTM A536, micro finish steel chrome plated or stainless steel ball and stem. TFE seats, 600 PSI.

2.06 BUTTERFLY VALVES

A. Select lug type valves.

B. 6 Inches and Smaller: 200 PSI, ductile iron body, extended neck, aluminum bronze disc, reinforced resilient EDPM seat, manual lever and lock. Nibco LD2000, or Victaulic 300 for mechanical coupling fittings.

2.07 ACCESS PANELS

A. Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size). Wall access panels to be minimum 12x12 (or required and approved size).

B. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.

C. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

D. Mechanical Actuators: Install with chain operators where indicated. Extend chains to 5 feet above floor and hook to clips to clear aisle passage.

E. Stem Selection: Outside screw and yoke stems, except provide inside screw, nonrising stem where space prevents full opening of OS&Y valves.

F. Seats: Renewable seats, except where otherwise indicated.

G. Balancing Valves: Install with minimum 4 pipe diameters, straight inlet and outlet pipe or per manufacturer's recommendations.

3.02 VALVE ADJUSTING AND CLEANING

A. Inspect valves for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.

B. Valve Identification. Tag valves per "Identification for HVAC Piping and Equipment."

3.03 ACCESS PANELS

A. Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

JMS MECHANICAL, INC.
ROHNERT PARK, CA
(707) 585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Work Included: Material and installation of supports, anchors and sleeves including: horizontal piping hangers and supports; vertical piping clamps; hanger rod attachments; building attachments; saddles and shields; miscellaneous metals, miscellaneous materials; roof equipment supports; anchors; equipment supports; wall and floor sleeves; and escutcheon plates.

1.02 QUALITY ASSURANCE

A Manufacturers: Firms regularly engaged in the manufacture of supports and anchors, of types and sizes required.

B Regulatory Requirements:
1. Provide pipe hangers and supports whose materials, design and manufacture comply with MSS SP-58, "Pipe Hangers and Supports - Materials, Design and Manufacture," latest edition.
2. Select and apply pipe hangers and supports complying with MSS SP-69, "Pipe Hangers and Supports - Selection and Application," latest edition.
3. A copy of the above-referenced standards on the construction site at all times.

C Seismic: Provide per Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

D Manufacturers: B-Line, Elcen Metal Products Co., F&S Control, Globe, Kindorf, Kinline, Michigan, Superstrut, Unistrut, Power-Strut. Note: See individual Sections for roof equipment support.

1.03 SUBMITTALS

A Submit the following:
1. Manufacturer's technical product data, including installation instructions, for each type of support, anchor and sleeve. Include UL approval drawing from manufacturer for each different pre-engineered firestop assembly.
2. Assembly type shop drawings for each type of sleeve, indicating dimensions, weights, required clearances, and methods of assembly of components.
3. Shop drawings for each individual roof pipe curb assembly, indicating number and location of each pipe or conduit which is to pass through the curb. Indicate pipe insulation requirements.

PART 2 - PRODUCTS

2.01 PIPING HANGERS AND SUPPORTS

A. General:

1. Horizontal Piping Hangers and Supports-Horizontal and Vertical Piping, and Hanger Rod Attachments: Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for uninsulated copper piping systems.
2. Building Attachments: Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
3. Saddles and Shields: Factory fabricated saddles or shields under piping hangers and supports for insulated piping. Size saddles and shields for exact fit to mate with pipe insulation. 1/2 round, 18 gauge, minimum 12 inches in length (4-inch pipe and larger to be three times longer than pipe diameter).
4. Roller Hangers: Adjustable roller hanger. Black steel yoke, cast iron roller.
5. Concrete Inserts: Malleable iron body, black finish. Lateral adjustment.
6. Continuous Concrete Insert: Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.

B. Pipe Hangers Size 2 Inches and Smaller: Adjustable swivel ring hanger, UL listed. Michigan 100 or 101.

C. Pipe Hangers Size 2-1/2 Inches and Larger: Adjustable clevis type, UL listed. Michigan 400.

D. Riser Clamps: Steel, UL listed. Michigan 510 or 511. Copper coated; Michigan 368.

E. Plumbers Tape: Not permitted as pipe hangers or pipe straps.

F. Michigan numbers are indicated for type and quality. Comparable products manufactured by Globe, Elcen, B-Line, Kindorf, Kinline, Unistrut, Anvil, Super Strut, Tolco, PHD, Power-Strut, or approved.

2.02 ROOF EQUIPMENT SUPPORTS

A. General:

1. Coordinate the location and type of each roof equipment support with the roofing system supplier. Coordinate systems to maintain roof warranty.
2. Minimum 18 gauge galvanized steel with fully mitered and welded corners, internal bulkhead reinforcing, integral base plates, pressure-treated wood nailer, and 18 gauge galvanized steel counterflashing. Provide insulated curbs where surrounding roof is insulated.
3. Compensate for slope in roof so top of support is level.
4. Construct curb to withstand seismic forces.

B. Manufacturers:

1. Equipment Supports: Pate ES, Custom Curb, Vibrex, or Thycurb.
2. Equipment Curbs: Pate PC, Custom Curb, Vibrex, or Thycurb.

3. Pipe Curb Assemblies: Pate PCC, Custom Curb, Vibrex, or Thycurb.

2.03 WALL AND FLOOR SLEEVES

A. General:

1. "Link-Seal" Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal. Provide Type S unless otherwise noted. Thunderline Corporation, or approved
2. Pre-Engineered Firestop Pipe Penetration Systems: UL listed assemblies for maintaining fire rating of piping penetrations through fire-rated assemblies. Comply with ASTM E814.
3. Insulating Caulking: Eagle, Pitcher Super 66 high temperature cement, or approved.
4. Fabricated Accessories:
   a. Steel Pipe Sleeves: Fabricate from Schedule 40 black or galvanized steel pipe. Remove end burrs by grinding.
   b. Sheet Metal Pipe Sleeves: Fabricate from G-90 galvanized sheets closed with lock-seam joints. Provide the following minimum gauges for the sizes indicated:
      1) Sleeve Size 4 Inches in Diameter and Smaller: 18 gauge
      2) Sleeve Sizes 5 to 6 Inches: 16 gauge.
      3) Sleeve Sizes 7 Inches and Larger: 14 gauge.
   c. Fire-Rated Safing Material:
      1) Rockwool Insulation: Complying with FS-HH-I-558, Form A, Class IV, 6 lbs./cu.ft. density with melting point of 1985F and K value of 0.24 at 75F.
      2) Calcium Silicate Insulation: Noncombustible, complying with FS-HH-I-523, Type II, suitable for 100F to 1200F service with K value of 0.40 at 150F]

2.04 ANCHORS

A. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer.

B. Manufacturers: Anchor-It, Hilti Hit System, Epcon System, or Power Fast System.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine the Drawings and coordinate for verification of exact locations of fire and smoke rated walls, partitions, floors and other assemblies. Indicate, by shading and labeling on Record Drawings such locations and label as "1-Hour Wall," "2-Hour Fire/Smoke Barrier," and the like. Determine proper locations for piping penetrations. Set sleeves in place in new floors, walls or roofs prior to concrete pour or grouting.

B. Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate proper placement of inserts, anchors and other building structural attachments.

3.02 INSTALLATION

A. Building Attachments: Install within concrete or on structural steel or wood. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert secure to forms. Where concrete with compressive strength less than 2500 PSI is indicated, install reinforcing bars through openings at top in inserts.

B. Hangers and Supports:

1. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers. Maximum spacings: MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not support piping from other piping.
2. Support fire protection piping independently of other piping.
3. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.
4. Allow controlled movement of piping systems to permit freedom of movement between pipe anchors and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
5. Piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
6. Insulated Piping: Provide protection saddles where insulation without vapor barrier is indicated. Provide protection shields on insulated piping where insulation with a vapor barrier is indicated.
7. Hanger Spacing:
   a. Steel Pipe 1 Inch and Smaller: 6 feet.
   b. Steel Pipe 1-1/4 Inches and Larger: 10 feet.
   c. Copper Tubing 1-1/2 Inches and Smaller: 6 feet.
   d. Copper Tubing 2 Inches and Larger: 10 feet.
   e. 90 Degree Offsets: Within 2 feet, both sides of offset.

C. Anchors: Install at ends of principal pipe runs where indicated on Drawings. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

D. Roof Equipment Supports, Equipment Curbs, and Pipe Curb Assemblies:

1. Provide prefabricated units for roof membrane and insulation penetrations related to mechanical equipment. Coordinate with roofing system. Set supports on the structural deck. Do not set supports on insulation or roofing. Provide level supports by prefabricated pitch built into the curb.
2. Equipment Supports: Provide for roof mounted equipment which does not require a structural roof deck penetration (i.e., condensing units).
3. Equipment Curbs: Provide for equipment which requires a structural roof deck penetration other than piping or conduit (i.e., fans, ducts).
4. Pipe Curb Assemblies: Provide for piping and electrical conduit which penetrates the structural roof deck to service equipment above the roof level (i.e., refrigerant piping, electrical power and control wiring).
5. Piping above roof to be supported with freestanding roof pipe supports unless detailed otherwise.

E. Escutcheon Plates: Install around horizontal and vertical piping at visible penetrations through walls, partitions, floors, or ceilings, including penetrations through closets, through below ceiling corridor walls, and through equipment room walls and floors.

F. "Link-Seal" Pipe Sleeves: Install at exterior wall piping penetrations. For penetrations below grade provide Schedule 40 steel sleeve with 1-inch, continuously welded, "weep ring" centered on length of sleeve.

G. Fabricated Pipe Sleeves:
1. Provide either steel or sheet metal pipe sleeves accurately centered around pipe routes. Size such that piping and insulation, if any, will have free movement within the sleeve, including allowance for thermal expansion. Sleeves not to be more than 1 pipe size larger than piping or piping plus insulation size.
2. Length: Equal to thickness of construction penetrated, except extend floor sleeves 1/4 inch above floor finish and, where floor surface drains to a floor drain, extend floor sleeve 3/4 inch above floor finish.
3. Provide temporary support of sleeves during placement in concrete and other work around sleeves. Provide temporary end closures to prevent concrete and other materials from entering pipe sleeves.
4. Seal each end airtight with a resilient nonhardening sealer.

H. Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:
1. Install fabricated pipe sleeve.
2. After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve I.D. with specified material.

I. Piping penetrations through fire-rated (1 to 3 hour) assemblies: Select and install pre-engineered pipe penetration system in accordance with the UL listing and manufacturer's recommendation.

3.03 ADJUSTING AND PAINTING

A. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping and equipment to proper level and elevations.

B. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted.

3.04 FIRESTOPPING PENETRATIONS IN FIRE-RATED WALL/FLOOR ASSEMBLIES

A. Refer to Section 07 84 00.

B. Provide proper sizing when providing sleeves or core-drilled holes to accommodate the penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet the requirements of ASTM E814.

C. Manufacturers: Hilti, Proset, or approved.

END OF SECTION

SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

SMS MECHANICAL, INC
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials and installation of seismic restraint devices and related items. Provide complete vibration isolation systems in proper working order.

1.02 CERTIFICATION DATA

A. Bidders on the air handling devices and fans, and terminal units must supply the appropriate inlet, outlet, radiated, discharge, and loss or regenerated octave band sound power level data, measure in accordance with the applicable ASHRAE or ANSI Specifications at a certified laboratory. The units selected should meet the Specification criteria of the tables in this Section and Equipment Schedules on Drawings. Do not consider units in excess of the listed values as appropriate for use on this project.

1.03 SEISMIC CONTROL AND RESTRAINT

A. Mechanical Equipment:
1. Brace or anchor mechanical equipment to resist a horizontal force acting in any direction using CBC, latest edition.
2. Vibration Isolated Equipment: Provide factory fabricated seismic restrained vibration isolating components. Earthquake resistant designs for equipment, i.e., air handling units, blowers, motors, ductwork, and mechanical piping, to conform to the regulations of the CBC, latest edition. Where standard factory fabricated components are not available, provide properly designed custom components which meet the requirements herein.
3. Provide any restraints noted on Drawings for Division 23 work.

B. Anchorage:
1. Where anchorage details are not shown on Drawings, the field installation subject to approval of the project structural engineer.
2. In other cases, retain a professional structural engineer licensed in the state in which the work will be done to provide shop drawings of seismic bracing for ductwork/equipment. Professional engineer to design and provide wet stamped (sealed) shop drawings for equipment, ductwork, and piping seismic bracing. Submit shop drawings and calculations along with equipment submittals.
3. The restraints which are used to prevent disruption of the function of the piece of equipment because of the application of the horizontal force to be such that the forces are carried to the frame of the structure in such a way that the frame will not be deflected when the apparatus is attached to a mounting base and equipment pad, or to the structure in the normal way, utilizing the attachments provided. Secure equipment to withstand a force in any direction.

C. Specify the seismic bracing and anchorage of piping in Section "Hangers and Supports for HVAC Piping and Equipment."

D. Provide earthquake bumpers to prevent excessive motion during starting and stopping of equipment and for earthquake bracing. Install bumpers after equipment is in operation to allow proper placement and alignment and ensure that bumpers are not engaged during normal system operation.

1.04 RUSTPROOFING

A. General: Design vibration isolation hardware or treat for corrosion resistance.

B. Isolators exposed to weather to have steel parts zinc electroplated, PVC coated, plus coating of neoprene or bitumastic paint. Etch aluminum components for outdoor installation and paint with industrial grade enamel.

C. Nuts, bolts and washers zinc electroplated.

1.05 ELECTRICAL CONNECTIONS

A. Make electrical connections to mechanical equipment motors through a flexible conduit designed to reduce motor vibration transfer into the rigid conduit which is directly attached to the building structure.

B. Flexible Conduit: Sufficiently long to provide a 360 degree loop in the flex between the motor and the rigid conduit. Route conduit through side of equipment roof curb and attaching flexible conduit. Caulk around curb penetration water tight.

C. Provide a soft neoprene bushing at the connection point between the flex and the rigid conduit to break the metal-to-metal contact.

D. Ground wires from vibrating equipment to be flexible with sufficient slack to prevent vibration transfer. Ground wires must not directly contact structural membranes (floors, walls or ceilings) of the building.

1.06 QUALITY ASSURANCE

A. Coordinate the size, location, and special requirements of vibration isolation equipment and systems with building systems. Coordinate plan dimensions of final selections and mechanical equipment with size of housekeeping pads.

B. Supply and install any incidental materials needed to meet the requirements stated herein.

1.07 SUBMITTALS

A. Provide a complete description of products to be supplied including product data, dimensions and specifications. Provide installation instructions for each product.

B. Provide a complete tabulation showing for each piece of vibration isolator supporting equipment the following:
   1. The equipment identification mark.
   2. The isolator type with rated load.
   3. The actual load per isolator.

C. Provide fabrication/shop drawings of steel rails, inertia bases, steel base frames, reinforcing, vibration isolator mounting attachment method, unitary straps and location of equipment attachment bolts.

D. Provide structural calculations for isolator seismic restraint sealed by a professional structural engineer, registered in the state of California

PART 2 - PRODUCTS

2.01 METAL PARTS INSTALLED OUT-OF-DOORS

A. Cold dip galvanized, cadmium plated or neoprene coated after fabrication.

2.02 SEISMIC RESTRAINTS FOR PIPING AND DUCTWORK

A. Use the document "Seismic Restraints Manual Guidelines for Mechanical Systems" Secure piping, ductwork, and the like to withstand a force in any direction.

B. Sway bracing is not required for pipes that are installed on very short hangers (12 inches or less).

C. Secure piping bracing at every fourth hanger transversely and every eighth hanger longitudinally.

D. As approved by code authority, use a bracing system manufactured by Superstrut, Mason, or Pipe Shields Inc , or approved.

E Design restraints to meet CBC Seismic Restraint requirements. Provide structural engineering calculations sealed by a professional engineer registered in state of California.

2.03 EQUIPMENT

A. Provide a means to prohibit excessive motion of mechanical equipment during an earthquake

B. Provide equipment, both hanging and base mounted, with mounting connection points of sufficient strength to resist lateral seismic forces equal to 0.5 of equipment operating weight.

C. Design restraints to meet CBC Seismic Restraint requirements. Provide structural engineering calculations sealed by a professional engineer registered in state of California.

2.04 NEOPRENE PAD (NP)

A. One layer of 5/16-inch thick ribbed or waffled neoprene, 40 to 50 durometer. Size pads for loading between 40 and 50 PSI.

B. NP Isolators: Amber/Booth type NR.

C. Manufacturers: Supply vibration isolation mounts by a single manufacturer. Acceptable suppliers are as follows: Amber/Booth Co. - A.B., Korfund Dynamics - K.D., Mason Industries, Inc. - M.I., Peabody Noise Control Inc. - P.N.C., Vibration Mountings & Controls, Inc. - V.M.&C., IAC, Koppers, Vibrex.

2.05 FLEXIBLE DUCT CONNECTIONS (FDC)

A. Neoprene loaded vinyl material or neoprene loaded canvas with vapor barrier. Flame spread rating of 25 or less, and a smoke spread rating of 50 or less, per ASTM E84. Not affected by temperatures as low as minus 10F, or as high as 200F.

B. Flexible Connections: Ventglas manufactured by Ventfabrics, Amatex, or approved.

2.06 FLEXIBLE PIPE CONNECTIONS (FPC)

A. Straight, double sphere shape fabricated of multiple plies of nylon cord, fabric and neoprene, vulcanized so as to become inseparable and homogenous. Able to accept compressive, elongative, transverse and angular movements.

B. Select and fit to suit the system temperature, pressure and fluid type. Do not use rods or cables to control extension of the connector.

C. Pipe Sizes 2 Inches or Smaller: Threaded female union couplings on each end. Larger sizes: Metallic flange couplings.

D. FPC: Mason MFTNC.

E. Manufacturers: Supply vibration isolation mounts by a single manufacturer. Acceptable suppliers are as follows: Amber/Booth Co. - A.B., Korfund Dynamics - K.D., Mason Industries, Inc. - M.I., Peabody Noise Control Inc. - P.N.C., Vibration Mountings & Controls, Inc. - V.M.&C., Metraflex, Vibrex.

F. Connections to match piping system.

2.07 GROMMETS

A. Combine a neoprene washer and sleeve.

B. Isogrommets manufactured by MBPS, Inc.

C. Series W by Barry Controls, or approved.

D. Neoprene Durometer: Between 40 and 50. Grommets: Specially formed to prevent fastening bolts from directly contacting the isolator base plate.

2.08 RESILIENT NONHARDENING SEALANT

A. Sealants for Acoustical Purposes: DAP acoustical sealant.

B. Manufacturers: Pecra, Tremco, USG, or approved.

2.09 FOAM RUBBER

A. Foam Rubber Sheets: Armstrong Armaflex, or approved.

2.10 ACOUSTICAL WRAP

A. Sound barrier material, designed specifically for sound control, apply for duct/pipe lag material, for indoor or outdoor use 2.54 mm (0.10 inch) thick barium sulfate loaded limp vinyl sheet bonded to a thin layer of reinforced aluminum foil, on one or both sides:

1.	Nominal Density:	1.0 lb./ft2
2.	Thermal Conductivity K:	0.29 BTU-in/hr-ft2-0F
3.	Rated service Temperature range:	-40F to 220F
4.	Flamespread:	10 (ASTM E84)
5.	Smoke Developed:	40 (ASTM E84)
6.	Minimum STC:	27
7.	Corrosion Resistance:	most oil, grease, acids and mid alkalis

B. Sound Transmission Loss (STC):

Frequency	125	250500	1000	2000	4000	STC
Transmission Loss dB	15	19 21	28	33	37	2

C. Manufacturers: Kinetic Noise Control, Inc. (KNM-100AL), Thermafiber Industrial Felt, or approved.

PART 3 - EXECUTION

3.01 APPLICATION

A General:

1. Set floor-mounted equipment on 4-inch-high housekeeping type concrete pads as detailed. Extend pad 6 inches beyond footprint of equipment in each direction.
2. Install flexible duct connections at fan unit intakes, fan unit discharges, and wherever else shown on Drawings.
3. Install flexible pipe connections (FPC) at pipe connections to vibration isolated equipment. Included, but not be limited to, air handling units, pumps, chillers, and cooling towers.
4. Isolate miscellaneous pieces of mechanical equipment, i.e., storage tanks, and expansion tanks from the building structure by NP or HN isolators.
5. Provide mounts for equipment installed outdoors for wind loads of 30 lbs. psf applied to any exposed surface of the isolated equipment.
6. Under no circumstances destroy isolation efficiency by bolting the isolators to the roof or floor or equipment. If bolting is necessary, provide rubber grommets and washers to isolate the bolt from the base plate.

7 Building Penetrations: Isolate water piping and ductwork penetrating wall, ceilings, floors or shafts from the structure by piping isolator or by 3/8-inch thick foamed rubber insulation. Install units flush with finished structure face, using one for each side as required. Cut units to length if longer than structure thickness. Caulk around pipe or duct at equipment room wall.

8 Pipe and Duct Hangers in Equipment Rooms: Support water piping and ducts connected to rotating equipment within the equipment rooms on spring and neoprene hangers. The first three hangers from a piece of vibrating equipment to have a minimum of 1/2 the static deflection of that of the equipment isolators. Other isolators should have a minimum of 1/4 the static deflection of that of the equipment.

B. Drain Service Piping Connected to Vibration Isolated Equipment: Do not contact the building structure or other nonisolated system unless it is resiliently mounted as described above.

3.02 VIBRATION ISOLATION EQUIPMENT INSTALLATION

A. General: Install vibration isolation equipment in accordance with the manufacturer's written instructions.

B. Flexible Duct Connections: Squarely align sheet metal ducts or plenum openings with the fan discharge, fan intake or adjacent duct section prior to installation of the flexible connection, so that the clear length is approximately equal the way around the perimeter. Install connections such that the fan unit or adjacent duct section is able to move 1 inch in any direction without causing metal-to-metal contact or stretching taught the flexible connection. Install the connections so that the clear space between ducts is a minimum of 4 inches, and the connection has a minimum of 1-1/2 inches of slack material. Install flexible connections per SMACNA.

C. Flexible Pipe Connections: Install flexible pipe connections to minimize initial misalignment.

D. Foam Rubber: Provide foam rubber sheets between fan bases and roof mounted equipment curbs and between rooftop mounted HVAC equipment and their curbs.

E. Anchorage: Adequately anchor or brace mechanical equipment, piping and ductwork to resist displacement due to seismic action, include snubbers on equipment mounted on spring isolators, chiller, pump, cooling tower, and the like.

3.03 ADJUSTING AND CLEANING

A. Clean each vibration isolator. Verify that each is working freely, and that there is no debris in the immediate vicinity of the unit that could short circuit unit isolation.

B. Schedule:

Equipment:	Type:
Duct Connections to AHU	FDC
Air Handler Casings	NP
Pipe Connections to AHU's	FPC

3.04 ACCESS PANELS

A Install wall and ceiling access panels to provide access to concealed valves, fans, motors, shock arrestors, fire dampers, terminal units, coils and other mechanical items needing service. Provide access panels at locations required or specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

JMS MECHANICAL, INC.
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials and installation of mechanical systems identification.

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.

B. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices, unless otherwise indicated.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.

B. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2- by 11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency shutoff and similar special uses by special "flags" in margin of schedule. In addition to mounted copies, furnish extra copies for maintenance manuals.

PART 2 - PRODUCTS

2.01 MECHANICAL IDENTIFICATION MATERIALS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 23 sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Manufacturers: Allen Systems, Inc., W. H. Brady Co., Signmark Division, Industrial Safety Supply Co., Inc., Seton Name Plate Corporation, or approved.

2.02 PLASTIC PIPE MARKERS

A. Provide one of the following:
1. Snap-on Type: Manufacturer's standard preprinted, semi-rigid snap-on, color-coded pipe markers.
2. Pressure-Sensitive Type: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure sensitive, vinyl pipe markers.

B. Small Pipes: For external diameters less than 6 inches (including insulation, if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
1. Snap-on application of pretensioned semi-rigid plastic pipe marker.
2. Adhesive lap joint in pipe marker overlap.
3. Laminated or bonded application of pipe marker to pipe (or insulation)

4. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4 inch wide; full circle at both ends of pipe marker, tape lapped 1-1/2 inches.

C. Lettering: Comply with piping system nomenclature as specified, scheduled or shown, and abbreviate only as necessary for each application length.

D. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.03 PLASTIC DUCT MARKERS

A. General: Manufacturer's standard laminated plastic, color-coded duct markers. Supply separate color codes for supply, exhaust, outside, and return air.

B. Include the Following Nomenclature:
1. Direction of air flow.
2. Duct service (supply, return, exhaust, outdoor air).

2.04 VALVE TAGS

A. Brass Valve Tags: Polished brass valve tags with stamp-engraved piping system abbreviation in 1/4-inch high letters and sequenced valve numbers 1/2 inch high, and with hole for fastener. 1-1/2-inch diameter tags, except as otherwise indicated. Valve designations to be coordinated with *existing* valve identifications to ensure no repetitive designations are utilized.

B. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

C. Access Panel Markers: Manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve. Include center hole to allow attachment.

2.05 PLASTIC EQUIPMENT MARKERS

A. General: Manufacturer's standard laminated plastic, color-coded equipment markers. Conform to the following color code:
1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.

B. Nomenclature: Match terminology used on drawing schedules as closely as possible.

C. Size: Provide approximate 2-1/2- by 4-inch markers for control devices, dampers, and valves; and 4-1/2- by 6-inch markers for equipment.

2.06 LETTERING AND GRAPHICS

A. General: Coordinate names, abbreviations and other designations used in mechanical identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.

B. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Chiller No. 3, Air Handling Unit No. 42, Standpipe F12, and the like).

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.02 DUCTWORK IDENTIFICATION

A. General: Identify air supply, return, exhaust, and intake ductwork with duct markers, showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork identification color).

B. Location: In each space where ductwork is exposed, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50 foot spacing along exposed runs.

C. Access Doors: Provide duct markers or stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions.

D. Dampers: Provide 12-inch, plenum-rated marker ribbon to end of balancing damper handles.

3.03 PIPING SYSTEM IDENTIFICATION

A. Install pipe markers on each system and include arrows to show normal direction of flow.

B. Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels and plenums), and exterior nonconcealed locations, in locations as follows:

1. Near each valve and control device.
2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
3. Near locations where pipes pass through walls or floors/ceilings, or enter nonaccessible enclosures.
4. At access doors and similar access points which permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.

6. Spaced intermediately at maximum spacing of 20 feet along each piping run, except reduce spacing to 10 feet in congested areas of piping and equipment, i.e., mechanical rooms.

3.04 VALVE IDENTIFICATION

A. General: Provide valve tag on every valve, cock and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units. List each tagged valve in valve schedule for each piping system.

B. Install mounted valve schedule in each mechanical room.

3.05 MECHANICAL EQUIPMENT IDENTIFICATION

A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices: Pumps, compressors, chillers, cooling towers and similar motor driven units, electric duct heaters, terminal units, coils, fans, chillers, boilers, blowers, unitary HVAC equipment, tanks and pressure vessels, filters, water treatment systems and similar equipment.

3.06 ADJUSTING AND CLEANING

A. Adjusting: Relocate any mechanical identification device which has become visually blocked.

B. Cleaning: Clean face of identification devices and glass frames of valve charts.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING

JMS MECHANICAL INC W/ MTB
ROHNERT PARK, CA PETALUMA, CA
707-585-0120 707-766-9790
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, equipment and labor required for testing, adjusting, and balancing work required by this Section, including air, hydronic systems, and associated equipment and apparatus. The work consists of setting speed and volume (flow) adjustments, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required

1.02 Scope of work

A Testing, adjusting, and Balancing (TAB) of the air conditioning systems and related ancillary equipment will be performed by a certified third party independent of the Contractor who specializes in testing, adjusting, and balancing of heating, ventilating, air-moving equipment and hydronic systems and has a minimum of 5 years experience in this specialty.

B. Make changes or replacements to the sheaves, belts, dampers, valves, etc. required for the correct balance as advised the TAB Firm, at no additional cost to the Owner.

C. The Drawings and Specifications indicate valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the Contractor to install these devices in a manner that will leave them accessible and readily adjustable. Should any such device not be readily accessible, provide access as requested by the TAB Firm. Correct equipment malfunction encountered during the balancing process.

D. Complete TAB services prior to Owner occupancy.

1.03 QUALIFICATIONS

A. Perform work of this Section by a firm certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC).

B. Do work of this Section under the direct supervision of a person who has passed written and practical NEBB or AABC examinations for testing, adjusting, and balancing of air and hydronic systems.

1.04 QUALITY ASSURANCE

A. Codes and Standards:
1. NEBB Compliance: Comply with NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus; or comply with AABC's Manual MN-1, "AABC National Standards," as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus.
2. Industry Standards: Comply with ASHRAE recommendations pertaining to measurements, instruments, and testing, adjusting and balancing, except as otherwise indicated.

B. Personnel: TAB personnel used on the project will be employees of the Test and Balance Agency. Perform TAB work under the direct supervision of the NEBB or AABC Certified Test and Balance Supervisor.

C. Instrumentation:
1. List in balance report instrument description, serial number, and date of calibration.
2. Use instruments calibrated no longer than 1 year prior to report submission.

1.05 SUBMITTALS

A. Procedures: Submit certified test reports, signed by TAB supervisor who performed TAB work.

B. Qualification Statements: Submit company's certification documents including Contractor Certification and Supervisor certification.

C. Report Forms:
1. Submit copies of report forms to Architect within 30 days of award of the Contract by Owner prior to commencement of testing and balancing work at the site.
2. Provide 8-1/2- by 11-inch paper for looseleaf binding, with blanks for listing the required test ratings and for certification of report.
3. Submit reports on forms similar in content to standard AABC or NEBB test forms.
4. Submit final test and balance report. Include Record Drawings with terminal codes for cross-reference with the Submittal, such that terminals referenced in the Submittal are easily located on the Drawings.
5. Include identification and types of instruments used, and their most recent calibration date.
6. Submit resume data on person who is to directly supervise testing, adjusting and balancing work.

D. Maintenance Data: Include copies of balancing report and identification of instruments in maintenance manuals.

E. NEBB or AABC Certificate: At time of submittal of forms, submit NEBB or AABC certification form for review.

1.06 Warranty

A. TAB Agency provides warranty for a period of 90 days following submission of completed report, during which time, Owner may request a recheck of up to 10 percent of total number of terminals, or resetting of any outlet, coil, or device listed in the final TAB report.

B. Warranty shall meet the requirements of the following programs:
1. AABC – National Project Performance Guarantee
2. NEBB – Conformance Certification

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

A. Ductwork and Housings: Use plastic plugs with retainers to patch drilled holes.

2.02 INSTRUMENTS

A. Utilize test instruments and equipment as recommended in the following:
   1. NEBB's Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
   2. AABC's Manual MN-1, "AABC National Standards."

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Perform TAB work with doors, closed windows, and ceilings installed, etc., to obtain simulated or project operating conditions. Do not proceed until systems scheduled for testing, adjusting and balancing are clean and free from debris, dirt and discarded building materials.

B. Verify the following:
   1. Equipment is operable and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Final filters are clean and in place.
   4. Duct systems are clean of debris.
   5. Fan rotation is correct.
   6. Dampers are in place and open.
   7. Access doors are closed.
   8. Air outlets are installed and connected.
   9. Hydronic Systems have been flushed, filled, and vented.
   10. Proper strainer baskets are clean and in place.
   11. Service and balance valves are open.
   12. Any conditions affecting system operation, such as open doors, adjacent pressurized areas, and the like, are in final operating conditions prior to testing and balancing.

C. Report any defects or deficiencies noted during performance of services to Architect and Commissioning Agent. Promptly report abnormal conditions in Mechanical Systems or conditions which prevent system balance.

D. Automatic Temperature Control Systems:
   1. Set and adjust automatically operated devices to achieve required sequence of operations. Coordinate with the automatic temperature control supplier. Do not proceed without his representation.
   2. Verify controls for proper calibration and correct as necessary.

3.02 TEST HOLE LOCATIONS

A. Install test holes at the inlet and outlet of air handling unit fans, exhaust fans, utility fans, and the like, and elsewhere as required to facilitate traverses and to test the air systems. Plug holes when finished. Install test holes in air handlers to obtain test data for each component.

3.03 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, outside, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional

area of duct.

C. Measure air quantities at air inlets and outlets. Log shows each successive test.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper regulation.

G. Adjust fans to deliver within 5 percent of specified flow. Adjust air outlets and inlets to within 10 percent of specified flow. Adjust to obtain balance with minimum fan speed possible.

H. Adjust fan for variable air volume systems with terminal units at 50 percent cooling airflow, opening terminal units at end of controlling duct run to achieve fan flow specified. Report final duct static pressure setpoint and supply fan and exhaust/return fan VFD speeds and frequencies.

I. Adjust outside air to fans as scheduled. Measure outside air for variable air volume fans at full flow. Adjust belt driven fan speeds to obtain necessary flow with variable frequency drive at 60 Hertz.

J. Adjust relief exhaust fans on variable air volume systems to maintain a positive building static pressure of 0.05 inch w.c. Verify and document calibration of building static pressure sensors.

3.04 AIR MOVING EQUIPMENT TESTING

A. Location.

B. Manufacturer.

C. Model.

D. Supply airflow, specified and actual.

E. Return airflow, specified and actual.

F. Outside airflow, specified and actual.

G. Total external static pressure, specified and actual.

H. Inlet pressure.

I. Discharge pressure.

J. Fan RPM.

3.05 EXHAUST FAN TESTING

A. Location.

B. Manufacturer.

C. Model.

D. Airflow, specified and actual.

E. Total external static pressure, specified and actual.

F. Inlet pressure.

G. Discharge pressure.

H. Fan RPM.

3.06 RETURN AIR/OUTSIDE AIR TESTING

A. Identification/location.

B. Design airflow.

C. Actual airflow.

D. Design return airflow.

E. Actual return airflow.

F. Design outside airflow.

G. Actual outside airflow.

H. Return air temperature.

I. Outside air temperature.

J. Required mixed air temperature.

K. Actual mixed air temperature.

L. Design outside/return air ratio.

M. Actual outside/return air ratio.

3.07 ELECTRIC MOTORS TESTING

A. Manufacturer.

B. HP/BHP.

C. Phase, voltage, amperage; nameplate, actual, no load. Record voltage and amperage on all phases of 3 phase motors.

D. RPM.

E. Service factor.

F. Starter size, rating, heater elements.

3.08 V-BELT DRIVES TESTING

A. Identification/location.

B Required driven RPM.

C. Driven sheave, diameter and RPM.

D Belt, size and quantity.

E. Motor sheave, diameter and RPM.

3.09 DUCT TRAVERSE TESTING

A. System zone/branch.

B. Duct size.

C. Area.

D. Design velocity.

E. Design airflow.

F. Test velocity.

G. Test airflow.

H. Duct static pressure.

I. Air temperature.

J. Air correction factor.

3.10 AIR DISTRIBUTION TESTING

A. Air terminal number.

B. Room number/location.

C. Terminal type.

D. Terminal size.

E. Design velocity.

F. Design airflow.

G. Test (final) velocity.

H. Test (final) airflow.

I. Percent of design airflow.

3.11 TERMINAL UNIT TESTING

A. Manufacturer.

B. Type (i.e., constant, variable, single, dual duct).

C. Identification/number.

D. Location.

E. Model.

F. Size.

G. Minimum static pressure.

H. Minimum design airflow.

I. Maximum design airflow.

J. Maximum actual airflow.

K. Inlet static pressure.

L. Inlet and outlet temperature with heating valve open.

M. Coil water pressure drop, inlet and outlet temperatures and flowrate.

3.12 DUCT PRESSURE SENSOR (VAV SYSTEM) TESTING

A. Location.

B. Static pressure with fan at block load airflow.

3.13 WATER SYSTEM PROCEDURES

A. Adjust water systems to provide required or design quantities. Use calibrated orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on pressure drop across various heat transfer elements in the system.

B. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

C. Effect system balance with automatic control valves fully open to heat transfer elements.

D. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shutoff valves for balancing unless indexed for balance point.

E. Adjust differential pressure on variable flow systems to minimum value that produces design flows to equipment.

3.14 COOLING COIL TESTING

A. Identification/number.

B. Location.

C. Service.

D. Manufacturer.

E. Airflow, design and actual.

F. Entering air DB temperature, design and actual.

G. Entering air WB temperature, design and actual.

H. Leaving air DB temperature, design and actual.

I. Leaving air WB temperature, design and actual.

J. Water flow, design and actual.

K. Water pressure drop, design and actual.

L. Entering water temperature, design and actual.

M. Leaving water temperature, design and actual.

N. Air pressure drop, design and actual.

3.15 HEATING COIL TESTING

A. Identification/number.

B. Location.

C. Service.

D. Manufacturer.

E. Airflow, design and actual.

F. Water flow, design and actual.

G. Water pressure drop, design and actual.

H. Entering water temperature, design and actual.

I. Leaving water temperature, design and actual.

J. Entering air temperature, design and actual.

K. Leaving air temperature, design and actual

L. Air pressure drop, design and actual.

3.16 ADJUSTING

A. Recorded data represents actually measured or observed conditions. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops. Adjust air systems to deliver specified volumes with lowest possible fan speed

3.17 DOMESTIC WATER

A. Adjust domestic water recirculation system to ensure hot water circulation in mains.

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

JMS MECHANICAL
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Piping and Equipment Insulation: Materials and installation of insulation, jackets and accessories for the following applications:

1. Chilled water piping systems
2. Heating water piping systems

B Ductwork Insulation: Materials and installation of duct insulation including the following applications: Air conditioning and heating ductwork.

1.02 QUALITY ASSURANCE

A. Qualification of Workers: Use proficient journeyman insulators and supervisors in the execution of this portion of the work to ensure proper and adequate installation of insulation throughout A firm with at least 5 years successful installation experience on projects with installations similar to that required for this project.

B. Compliance with Specifications:

1. Whenever required during progress of the work, furnish proof acceptable to the Owner that items installed are equal to or exceed requirements specified for this work.
2. In the event such proof is not available, or is not acceptable to the Owner, the Owner may require the Contractor to remove the item or items and replace with material meeting the specified requirements and to repair damage caused in the removal and replacement, at no additional cost to the Owner
3. Install per manufacturer's written instructions.
4. As a minimum, comply with appropriate state energy code or other applicable codes.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for each type of insulation, jacket, glue, paint, fitting cover, and accessory Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each piping, equipment and duct system requiring insulation.

1.04 PRODUCT HANDLING

A. Protection: Use means necessary to protect insulation materials before, during and after installation.

B. Replacements: In the event of damage, immediately make repairs and replacements necessary.

1.05 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a flame spread of 25, fuel contributed of 50 and smoke developed of 50 as tested by ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with the requirements of UL "Pipe and Equipment Coverings R5583 400 8.15."

C. Test duct insulation in accordance with ASTM E84 and bear the UL label.

1.06 LINING MATERIALS

A. Materials to be mold-, humidity-, and erosion-resistant surface that meets the requirements of UL 181.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Piping: Armacell LLC Armaflex, Certainteed, Imcoa, Johns Manville, Knauf, Nomaco, Owens-Corning, PPG, or approved.

B. Ductwork: Armacell LLC Armaflex, Certainteed, Johns Manville, Knauf, Owens-Corning, PPG, or approved.

2.02 TYPE 1, FIBERGLASS PIPE INSULATION

A. Glass Fiber: ASTM C547; rigid molded, noncombustible.
1. Thermal Conductivity Value: 0.27 at 75F.
2. Maximum Service Temperature: 850F.
3. Vapor Retarder Jacket: White Kraft paper reinforced with glass fiber and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed.

2.03 TYPE 5, PLASTIC PIPE INSULATION

A. Flexible unicellular polyolefin foam insulation complying to ASTM C534, ASTM E84 (25/50), UL 723 (25/50). Thermal conductivity of 0.24 (BTU/in)/(hr/sq.ft./deg. F) at 75F. Preslit longitudinal seam. Imcoa, or approved.

2.04 TYPE 7, FLEXIBLE FIBERGLASS BLANKET

A. ASTM C553, Type 1, Class B-2; flexible blanket.

B. 'K' Value: 0.27 at 75F installed.

C. Density: 0.75 lb./cu.ft.

D. Vapor Barrier Jacket: FSK aluminum foil reinforced with fiberglass yarn and laminated to fire resistant Kraft, secured with UL listed pressure sensitive tape or outward clinched expanded staples and vapor barrier mastic as needed.

2.05 TYPE 8, DUCT LINER

A. ASTM C1071; flexible blanket.

B. 'K' Value: ASTM C518, 0.25 at 75F.

C. Noise Reduction Coefficient: 0.65 or higher based on "Type A mounting."

D. Maximum Velocity on Mat or Coated Air Side: 5,000 FPM

E. Adhesive: UL listed waterproof type.

F. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened

G. Mold-, Humidity-, and Erosion-Resistant Surfaces: UL 181.

2.06 JACKETING

A. PVC Plastic Fitting Covers: Schuller Zeston 2000. One-piece molded type fitting covers and jacketing material, gloss white. Connections: Tacks; pressure sensitive color matching vinyl tape.

B Canvas Jacket: UL listed fabric, 6 oz/sq.yd., plain weave cotton treated with dilute fire retardant lagging adhesive.

2.07 ACCESSORIES

A. Equipment Insulation Jacketing: Presized glass cloth, not less than 7 8 ounces/sq.yd., except as otherwise indicated. Coat with gypsum based cement.

B. Equipment Insulation Compounds: Provide adhesives, cement, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

C. General: Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated. Accessories, i.e., adhesives, mastics, cements and tape to have the same flame and smoke component ratings as the insulation materials with which they are used. Shipping cartons to bear a label indicating that flame and smoke ratings do not exceed those listed above. Provide permanent treatment of jackets or facings to impart flame and smoke safety. Provide nonwater soluble treatments.

2.08 PIPE FITTING INSULATION COVERS

A. PVC preformed molded insulation covers. Zeston, or approved.

2.09 DUCT INSULATION ACCESSORIES

A. Staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.

2.10 DUCT INSULATION COMPOUNDS

A. Cements, adhesives, coatings, sealers, protective finishes and similar accessories as recommended by insulation manufacturer for applications indicated.

PART 3 - EXECUTION

3.01 VERIFICATION OF CONDITIONS

A Do not apply insulation until pressure testing of the ducts has been completed. Do not apply insulation until the duct has been inspected.

B. Examine areas and conditions under which duct insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean and dry surfaces to be insulated.

3.03 INSTALLATION

A. Insulation: Continuous through walls, floors, partitions except where noted otherwise.

B. Piping and Equipment:

1. Install insulation over clean, dry surfaces with adjoining sections firmly butted together and covering surfaces. Fill voids and holes. Seal raw edges. Install insulation in a manner such that the insulation may be split, removed, and reinstalled with vapor barrier tape on strainer caps and unions. Do not install insulation until the piping has been leak tested and has passed such tests. Do not insulate chiller manholes, equipment manufacturer's nameplates, handholes, and ASME stamps. Provide beveled edge at such insulation interruptions. Repair voids or tears.

C. Ductwork:

1. Install insulation in conformance with the manufacturer's recommendations to completely cover the duct.
2. Butt insulation joints firmly together and install jackets and tapes smoothly and securely.
3. Apply duct insulation continuously through sleeves and prepared openings, except as otherwise specified. Apply vapor barrier materials to form a complete unbroken vapor seal over the insulation.
4. Coat staples and seals with vapor barrier coating.
5. Cover breaks in the jacket material with patches of the same material as the vapor barrier. Extend the patches not less than 2 inches beyond the break or penetration in all directions and secure with adhesive and staples. Seal staples and joints with brush coat of vapor barrier coating.
6. Fill jacket penetrations, i.e , hangers, thermometers and damper operating rods, and other voids in the insulation with vapor barrier coating. Seal the penetration with a brush coat of vapor barrier coating.
7. Seal and flash insulation terminations and pin punctures with a reinforced vapor barrier coating.
8. Continue insulation at fire dampers up to and including those portions of the fire damper frame which are visible at the outside of the rated fire barrier. Insulation terminations at fire dampers in accordance with the above.
9. Do not conceal duct access doors with insulation. Install insulation terminations at access doors in accordance with the above.
10. Duct Liners: Install mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with a continuous 100 percent coat of adhesive. For widths over 20 inches, additionally secure the liner with mechanical fasteners 15 inches on center. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation overlap sides. Keep duct liner clean and free from dust. At completion of project, vacuum duct liner if it is dirty or dusty. Cut studs off near washers. Do not use small pieces. If insulation is installed without horizontal, longitudinal, and end joints butted together, installation will be rejected and work removed and replaced with work that conforms to this Specification.

11. Duct Wrap: Cover supply air ducts except ducts internally lined. Wrap tightly with circumferential joints butted and longitudinal joints overlapped minimum of 2 inches. Adhere insulation with 4-inch strips of insulating bending adhesive at 8 inches on center. On ducts over 24 inches wide, additionally secure insulation with suitable mechanical fasteners at 18 inches on center. Circumferential and longitudinal joints stapled with flare staples 6 inches on center and covered with 3-inch-wide, foil reinforced tape.

3.04 PROTECTION AND REPLACEMENT

A. Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

3.05 FIBERGLASS INSULATION

A. Lap seal insulation with waterproof adhesive. Do not use staples or other methods of attachment which would penetrate the vapor barrier. Apply fitting covers with seated tacks and vapor barrier tape.

B. Apply insulation to pipe and seal with self-sealing lap. Use self-sealing butt strips to seal butt joints. Insulate fittings, valves and unions with single or multiple layers of insulation and cover to match pipe or use preformed PVC molded insulation covers.

3.06 PIPING SURFACES TO BE INSULATED

Item to be Insulated:	System Insulation Type:	Pipe Size:	Insulation Thickness:
Aboveground heating and piping	1, 5	Runouts up to 2" All others	1" 1-1/2"
Chilled, heating water valves.	5	N/A	1"
Aboveground chilled, heating in Mechanical Room	1, 5	<2" 2-1/4 to 6" 6"	1-1/2" 2" 2-1/2"
Condensate drain piping.	1, 5	all	1/2"

Note: Insulation thickness shown is a minimum. If state codes require additional thickness, then provide insulation thickness per code requirements.

3.07 DUCTWORK SURFACES TO BE INSULATED

Item to be Insulated:	System Insulation Type:	Duct Size:	Insulation Thickness:
Supply ductwork (where duct is not specified to be lined).	7	all	1-1/2"
Supply and return ductwork (in Mechanical Room).	7	all	2"
Supply ductwork (where duct is specified to be lined)	8	all	1"

Note: Insulation thickness shown is a minimum. If state codes require additional thickness, then provide insulation thickness per code requirements.

3.08 FLEXIBLE ELASTOMERIC TUBING

A. Slip insulation over piping or if piping is already installed, it should be slit and snapped over the piping. Joints and butt ends must be adhered with 520 adhesive.

3.09 INSULATION SHIELDS

B. Provide full size diameter hangers and shields (18 gauge minimum) for cold piping. Hot water piping hangers may penetrate insulation to contact pipe directly. Provide 18-inch long, noncompressible insulation section at insulation shields for lines 2 inches and larger (cold piping).

END OF SECTION

SECTION 23 08 00
COMMISSIONING of HVAC

JMS MECHANICAL W/T.A.C.
ROHNERT PARK
707 585-0120

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. OPR, BoD, and BoD-HVAC documentation prepared by Owner and Architect contains requirements that apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for commissioning the HVAC system and its subsystems and equipment. This Section supplements the general requirements specified in Division 1 Section "General Commissioning Requirements."

B. Related Sections include the following:

1. Division 1 Section 01 91 13 General Commissioning Requirements for general requirements for commissioning processes that apply to this Section.

1.3 DEFINITIONS

A. Architect: Includes Architect identified in the Contract for Construction between College and Contractor, plus consultant/design professionals responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.

B. BoD: Basis of Design.

C. BoD-HVAC: HVAC systems basis of design.

D. CxA: Commissioning Authority.

E. OPR: Owner's (College) Project Requirements.

F. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

G. TAB: Testing, Adjusting, and Balancing.

1.4 CONTRACTOR'S RESPONSIBILITIES

A. The following responsibilities are in addition to those specified in Division 1 Section "General Commissioning Requirements."

B. Contractor:
1. Attend procedures meeting for TAB Work.
2. Certify that TAB Work is complete.

C. Mechanical Subcontractor:

1. Attend TAB verification testing.
2. Provide measuring instruments and logging devices to record test data, and data acquisition equipment to record data for the complete range of testing for the required test period.

D. HVAC Instrumentation and Control Subcontractor: With the CxA, review control designs for compliance with the OPR and BoD, controllability with respect to actual equipment to be installed, and recommend adjustments to control designs and sequence of operation descriptions.

E. TAB Subcontractor:

1. Contract Documents Review: With the CxA, review the Contract Documents before developing TAB procedures.

a. Verify the following:

1) Accessibility of equipment and components required for TAB Work.

2) Adequate number and placement of duct balancing dampers to allow proper balancing while minimizing sound levels in occupied spaces.

3) Adequate number and placement of balancing valves to allow proper balancing and recording of water flow.

4) Adequate number and placement of test ports and test instrumentation to allow reading and compilation of system and equipment performance data needed to conduct both TAB and commissioning testing.

5) Air and water flow rates have been specified and compared to central equipment output capacities.

b. Identify discontinuities and omissions in the Contract Documents.

c. This review of the Contract Documents by the TAB Subcontractor satisfies requirements for a design review report as specified in Division 23 Section "Testing, Adjusting, and Balancing."

2. Additional Responsibilities: Participate in tests specified in Division 23 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation."

F. Electrical Subcontractor:

1. With the Mechanical Subcontractor, coordinate installations and connections between and among electrical and HVAC systems, subsystems, and equipment.
2. Attend TAB verification testing.

1.5 COMMISSIONING DOCUMENTATION

A. The following are in addition to documentation specified in Division 1 Section "General Commissioning Requirements."

B. BoD HVAC: Owner will provide BoD-HVAC documents, prepared by Architect and approved by College Representative, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

C. Test Checklists: CxA with assistance of Architect shall develop test checklists for HVAC systems, subsystems, and equipment, including interfaces and interlocks with other systems. CxA shall prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. In addition to the requirements specified in Division 1 Section "General Commissioning Requirements," checklists shall include, but not be limited to, the following:

1. Calibration of sensors and sensor function.
2. Testing conditions under which test was conducted, including (as applicable) ambient conditions, set points, override conditions, and status and operating conditions that impact the results of test.
3. Control sequences for HVAC systems.
4. Responses to control signals at specified conditions.
5. Sequence of response(s) to control signals at specified conditions.
6. Narrative description of observed performance of systems, subsystems, and equipment. Notation to indicate whether the observed performance at each step meets the expected results.
7. Interaction of auxiliary equipment.
8. Issues log.

1.6 SUBMITTALS

The following submittals are in addition to those specified in Division 1 Section "General Commissioning Requirements."

A. Testing Procedures: CxA shall submit detailed testing plan, procedures, and checklists for each series of tests. Submittals shall include samples of data reporting sheets that will be part of the reports.

B. Certificate of Readiness: CxA shall compile certificates of readiness prepared by Contractor certifying that systems, subsystems, equipment, and associated controls are ready for testing

C. Certificate of Completion of Installation, Prestart, and Startup: CxA shall certify that installation, prestart, and startup activities have been completed. Certification shall include completed checklists provided by TAB Subcontractor as specified in Division 23 Section "Testing, Adjusting, and Balancing." and the Pre-Functional Checklist by the Controls Contractor

D. Certified Pipe Cleaning and Flushing Report: CxA shall certify that pipe cleaning, flushing, hydrostatic testing, and chemical treating have been completed.

E. Test and Inspection Reports: CxA shall compile and submit test and inspection reports and certificates, and shall include them into the systems manual and commissioning report.

F. Corrective Action Documents: CxA shall submit corrective action documents.

G. Certified TAB Reports: CxA shall submit verified, certified TAB reports.

PART 2 - PRODUCTS

The following products and services providers will be directly involved in the commissioning of the building system:

A. T.A.C. Americas (Yamas Controls)
Y-Net Building Automation System

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Prerequisites for Testing:

1. Certify that HVAC systems, subsystems, and equipment have been completed, calibrated, and started; are operating according to the OPR, BoD, and Contract Documents; and that Certificates of Readiness are signed and submitted.
2. Certify that HVAC instrumentation and control systems have been completed and calibrated; are operating according to the OPR, BoD, and Contract Documents; and that pretest set points have been recorded.
3. Certify that TAB procedures have been completed, and that TAB reports have been submitted, discrepancies corrected, and corrective work approved.
4. Test systems and intersystem performance after approval of test checklists for systems, subsystems, and equipment.
5. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shut down, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
6. Verify each operating cycle after it has been running for a specified period and is operating in a steady-state condition.
7. Inspect and verify the position of each device and interlock identified on checklists. Sign off each item as acceptable, or failed. Repeat this test for each operating cycle that applies to system being tested.
8. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
9. Annotate checklist or data sheet when a deficiency is observed.
10. Verify equipment interface with monitoring and control system and TAB criteria; include the following as applicable:

    a. Supply and return flow rates for VAV and constant volume systems in each operational mode.
    b. Operation of terminal units in both heating and cooling cycles.
    c. Minimum outdoor-air intake in each operational mode and at minimum and maximum airflows.
    d. Building pressurization.
    e. Total exhaust airflow and total outdoor-air intake.
    f. Operation of indoor-air-quality monitoring systems.

11. Verify proper responses of monitoring and control system controllers and sensors to include the following:

    a. For each controller or sensor, record the indicated monitoring and control system reading and the test instrument reading. If initial test indicates that the test reading is outside of the control range of the installed device, check calibration of the

installed device and adjust as required. Retest malfunctioning devices and record results on checklist or data sheet.

b. Report deficiencies and prepare an issues log entry.

12. Verify that HVAC equipment field quality-control testing has been completed and approved. CxA shall direct, witness, and document field quality-control tests, inspections, and startup specified in individual Division 23 Sections.

B. Testing Instrumentation: Install measuring instruments and logging devices to record test data for the required test period. Instrumentation shall monitor and record full range of operating conditions and shall allow for calculation of total capacity of system for each mode of operation. For individual room cooling tests, provide temporary heaters to impose a cooling load indicated in BoD. Operational modes include the following:

1. Occupied and unoccupied.
2. Warm up and cool down.
3. Economizer cycle.
4. Emergency power supply.
5. Life-safety and safety systems.
6. Smoke control.
7. Fire safety.
8. Stair pressurization system.
9. Temporary upset of system operation.
10. Partial occupancy conditions.
11. Special cycles.

3.2 TAB VERIFICATION

A. TAB Subcontractor shall coordinate with CxA for work required in Division 15 Section "Testing, Adjusting, and Balancing." TAB Subcontractor shall copy CxA with required reports, sample forms, checklists, and certificates.

B. Contractor, HVAC Subcontractor, and CxA shall witness TAB Work.

C TAB Preparation:

1. TAB Subcontractor shall provide CxA with data required for "Pre-Field TAB Engineering Reports" specified in Division 23 Section "Testing, Adjusting, and Balancing."

a. CxA shall use this data to certify that prestart and startup activities have been completed for systems, subsystems, and equipment installation.

D. Ductwork Air Leakage Testing:

1. Architect will identify, for HVAC Subcontractor and CxA, portions of duct systems to have ductwork air leakage testing. Ductwork air leakage testing shall be performed according to Division 23 Section "Metal Ducts," and shall be witnessed by the CxA.
2. On approval of preliminary ductwork air leakage testing report, the CxA shall coordinate verification testing of ductwork air leakage testing. Verification testing shall include random retests of portions of duct section tests, reported in preliminary ductwork air leakage testing report. The HVAC Subcontractor shall perform tests using the same instrumentation (by model and serial number) as for original testing; the CxA shall witness verification testing.

E. Verification of Final TAB Report:

1. CxA shall select, at random, 10 percent of report for field verification.
2. CxA shall notify TAB Subcontractor 10 days in advance of the date of field verification; however, notice shall not include data points to be verified. The TAB Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item is defined as follows:

a. For all readings other than sound, a deviation of more than 10 percent.

1) For sound pressure readings, a deviation of 3 dB. (Note: Variations in background noise must be considered.)

4. Failure of more than 10 percent of selected items shall result in rejection of final TAB report.

F. If deficiencies are identified during verification testing, CxA shall notify the HVAC Subcontractor and Architect, and shall take action to remedy the deficiency. Architect shall review final tabulated checklists and data sheets to determine if verification is complete and that system is operating according to the Contract Documents.

G. CxA shall certify that TAB Work has been successfully completed.

3.3 TESTING

A. Test systems and intersystem performance after test checklists for systems, subsystems, and equipment have been approved.

B. Perform tests using design conditions whenever possible.

1. Simulate conditions by imposing an artificial load when it is not practical to test under design conditions and when written approval for simulated conditions is received from CxA. Before simulating conditions, calibrate testing instruments. Set and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
2. Alter set points when simulating conditions is not practical and when written approval is received from CxA.
3. Alter sensor values with a signal generator when design or simulating conditions and altering set points are not practical. Do not use sensor to act as signal generator to simulate conditions or override values.

C. Scope of HVAC Subcontractor Testing:

1. Testing scope shall include entire HVAC installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. It shall include measuring capacities and effectiveness of operational and control functions.
2. Test all operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Detailed Testing Procedures: CxA, with HVAC Subcontractor, TAB Subcontractor, and HVAC Instrumentation and Control Subcontractor, shall prepare detailed testing plans, procedures, and checklists for HVAC systems, subsystems, and equipment.

E. Boiler Testing and Acceptance Procedures: Testing requirements are specified in Division 15 boiler Sections. CxA shall review and comment on submittals, test data, inspector record, and boiler certification and shall compile information for inclusion in systems manual.

F. HVAC Instrumentation and Control System Testing:

1. Field testing plans and testing requirements are specified in Division 23 Sections "HVAC Instrumentation and Controls" and "Sequence of Operation." The CxA, HVAC Subcontractor, and the HVAC Instrumentation and Control Subcontractor shall collaborate to prepare testing plans.

2. CxA shall convene a meeting of appropriate entities to review test report of HVAC instrumentation and control systems.

G. Pipe cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in Division 15 piping Sections. HVAC Subcontractor shall prepare pipe system cleaning, flushing, and hydrostatic testing. CxA shall review and comment on plan and final reports. CxA shall certify that pipe cleaning, flushing, hydrostatic tests, and chemical treatment have been completed. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed Drawings for each pipe sector showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

H. Energy Supply System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of systems and equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each equipment item and pipe section to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in system testing plan.
2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

I. Heat-Generation System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of boilers, feedwater equipment, furnaces, and auxiliary equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings for each pipe sector showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

J. Refrigeration System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

K. HVAC Distribution System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems. Include HVAC terminal equipment and unitary equipment. Plan shall include the following:

1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

L. Vibration and Sound Tests: HVAC Subcontractor shall prepare testing plans to verify performance of vibration isolation and seismic controls. CxA shall witness and certify tests and inspections.

M. Deferred Testing:

1. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, the deficiency shall be documented and reported to Owner. Deficiencies shall be resolved and corrected by appropriate parties and test rescheduled.
2. If the testing plan indicates specific seasonal testing, appropriate initial performance tests shall be completed and documented and additional tests scheduled.

N. Testing Reports:

1. Reports shall include measured data, data sheets, and a comprehensive summary describing the operation of systems at the time of testing.
2. Include data sheets for each controller to verify proper operation of the control system, the system it serves, the service it provides, and its location. For each controller, provide space for recording its readout, the reading at the controller's sensor(s), plus comments. Provide space for testing personnel to sign off on each data sheet.
3. Prepare a preliminary test report. Deficiencies will be evaluated by Architect to determine corrective action. Deficiencies shall be corrected and test repeated.
4. If it is determined that the system is constructed according to the Contract Documents, Owner will decide whether modifications required to bring the performance of the system to the OPR and BoD documents shall be implemented or if tests will be accepted as submitted. If corrective Work is performed, Owner will decide if tests shall be repeated and a revised report submitted.

END OF SECTION

SECTION 23 09 13

VARIABLE FREQUENCY DRIVES

JMS MECHANICAL, INC w/ T.A.C.
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #21

PART 1 - GENERAL

1.01 SUMMARY

A. Materials and installation for a complete adjustable frequency motor drive consisting of a pulse width modulated (PWM) inverter for use on a standard NEMA Design B induction motor. Design drive specifically for variable torque applications

B. Variable Frequency Drive (VFD): Provided by Section ~~"Controls."~~ 22 55 00.

1.02 QUALITY ASSURANCE

A. It is required that the drive manufacturer have an existing:
   1. Sales representative exclusively for HVAC products, with expertise in HVAC systems and controls.
   2. An independent service organization.
   3. A parts stocking depot local to the installation site.

B. Manufacturers: A firm engaged in the production of this type of equipment for a minimum of 10 years.

C. Referenced Standards:
   1. IEEE Standard 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
   2. UL 508, Industrial Control Equipment.
   3. NEMA: ICS 6, Industrial Controls and Systems Enclosures.
   4. IEC 801-2, 801-4, 255-4.

D. Testing: Test all printed circuit boards and bummed in before being assembling into the completed VFD. Subject VFD to a preliminary functional test, minimum 8-hour burn-in, and computerized final test at 104F (40C), at full rated load

E. Qualifications:
   1. VFDs and options to be UL listed as a complete assembly. VFDs that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.
   2. C-UL listed or CSA approved.

1.03 SUBMITTALS

A. Include the following information:
   1. Outline dimensions.
   2. Weight.
   3. Typical efficiency versus speed graph for variable torque load.
   4. Compliance to IEEE 519, harmonic analysis for job site including total voltage harmonic distortion and total current distortion.
      a. Provide calculations, specific to this installation, showing total harmonic voltage distortion is less than 5 percent size. Input line filters provided as required by VFD manufacturer to ensure compliance with IEEE Standard 519.
      b. Prior to installation, provide the estimated total harmonic distortion (THD) caused by the VFDs. Based results on a computer aided circuit

simulation of the total actual system, with information obtained from the power provider and the user

c If the voltage THD exceeds 5 percent, the VFD manufacturer is to recommend the additional equipment required to reduce the voltage THD to an acceptable level.

1.04 WARRANTY

A. Warranty ~~12~~ **24** months from the date of certified start-up. Include all parts, labor, travel time, and expenses.

PART 2 - PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A **Each VFD shall be configured to communicate through the local area network utilizing protocol compatible with the computerized building automation and control system, see section 255 55 00.**

B. **The points shown on control drawings schematic shall be hardwired.**

C **All VFDs to have a complete factory wired bypass system consisting of an output contactor and bypass contactor.**

D. **All VFDs are provided by the BMS contractor**

E **The drive manufacturer shall supply the drive and all necessary controls as herein specified. Alternate manufacturers of VFDs other than the basis of design shall be prior approved by Owner's Representative and comply fully with these specifications. Approval does not relieve supplier of specification requirements, except where request for submittal to Owner's Representative identifies specifically any variances from these specifications. Alternate manufacturers of VFDs require Owner's Representative's written approval.**

F **Specific electrical requirements (i.e., horsepower and electrical characteristics, etc.) are specified within the individual equipment specification sections and as scheduled on the drawings.**

G **All VFDs shall be provided by the BMS contractor unless otherwise noted on drawings. The drives shall be programmed per the specification and Sequences of Operation and start-up performed by the drive manufacturer's representative. The drive manufacturer's representative shall provide all necessary assistance to the Division 25 55 00 contractor in connecting the drive to the control network, mapping the control points, data transfer, installation and start-up commissioning.**

H. Design: Solid state, with a Pulse Width Modulated (PWM) output waveform enclosed in a NEMA 1 enclosure, completely assembled and tested by manufacturer. Employ a full wave rectifier (to prevent input line notching), DC Line Reactor, capacitors, and Insulated Gate Bipolar Transistors (IGBTs) as the output switching device drive efficiency: 97 percent or better at full speed and full load. Fundamental power factor: 0 98 at all speeds and loads. Unit designed to feed two motors simultaneously.

I. Specifications:

1 Input 440/450/480/500VAC plus or minus 10 percent (capable of operation to 550VAC), 3 phase, 48 to 63Hz or Input 208/220/230/240VAC plus or minus 10 percent, 3 phase, 48 to 63Hz.

2. Output 0 - Input Voltage, 3 phase, 0 to 500Hz for drives up to 75 HP; 0 to 120Hz for drives over 75 HP.
3. Environmental Operating Conditions: 0 to 40C at 3kHz switching frequency, 0 to 3300 feet above sea level, less than 95 percent humidity, noncondensing.
4. Enclosure rated Type 1.

J. Standard Features:
1. Provide all VFDs with the same customer interface, including digital display, keypad and customer connections; regardless of horsepower rating. The keypad is to be used for local control (start/stop, forward/reverse, and speed adjust), for setting all parameters, and for stepping through the displays and menus.
2. Fault Mode on Loss of Input:
   a. Displaying a fault
   b. Running at a programmable preset speed as selected by user.
3. Utilize English digital display (code numbers are not acceptable) Digital Display: A 40 character (2 line by 20 characters/line) LCD display, backlit to provide easy viewing in any light condition, adjustable contrast to optimize viewing at any angle display. All set-up parameters, indications, faults, warnings and other information in words to allow the user to understand what is being displayed without the use of a manual or cross reference table.
4. Utilize preprogrammed application macro's specifically designed to facilitate start-up. Provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time.
5. Automatic restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts to be programmable. If the time between reset attempts is greater than zero, the time remaining until reset occurs to count down on the display to warn an operator that a restart will occur.
6. Capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to setpoint without safety tripping or component damage (flying start).
7. Automatic extended power loss ride-through circuit.
8. Customer terminal strip isolated from the line and ground.
   a. Prewired three-position Hand-Off-Auto switch and speed potentiometer. When in "Off" the VFD will be stopped. When in "Auto" the VFD will start via an external contact closure, and its speed will be controlled via an external speed reference.
9. Current Limit Circuits to Provide Trip Free Operation:
   a. Slow current regulation limit circuit adjustable to 125 percent (minimum) of the VFDs variable torque current rating. Adjustment made via the keypad, and displayed in amps.
   b. Rapid current regulation limit adjustable to 170 percent (minimum) of the VFDs variable torque current rating.
   c. Current switch off limit fixed at 255 percent (minimum, instantaneous) of the VFDs variable torque current rating.
10. Overload Rating: 110 percent of its variable torque current rating for 1 minute every 10 minutes, and 140 percent of its H torque current rating for 2 seconds every 15 seconds.
11. DC Line Reactor to reduce the harmonics to the power line.
12. Optimized for a 3 kHz carrier frequency to reduce motor noise.
13. Manual speed potentiometer or keypad as a means of controlling speed manually.

K. Adjustments:
1. Five programmable critical frequency lockout ranges.
2. PI Setpoint controller.
3. Two programmable analog inputs for reference for PI controller. Analog Inputs: include a filters; programmable from 0.01 to 10 seconds to remove any oscillation in the input signal.

4. Six programmable digital inputs for maximum flexibility in interfacing with external devices.
5. Two programmable analog outputs proportional to Frequency, Motor Speed, Output Voltage, Output Current.
6. Two independently adjustable accel and decel ramps. Ramp times adjustable from 1 to 1800 seconds
7. The VFD to ramp or coast to a stop, as selected by user.

L. Display: The following operating information displays to be standard on the VFD digital display.
1. Output frequency
2. Motor speed (RPM, percent or engineering units)
3. Motor current
4. Calculated motor torque
5. Calculated motor power
6. Output voltage
7. Analog input values
8. Keypad reference values
9. Elapsed time meter
10. kWh meter

M. Protection Circuits: In the case of a protective trip, stop the drive and announce the fault condition.
1. Overcurrent trip 315 percent instantaneous (225 percent RMS) of the VFDs variable torque current rating.
2. Overvoltage trip 130 percent of the VFD's rated voltage.
3. Undervoltage trip 65 percent of the VFD's rated voltage.
4. Overtemperature plus 70C (ACH 501); plus 85C (ACH 502).
5. Ground Fault either running or at start.
6. Adaptable Electronic Motor Overload (I2t).

N. Speed Command Input Via:
1. Keypad.
2. Two analog inputs, each capable of accepting a 0 to 20mA, 4 to 20mA, 0 to 10V, 2 to 10V signal. Analog inputs programmable filter to remove an oscillation of the reference signal. Minimum and maximum values (gain and offset) adjustable within the range of 0 to 20mA and 0 to 10V.

O. Accessories:
1. Door interlocked thermal magnetic circuit breaker disconnect handle, through-the-door type, and padlockable in the "Off" position.
2. Fire alarm system control interlocks for "seize control" and "on/off."
3. Two motor winding thermistor inputs to shut drive down if either motor registers overload.
4. Refer to Division 28 fire alarm drawing for connection details.
5. Fused disconnects for each motor.
6. Trouble output contact.
7. Output filter to provide for wave shaping.
8. Provide 5 percent impedance 3 phase line reactor on the input side of the VFD.

P. Manufacturers: Siemens, General Electric, Danfoss, Yaskawa, Mitsubishi, ABB, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Coordinate with installers of power and control wiring

B. **Installation shall be the responsibility of the Division 25 55 00 contractor. Install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.**

C. **Power wiring shall be completed by a licensed electrical contractor. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual. Existing motor contactors shall be removed from MCC and existing HOA switches shall be removed and blanked off. Existing smoke shutdown wiring shall be relocated to safety shutdown terminal strip of VFD.**

3.02 START UP

A. Provide certified factory start-up for each drive by a factory-authorized service center. Provide a certified start-up form for each drive.

B. Test unit operation in all modes of operation.

END OF SECTION

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. General: Provide pipe, tube and fittings of the type, fitting requirements, grade, class, size and weight indicated or required for each service. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards. All piping in a given size range of same type.

B. Service:
1. Chilled Water (Above Grade):
   a. Pipe Sizes 2-1/2 Inches and Larger:
      1) Steel, black, Schedule 40 with welded, flanged, or grooved Victaulic.
      2) Copper tubing, Type K or L, with brazed fittings, or grooved Victaulic
   b. Pipe Sizes 2 Inches and Smaller:
      1) Steel, black, Schedule 40 with welded or threaded fittings.
      2) Copper tubing, Type K or L, with soldered fittings (95/5 solder).
      3) Pressfit system.
2. Heating Water (Above Grade):
   a. Pipe Sizes 2-1/2 Inches and Larger:
      1) Steel, black, Schedule 40 with welded, flanged.
      2) Copper tubing, Type K or L, with brazed fittings.
   b. Pipe Sizes 2 Inches and Smaller:
      1) Steel, black, Schedule 40 with welded or threaded fittings.
      2) Copper tubing, Type K or L, with soldered fittings (95/5 solder).
      3) Pressfit system.
3. Drain Pipe:
   a. Steel, black, Schedule 40, threaded fittings.
   b. Copper tubing, M, soldered fittings (95/5 solder).

C. Steel Drain Pipe: ASTM A53, Schedule 40, Galvanized or black.

D. Copper Tube - Temper: Provide Type "K" hard drawn temper unless otherwise directed.

2.02 VALVES

A. General: Provide end connections which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option.

B. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.

2.03 MANUAL AIR VENT VALVES

A. Manufacturers: Armstrong, Bell & Gossett, Hoffman, Spirax Sarco, or approved.

B. Operated manually with screwdriver or thumbscrew, 1/8-inch NPS or 1/4-inch NPS connection as required.

2.04 AUTOMATIC AIR VENT VALVES

A. Manufacturers: Taco Hy-Vent, Bell & Gossett, Hoffman, or approved for branch lines. Hoffman 78 or approved at air separators, mains, in mechanical rooms.

B. Float type with pressure rating equal to or greater than the system in which it is installed.

2.05 AUTOMATIC FLOW CONTROL VALVES

A. General: Pressure independent design, constructed to provide constant flow over a range of differential pressures, with field adjustable control point.

B. Accuracy: Plus or minus 5 percent.

C. Flow Characteristic: Smooth, continuous curve, void of abrupt changes over the entire range of operation.

D. Construction: Brass body, EPDM O-ring seals, abrasion resistant and non-corrosive thermoplastic cartridge, 1/8-inch pressure ports.

E. Flow adjustment: External adjustment via removable key and numeric dial indicator. Indicator reading to match manufacturer's data chart for calibration and flow reading.

F. Pressure/Temperature Rating: 230 PSIG/248F.

G. Manufacturer: Griswold Flowcon SH or approved.

2.06 STRAINERS

A. Manufacturers: Mueller, Armstrong, Keckley, Hoffman, Hayward, Wheatley, or approved.

B. General: Full line size strainers with ends matching connecting piping materials, machined screen seats, gasketed cap, blow off outlet, minimum 2-1/2 to 1 open area ratio, and Type 304 stainless steel screens with 1/16-inch diameter holes.

C. Y-Strainers:
1. Copper Pipe Installations: Mueller 352-1/2.
2. Steel Pipe Installations: Mueller 11.

2.07 THERMOMETERS

A. Manufacturers: Ashcroft, Trerice, Weiss, Palmer, Marshaltown, Weksler, or approved.

B. 3-inch diameter bimetal dial thermometer, stainless steel case, white dial, black numbers, 4-inch stainless steel stem, brass separable socket. Back or bottom connections as required.

Service	Range
Heating Water	50 to 300F
Chilled Water	0 to 120F
Condenser Water	50 to 150F

2.08 THERMOMETER WELLS

A. Manufacturers: Same as thermometers.

B. Brass or stainless steel, pressure rated to match piping system design pressure. Provide extensions for insulated piping of length required to extend above insulation used at each location. Provide cap nut with chain fastened permanently to thermometer well.

2.09 PRESSURE GAUGES

A. Manufacturers: Amtek/U.S. Gauge, Ashcroft, Palmer, Marshaltown Instruments, Trerice, Weiss, Weksler, or approved.

B. Type: General use, 1 percent accuracy, ANSI B40.1, Grade A, phosphor bronze bourdon type, bottom connection.

C. Case: Drawn steel or brass, glass lens, 4-1/2-inch diameter.

D. Connector: Brass with 1/4-inch male NPT.

E. Scale: White coated aluminum, with permanently etched markings.

F. Range:
1. Pump Suctions: 30-inch Hg - 60 PSI.
2. Water: 0 - 100 PSI.

2.10 INSTRUMENT PROBE FITTINGS

A. Manufacturers: Pete's Plug, or approved.

B. Brass or stainless steel body and cap, high pressure rated, valve material neoprene, Nordal or Viton to suit temperature range, 1/4 inch or 1/2-inch NPT tailpiece

2.11 EXPANSION JOINTS

A. Manufacturers: Flexonics, Mason Industries, Amber-Bush, Metraflex, or approved.

B. Furnish and install controlled flexing expansion joints where shown or required. Expansion Joints: Minimum of 150 PSI working pressure.

C. For copper piping, 3/4 inch through 3 inches, use Type HB, 1-3/4-inch traverse two-ply stainless steel bellows, traveling nipple extended through bellows and guided each end, integral shroud, screwed steel ends.

D. For steel piping, 1-1/2 inches through 8 inches externally pressurized. 4-inch traverse, 150 PSI working pressure, stainless steel bellows, 150 PSI flanged ends, furnish insulation shroud.

2.12 PIPE GUIDES

A. Manufacturers: Flexonics "Flexon," Mason Industries, Amber-Bush, Metraflex, or approved.

2.13 PIPE ANCHORS

A. Manufacturers: Flexonics, Mason Industries, Amber-Bush, Metraflex, or approved.

2.14 ACCESS PANELS

A. Provide flush mounting access panels as required for service of fire dampers, cleanouts, valves, and the like, and other items requiring maintenance or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling access panels to be minimum 24x24 (or required and approved size). Wall access panels to be minimum 12x12 (or required and approved size).

B. Manufacturers: Milcor, Karp, Elmdor, In-Ryko, Acudor, or approved. Provide two keys for each set of locks provided.

PART 3 - EXECUTION

3.01 HYDRONICS SPECIALTIES INSTALLATION

A. Manual Vent Valves: Install on each hydronic terminal at highest point, and on each hydronic piping drop in direction of flow for mains, branches, and runouts, and elsewhere as indicated. Provide manual vents of 1/8 inch in size in pipes through 2 inches in diameter, and vents of 1/4 inch size in pipes 2-1/2 inches and larger.

B. Installation of Temperature Gauges:
1. Install in vertical upright position, tilted so as to be easily read at floor.
2. Glass Thermometers: Install at the following locations, and elsewhere as indicated: At inlet and outlet of each hydronic coil.
3. Thermometer Wells: Install in piping in vertical upright position. Fill well with oil or graphite, secure cap.

C. Installation of Pressure Gauges:
1. General: Install pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.
2. Locations: Install in the following locations, and elsewhere as indicated:
   a. Provide at inlet and outlet of each hydronic coil.

D. Expansion Joints: Provide where required to allow pipe expansion due to thermal stresses. Provide locations per manufacturer's recommendations. Provide a pipe guide on each side of each expansion joint, located per manufacturer's recommendations. Provide guides in addition to all other pipe supports and hangers. Do not use guides in lieu of supports or hangers required per Section 23 05 29, Hangers and Supports for HVAC Piping and Equipment.

3.02 AIR VENTS

A. Automatic: Furnish and install automatic air vents at all high points of the water systems and as otherwise required. Vents: 3/4 inch with 1/2-inch IPS drain piping to the nearest floor drain or other approved location. Provide a gate valve and union ahead of all automatic air vents.

B. Manual Vents (Where no Floor Drain or other Acceptable Location Exists): Provide 10-inch length of 1/4-inch copper tube with 180 degree bend down to discharge into hand-held bucket.

3.03 GAUGE ADJUSTING AND CLEANING

A. Adjust faces of meters and gauges to proper angle for best visibility.

B. Clean windows of meters and gauges and factory finished surfaces. Replace cracked or broken windows, repair any scratched or marred surfaces with manufacturer's touch-up paint.

3.04 PIPE TEST

A. General:
1. Make all tests in presence of Architect or authorized representative.
2. Make test before pipes are concealed.

3. Fill system and remove air from system at least 24 hours before test begins.
4. Correct leaks in screwed fittings by remaking the joint. Cut out and reweld leaks in welded joints; caulking is not permitted.

B. Water Piping: Apply test pressure 125 PSI and maintain for 1 hour with no visible leaks and no appreciable drops after the test pump has been disconnected.

3.05 PIPE GUIDES

A. Install on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides to pipe structure. Contact with chilled water pipe not to permit heat to be transferred in sufficient quantity to cause condensation on any surface.

B. Install approximately 4 pipe diameters (first guide) and 14 diameters (second guide) away from each end of all expansion joints. Do not use as supports. Provide in addition to other required pipe hangers and supports.

3.06 PIPE ANCHORS

A. Furnish and install pipe anchors where shown or required to prevent pipe movement. If fabricated, construct anchors of steel plate, 3/4-inch minimum thickness, securely welded to pipe with two steel plates, stiffeners and bolted to structure.

3.07 ACCESS PANELS

A. Install ceiling or wall access panels to provide access to concealed valves, fans, motors, fire dampers, terminal units, coils and other items needing service. Provide access panels at locations required or as specified herein. Coordinate locations/sizes of access panels with Architect prior to work.

END OF SECTION

SECTION 23 31 00

DUCTWORK

JMS MECHANICAL, INC
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Materials, installation and testing of HVAC ductwork and accessories, including the following:
1. Heating and air conditioning supply and return systems.
2. Outside air systems.
3. Exhaust systems.
4. Ductwork hangers.
5. Plenums.

1.02 QUALITY ASSURANCE

A. Unless otherwise noted, where the Specification refers to SMACNA in reference to sheet metal or flexible ductwork, this refers to HVAC Duct Construction Standards, Metal and Flexible, latest edition, as published by SMACNA.

B. Unless otherwise noted, where the Specification refers to TIMA in reference to fiberglass ductwork, this refers to Fibrous Glass Duct Construction Standards, latest edition, as published by TIMA.

C. Provide duct systems per CMC, latest edition, and all referenced standards.

D. Have available at the project field office a copy of the referenced standards.

1.03 SUBMITTALS

A. Provide shop drawings for duct materials, flues

B. Submit duct pressure testing reports. Provide individual reports for each AHU duct system.

1.04 AIR DISTRIBUTION DUCT SYSTEM

A. General: All ductwork, including collars, register boxes, fire dampers, exhaust fans, ventilation louvers, roof vents and screens, as well as all dampers and any other miscellaneous items not specifically mentioned but necessary for a complete installation. Apply the latest standards of SMACNA and ASHRAE with respect to sheet-metal gauge and general construction for round and rectangular ducts.

PART 2 - PRODUCTS

2.01 GALVANIZED SHEET-METAL DUCTWORK

A. General: CMC Duct Construction Standards, latest edition, or latest edition of ASHRAE Guide Table 1-1/2 ounce galvanizing per square foot, both sides.

2.02 FLEXIBLE DUCTS

A. General: Comply with CMC, latest edition, Class 0 or Class 1.

B. Standard factory fabricated product, construct an inner wall of impervious vinyl or chlorinated polyethylene, permanently bonded to a vinyl or zinc-coated spring steel helix. Cover the assembly with fiberglass blanket insulation covered by an outer wall of vinyl or fiberglass-reinforced metalized vapor barrier. UL 181 listed Class 1 flexible air duct material. Overall thermal transmission no more than 0.25 (BTU/in)/(hr/sq ft /deg. F) at 75F differential, per ASTM C335. Vapor transmission value no more than 0.10 perm, per ASTM E96. Rated for a minimum of 4-inch w.g. positive pressure and 1-inch w.g. negative pressure.

C. Air friction correction factor of 1.3 maximum at 1000 FPM. Working air velocity of at least 2000 FPM. Flame spread rating no more than 25. Smoke development rating no more than 50 as tested per ASTM E84. Must have cataloged data on insertion loss characteristics, minimum attenuation of 29 DB for 10-foot straight length at 8-inch diameter and 500 Hz.

D. Manufacturers: J. P. Lamborn Co., Norflex, Clevaflex, Genflex, Atco, Flexmaster, Thermaflex, or approved.

2.03 FACTORY FABRICATED METAL ROUND AND FLAT OVAL DUCTWORK

A. General: Provide per CMC Duct Construction Standards, latest edition, and ASTM A527 Class 0. Round sheet metal, spiral lock seam type. Fittings: Same construction as the duct. Tap in fittings not allowed. Duct sealer: Specifically formulated for sealing field joints for round spiral lock-seam duct systems.

2.04 SHEET-METAL DUCT SEALER

A. Hardcast "Duct-Seal 321" or United McGill. Indoor/outdoor, low VOC (<20 GPL), water based with fiber reinforcement.

2.05 PREFABRICATED DUCT JOINTS

A. Manufactured flanged traverse rectangular and round duct joints.

B. Manufacturers: Ductmate, Mez, Ward Duct Connectors, Lockformer TDC, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The duct layout shown on the Contract Drawings is diagrammatic in nature. Coordinate the ductwork routing and layout, and make alterations to the ductwork routing and layout as required to eliminate physical interferences. Where deviations in the ductwork routing as shown in the Contract Drawings are required, such alterations not to compromise the air flow, pressure drop, and sound characteristics of the duct fitting or run as shown on the Contract Drawings. Make such determination by Architect. In the event Architect determines that the installed ductwork is inconsistent with the above mentioned criteria, remove and replace at no additional cost to the Owner.

B. Install ductwork in the location and manner shown and detailed. Review deviations required by job conditions with Architect prior to any fabrication. Provide fittings construction per SMACNA.

C. Connect duct assemblies such as ductwork, plenums, etc., and operating machines or mechanisms such as fans, air conditioners, etc., with flexible connections per Section 23 05 48, Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Fabricate radius elbows with centerline radius not less than 1-1/2 duct diameters.

E Do not install duct size transition pitch angles which exceed 30 degrees for reductions in duct size in the direction of airflow, and 15 degrees for expansions in duct size in the direction of airflow.

F. Install single thickness turning vanes in square throat rectangular elbows and in tees. Provide 3/4-inch trailing edge on turning vanes, turned slightly past parallel to the duct

G Duct sizes indicated are free inside dimensions including where internal lining is shown.

H. Provide galvanized sheet-metal duct material for all ducts unless otherwise indicated or specified.

I. Provide temporary closures of open ducts during construction to prevent dust and debris from entering the system.

J. Flexible Duct:
1. Install flexible duct with bend radius equal to 1 5 times the diameter. Minimum length 2 feet. Maximum length 5 feet, unless noted otherwise.
2. Provide round neck grilles/diffusers or square-to-round transitions. No flex duct connections directly to square neck allowed.
3. Flex duct allowed only for vertical drops to diffusers. Maximum offset angle from vertical: 30 degrees
4. Approved for use on supply ducts only; not allowed for return or exhaust.
5. Flex duct allowed in concealed spaces above lay-in ceilings only.

K. Fabricate ductwork and all sheet metal work of prime grade, lock forming quality steel in accordance with the current issues of the ASHRAE "Guide" and SMACNA standards and installed in strict conformance with SMACNA standards.

L. Submit shop drawings for approval for all ductwork. All ductwork to be sheet metal.

M. Construct ductwork upstream of VAV boxes for [4]-inch pressure class; downstream duct [1]-inch pressure class. All other duct [2]-inch pressure class.

N. Round spiral duct and fittings or where required due to available clearances, use flat oval ductwork and fittings upstream of terminal units manufactured by United Sheet Metal, Rolok or approved in accordance with ASTM A527.

O. Seal all joints and seams in supply, exhaust, and return air ductwork and plenums.

P. Fabricate ductwork and plenums with a smooth inside surface and support and brace to prevent sagging and vibration at any time. Provide galvanized steel angles for reinforcing and bracing.

Q. Joints:
1. Carefully cut and trim all joints and seams in fabricated ducts and fitting to form a closed joint with no portion of the duct or fitting protruding into the air stream.
2. Seal all joints in sheet-metal ducts in concealed locations (such as enclosed ceiling spaces) with Hardcast joint sealant system applied in accordance with manufacturer's recommendations, or use Ductmate-type joints.
3 Seal all joints in sheet-metal ducts in exposed locations with sealant system applied in accordance with manufacturer's recommendations. Wipe off excess sealer on duct to give a clean finish, or use Ductmate-type joints
4. Standard gray duct tape not allowed.

R. All fasteners such as sheet-metal screws, machine screws or rivets to be cadmium plated

S. Crimp flat duct surfaces diagonally or beaded regardless of size, unless acoustically lined.

T. Fabricate all duct size transitions with a slope of not more than 1 foot to 5 feet where possible, but in no case more than 1 foot in 3 feet

U. Fabricate duct turns with the inside (smallest) radius at least equal to the duct width. Where necessary, square elbows may be used, with maximum available inside radius and with fixed single thickness curved vanes, with trailing edge extended 3/4 inch.

V. Provide flexible connectors at connections to all equipment, in ducts crossing building expansion joints and may be used at connections of dissimilar metals. Flexible Connections: Minimum 16 ounce airtight "Ventglass" noncombustible fabric with fire retardant neoprene coating on outside, fastened with bolted galvanized steel bands. Maintain a minimum 1-inch space between the connecting surfaces.

W. Duct Hangers and Supports:

1. Hang rectangular sheet-metal ducts with a cross sectional area of less than 7 sq.ft. with galvanized strips of No. 16 USS gauge steel 1 inch wide, and all larger ducts with steel angles and adjustable hanger rods similar to piping hangers. Support at 8 feet on center, as detailed.
2. Anchor all ducts securely to building in such a manner as to prevent transmission of vibration to structure. Do not connect duct hanger straps to roof deck. Do not support ducts from other ducts or piping.
3. For round sheet-metal ducts, provide duct support in accordance with SMACNA Guidelines. Verify type of building construction.
4. Attach strap hangers installed flush with end of sheet-metal duct run to duct with sheet-metal screws.
5. Do not install duct stiffeners on interior (air side) of unlined ductwork; install on exterior only or on interior of ductwork with duct liner.
6. Seismic Restraint: Brace all ductwork against lateral movement as detailed in document "Seismic Restraint Manual Guidelines for Mechanical Systems" as published by SMACNA.

X. Ductwork not to be supported from the roof deck. Hang ducts from beams, joists or supplementary structural members. Do not hang ductwork from joist bridging or from other ducts.

Y. Although not necessarily indicated on the Drawings, provide turning vanes at all mitered elbows, opposed blade balancing dampers with locking quadrants at branch ducts, volume extractors and any other applicable devices necessary for minimum duct resistance and proper system air balancing. Sufficiently stiffen all dampers to prevent noise or vibration and in no case be lighter than 20 gauge steel. Provide with accessibly located adjuster, manufactured by Young Regulator Co., Parker Kalon Corporation, or approved.

Z. Construct all exterior ductwork or ductwork which is otherwise exposed to weather watertight.

AA. Increase the size of all sheet-metal ducts as required to accommodate insulation lining.

BB. Locate access doors in ductwork as required for service of fire dampers, automatic dampers and other items requiring maintenance or inspection.

CC. Paint inside surface of all bare ductwork which is visible through face of grilles with flat black paint.

3.02 DUCTWORK PRESSURE TESTING

A. Provide air pressure testing of concealed ductwork systems (testing is not required for ductwork exposed to air conditioned space). Test ductwork prior to connection to fan equipment. Repair leaks and retest until stipulated results are achieved.

1. Test at positive static pressure for 5 minutes with maximum air leakage not to exceed 1 percent of rated flow.
2. Testing machine: Meet requirements of SMACNA standards. Pacific Air Products "Port-O-Lab," Rolok, United Sheet Metal, or approved.
3. Test supply systems prior to connecting VAV boxes.
4. Perform all tests in the presence of Owner's Representative. Give 48 hours advance notice before commencement of each test.
5. Test ductwork systems in sections as large as possible and record all test results according.
6. Coordinate testing with ceiling installation.
   a. Provide sheet-metal plates and install between each duct test section (applies to main-to-main fittings, branch-to-branch fittings and main-to-branch fittings). At each plate location, fabricate joint with Ductmate. Insert 14 gauge sheet metal between Ductmate using a neoprene gasket on both sides of metal plate.
   b. Leave plates in place until isolated section has been tested and approved by Owner's Representative.
   c. Once sections have passed test, remove plates and reattach Ductmate joints. After fan unit is running, test joint for leakage by using a mixture of soap and water. If any noise or bubbling occurs, reseal joint. Owner's representative to witness this procedure.
7. Test duct at 1-1/2 times the design air pressure. Seal any audible leaks.

3.03 MOUNTING FOR SIDEWALL GRILLES AND REGISTERS

A. All mounting heights indicated on Drawings from finish floor to lower edge of grille or register. Exception: If note on Drawings states for example "Down 6 inches," this indicates measurement from ceiling to top edge of grille or register.

B. Install all sidewall return air grilles for "sight-tight" visibility at eye level (position blades to obscure visibility from floor level).

3.04 GRILLE AND EXPOSED DUCT CLEANING

A. After completion of ductwork installation, operate each fan system (excluding exhaust fans) for a minimum of 30 minutes prior to installation of ceiling grilles and diffusers. After grilles and diffusers are installed, clean out all accumulation of particles from grilles and diffusers prior to acceptance.

B. Clean exterior surface of all ducts exposed to public view of chalk, pencil and pen marks, labels, sizing tags, dirt, dust, etc , so that upon completion of installation, ducts are left in clean and unblemished manufactured condition.

C All exposed duct and grilles shall remain free of dust entrained streaks due to leakage at joints and grille connections during warranty period. Clean leaks, seal and refinish to match existing if visible streaks develop.

END OF SECTION

SECTION 23 33 00

DUCTWORK ACCESSORIES

JMS MECHANICAL, INC
ROHNERT PARK, CA
707 585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Work Included: Materials, installation, and testing of HVAC duct accessories such as volume dampers, splitter dampers, adjustable deflectors, duct access doors, backdraft dampers, fire dampers, duct silencers, spin-in fittings, and smoke dampers

1.02 QUALITY ASSURANCE

A Provide fire dampers in conformance with the requirements of Fire Damper and Heat Stop Guide for Air Handling Systems, as published by SMACNA

1.03 SUBMITTALS

A Submit manufacturer's catalog data and fabrication/installation drawings for each factory fabricated duct accessory

PART 2 - PRODUCTS

2.01 DAMPERS

A Volume Dampers (VD):

1 Construct of galvanized sheets not lighter than 18 gauge, reinforced to prevent vibration, equipped at both ends with brass bearing mounts and of sufficient length to provide a complete shutoff of the duct

2 Provide each damper with an adjustment and locking quadrant device manufactured by Young Regulator Co., No 403 operator for accessible locations, or No. 315 for nonaccessible locations Ventlock, or approved Provide operating rod and attaching devices as required for No. 315 operator Provide Young Regulator No. 443 or 443B raised platform for insulated duct

B Register Dampers: Dampers utilized with grilles Opposed blade dampers utilizing a side operated worm drive which provides external duct operation. Slot the end of the shaft to receive a screwdriver. Factory assembled side operator. Construct of the same material as the grille Manufacturers: Same as grilles and diffusers. Provide Young Regulator 443 or 443B raised platform for insulated duct

C Control Dampers: Provide automatic control dampers as indicated. Airfoil, multiblade type, maximum blade length of 48 inches Provide parallel blades for positive or modulating mixing service and opposed blades for throttling service. Blades to be interlocking, minimum 16 gauge galvanized steel. Damper blades reinforced, have continuous full length axle shafts and/or operating jackshafts as required to provide coordinated tracking of blades. Dampers over 25 sq ft in area to be in two or more sections, with interconnecting blades. Dampers to have a maximum air leakage of 15 CFM psf at 4-inch w.g. pressure. Provide automatic dampers except those specified with units. Manufacturers: Louvers & Dampers, Ruskin, Cesco, Greenheck, Prefco, or approved

2.02 DUCT ACCESS DOORS

A. Gasketed, hinged or removable, rated for operating pressure. Ductmate "Sandwich" for rectangular ductwork or "Metu" for round ductwork, or approved

PART 3 - EXECUTION

3.01 VOLUME DAMPERS

A. Provide in main duct branches where shown. Provide in branch ducts serving air inlets and outlets.

B. Locate dampers as close to trunk or main branch as possible.

3.02 DUCT ACCESS DOORS

A. Install where shown and required by SMACNA. Provide on the reset side of all fire dampers and adjacent to duct mounted automatic dampers. Install per manufacturer's recommendations.

B. Where access doors are for service of fire or smoke dampers, stencil the words "Fire Damper" or "Smoke Damper" in 1/2-inch high capital letters on the outside of the door.

END OF SECTION

SECTION 23 34 00

FANS

SMS MECHANICAL, INC.
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Work Included: Materials, installation, and testing of fans used for ventilation and exhaust service.

1.02 SUBMITTALS

A Submit manufacturer's catalog data, fan curves with operating points indicated, spare parts list, operation and maintenance manuals, and test reports for each type and size of fan.

B Submit sound power levels for fan inlet and outlet at operation points.

PART 2 - PRODUCTS

2.01 CENTRIFUGAL BELT DRIVE ROOF EXHAUST FANS

A Hood Construction: Aluminum dome, hingeable for service

B Fan and Inlet Cone: Aluminum, centrifugal blower type Wheels overlap the spun venturi Wheels statically and dynamically balanced

C Motors: Permanently lubricated, sealed ball bearings.

D Wheel Shaft: Ground and polished steel and mounted in permanently lubricated, sealed pillow block ball bearings

E Drives: Sized for a minimum of 165 percent of driven horsepower

F Pulleys: Fully machined cast iron, keyed and enclosed to the wheel and motor shafts

G Motor Pulley: Adjustable for final system balancing. Mount the entire drive assembly on vibration isolators

H AMCA Certified Ratings Seal for both air and sound.

I Manufacturers: Greenheck, Carnes, Cook, Penn, ILG, Breidert, Acme, JencoFan, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A Secure fans to curb with lag bolts on each side Seal with mastic Mount level

END OF SECTION

SECTION 23 36 00

AIR TERMINAL UNITS

JMS MECHANICAL, INC
ROHNERT PARK, CA
707 585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, installation and testing for variable air volume terminal units, including the following:
1. Central Air Terminals:
a Shutoff
b Reheat

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:
1 ARI Compliance: Provide air terminals which have been tested and rated in accordance with ARI 880-98, Air Terminals, and bear ARI certification seal.
2 NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A, Air Conditioning and Ventilating Systems.

1.03 SUBMITTALS

A. Product Data: Manufacturer's technical product data, including performance data for each size and type of air terminal furnished

B. Schedule: Showing drawing designations, room locations, number furnished, model number, size, and accessories furnished

C. Shop Drawings: Manufacturer's assembly type shop drawings, indicating dimensions, weight loadings, required clearances, and methods of assembly of components

D. Sound Levels:
1 Radiated and discharge sound power levels at octave bands 2 to 6 minimum, full range of rated inlet static pressure for each terminal size and required airflow; per ARI 880.
2 NC levels based on 10Db room effect, 10Db ceiling transmission loss and 1-1/2-inch inlet static pressure for each terminal size and required air flow; per ARI 880.

E Selection: Do not select units outside the range of manufacturer's cataloged data for capacity scheduled. Units to be selected and provided with a maximum inlet velocity of 200 FPM. Provide units with a 1800 to 2000 FPM inlet velocity range

PART 2 - PRODUCTS

2.01 TERMINAL UNITS WITH HOT WATER HEAT

A General: Furnish and install shutoff-type variable air volume units as herein specified Provide units with hot water heating coils as scheduled

B. Casing:
1. Factory assembled, manufactured of corrosion protected welded steel and fabricated to withstand the pressures encountered 22 gauge minimum casing.

2. Maximum Unit Height: 18 inches.
3. Inlet: Round or oval to match standard duct sizes.
4. Casing acoustically and thermally insulated with 1-1/2 lbs./cu ft density. Insulation UL listed and approved for UL 181. The insulation to meet NFPA 90A requirements. Thickness: 1/2 inch minimum. Construct units with solid inner liner over insulation.

C. Air Modulation Device: Accomplish air volume control at the unit inlet by a normally open air valve or heavy duty damper. Modulate from full airflow to scheduled minimum air flow as indicated. Device capable of tight shutoff. Maximum leakage rate across the air throttling device: 3 percent of design air flow at 4-inch static pressure, 3-inch differential. Actuator compatible with linkage.

D. Flow Sensor: Provide an integral flow ring sensor or other averaging type calibration device along with unit mounted calibration chart to ensure accuracy of airflow measurement of plus or minus 5 percent under all types of inlet conditions. Single point sensing tap will not be acceptable. Flow maximums and minimums as shown on Drawings.

E. Acoustics: Radiated NC level based on ARI 880 not to exceed that specified based on 8Db room effect and 10Db ceiling transmission loss and 1-1/2-inch inlet static pressure.

F. Hot Water Reheat Coil: Provide terminal units with hot water reheat coil where specified, performance as shown on Drawings. High temperature drop coil. 5/8-inch OD seamless copper tubes mechanically expanded to aluminum fins. 150 PSIG working pressure. Sweat connections.

G. Controls: Supplied by control manufacturer, factory mounted by terminal unit manufacturer; direct digital control. Coordinate with Contractor.

H. Manufacturers: Trane, Titus, Tuttle & Bailey, Krueger, Price, Carrier, Environmental Technology, Carnes, Enviro-Tech, Air Devices, Nailor-Hart, Redd-I, Tempmaster, or approved. MODEL DESV

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install air terminals in accordance with manufacturer's installation instructions.

B. Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Duct Connections: Connect ductwork to air terminals as indicated.

3.02 FIELD QUALITY CONTROL

A. Upon completion of installation and prior to initial operation, test and demonstrate that air terminals and duct connection to air terminals are leaktight. Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

SMS MECHANICAL, INC.
ROHNERT PARK CA
707 585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A Work Included: Materials, installation, and testing of HVAC outlets and inlets.

1.02 QUALITY ASSURANCE

A Components: Tested, rated and certified per Air Diffusion Council procedures

B Air Movement and Control Association Int'l (AMCA) Compliance: Test and rate louvers in accordance with AMCA 500, "Test Method for Louvers, Dampers and Shutters." Provide louvers bearing AMCA Certified Rating Seal.

1.03 SUBMITTALS

A Manufacturer's catalog data on each of the following:
1 Type of register, diffuser, grille, frame, louver, and dampers
2 Schedule of air outlets and inlets indicating drawing designation, model number and accessories furnished.

PART 2 - PRODUCTS

2.01 GRILLES, REGISTERS, DIFFUSERS

A Subject to compliance with requirements, provide products of one of the following

B Provide 1-, 2-, 3-, or 4-way deflection as indicated.

C Register Dampers: Dampers utilized with grilles. Opposed blade dampers utilizing a side operated worm drive which provides external duct operation. Slot the end of the shaft to receive a screwdriver. Factory assembled side operator. Construct of the same material as the grille. Manufacturers: Same as grilles and diffusers.

D Coordinate mounting frames with construction types per finish schedule.

E Performance: Provide components that have velocity, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current standard literature, which are plus or minus 10 percent of the components as listed in the Diffuser, Register and Grille Schedule, or as specified herein.

F Manufacturers: Agitaire, Air Concepts, Anemostat, Carnes, Connor, Environmental Air Products, Hart & Cooley, J&J Register, Krueger, Metalaire, Nailor, Price Co, Shoemaker, Titus, Tuttle & Bailey, Seiho

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install grilles, registers, and diffusers per manufacturer's instructions. Locate and size openings through finished surfaces to provide complete coverage of rough openings by integral device flanges or auxiliary frames.

B. Paint exterior of devices per color selected by Architect.

C. Coordinate duct connections with device final dimensions. Provide square to round adapters where required for connection to round ducts.

D. Adjust the throws of air outlets to eliminate drafts.

END OF SECTION

SECTION 23 75 00

AIR HANDLING UNITS

JMS MECHANICAL, INC.
ROHNERT PARK, CA
707-585-0120
SUBMITTAL #12

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Materials, installation and testing of central station air handling unit.

1.02 QUALITY ASSURANCE

A Regulatory Requirements:

1. ANSI/NFPA 90A, Installation of Air Conditioning and Ventilation Systems.
2. AMCA Compliance: Test and rate per AMCA 210 and 500.
3. ARI Compliance: Test and rate per ARI 430-99, Central Station Air Handling Units.
4. ARI Compliance: Test and rate coils per ARI 410-2001, Forced-Circulation Air-Cooling and Air-Heating Coils.
5. UL: Provide units and components which are labeled and listed by UL.

1.03 SUBMITTALS

A. Submit For: Air handlers.

B. Coil Selection: Submit manufacturer's computer-generated output data.

PART 2 - PRODUCTS

2.01 FILTER GAUGES

A. Provide Dwyer 2000 Magnehelic gauges.

B Magnehelic gauge to be accurate to plus or minus 2 percent of full range. Weatherproof glass.

C. Provide sensing probes and shutoff valves for each gauge.

D. Provide gauge for each filter bank.

2.02 MODULAR AIR HANDLING UNITS

A. Unit Casing:

1. Unit shall be constructed of a complete frame with easily removable panels. Removal of any panel shall not affect the structural integrity of the unit. Single height coil sections shall have removable frame sections to facilitate vertical coil extraction.

2. All units shall be supplied with 16-gage, G-90 galvanized steel base rails. Bolt-on legs are NOT acceptable. Perimeter 10-gage lifting lugs for overhead lifting shall be provided on each section. Slinging units in place of lifting lugs shall not be acceptable.

3. Unit shall be thermally broken to minimize the conduction path from the inside of the casing to the outside.

4. Casing panels (top, sides, and bottom) shall be constructed of galvanized steel, and shall have one of the following exterior finishes as specified:

   a. Pre-painted with a baked enamel finish passing 500-hour salt spray test (ASTM B-117) for pre-painted steel and 125-hour marine level 1 prohesion test (ASTM G-85 A5) for pre-painted steel.

5. Casing panels (top, sides, and bottom) shall have no exterior exposed raw edges that could lead to rust formation. All casing corners shall be radiused or chamfered.

6. Casing panels (top, sides, and bottom) shall be one piece, double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

7. Casing deflection shall not exceed a 1:200 ratio when subject to an internal pressure of ± 5-in. wg.

8. Side panels shall be easily removable for access to unit and shall seal against a full perimeter automotive style gasket to ensure a tight seal.

9. The panel retention system shall comply with UL 1995 which states all moving parts (for example, fan blades, blower wheels, pulleys, and belts) that, if accidentally contacted, could cause bodily injury, shall be guarded against accidental contact by an enclosure requiring tools for removal.

10. Accessibility shall be as follows:

    a. Hinged double-wall access doors on both sides. Provide removable double-wall access panels where there is not adequate room for an access door to fully open.

    b. Removable double-wall access panels on both sides.

11. Provide:

    a. Thermal pane reinforced glass viewports shall be factory-installed on the access panel(s) or door(s) of the section.

    b. Marine lights shall be factory installed with convenience outlets.

12. Fan supports, structural members, panels, or flooring shall not be welded, unless aluminum, stainless steel, or other corrosion-resistant material is used. Painted welds on unit exterior steel or galvanized steel are not acceptable.

13. All coil sections shall be doublewall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less

than 13. Single height coil sections shall have removable frame sections to facilitate vertical coil extraction.

B. Access Doors:

1. Access doors shall be one piece, double-wall construction with insulation sealed between the inner and outer panels. Panel assemblies shall not carry an R-value of less than 13.

C. Drain Pans:

1. Drain pans shall be insulated double-wall or stainless steel construction. The pan shall be sloped in 4 directions toward the drain fitting. Drain pan shall have a recessed bottom drain design with 1-1/2-in. MPT connection exiting through the hand side or opposite side of the casing (see plans for locations). Drain connection shall be insulated from the drain pan to the point at which it exits the casing. One drain outlet shall be supplied for each cooling coil section. Drain pan shall allow no standing water and comply with ASHRAE Standard 62. Where 2 or more coils are stacked in a coil bank, intermediate drain pans shall be provided and the condensate shall be piped to the bottom drain pan. The bottom coil shall not serve as a drain path for the upper coil.

D. Casing:

1. Doublewall constructed unit to prevent fiberglass erosion into the airstream and to allow cleaning of the unit interior. 2-inch-thick interior wall of either 20 gauge solid galvanized steel. Foil faced insulation is not acceptable.

2. Ship fully assembled unit (within freight limitations) on a minimum 10 gauge galvanized steel base rail/housekeeping pad.

3. Seal all positive pressure section panels with closed-cell foam gasketing.

E. Insulation: Factory insulate unit with 2-inch, 1-1/2 lb. density, mat-faced insulation. Insulate connecting channels to prevent seating.

F. Outside Air/Return Air/Economizer Dampers: Provide outside air/return air dampers on filter mixing box to modulate the volume of outside and return air to perform economizer function. Airfoil design dampers and either parallel or opposed blade type with metal compressible jamb seals and extruded vinyl blade jamb seals on all blades. Rotate blades on stainless steel sleeve bearings. Maximum damper blade length to be 60 inches. Leakage rate not to exceed 5 CFM/sq ft. at 2-inch w.g., 9 CFM/sq.ft. at 4-inch w.g.

G. Base Construction:

1. Construct base frame from structural steel galvanized channel around the perimeter of the unit, with intermediate channel and angle iron supports. Size members to freespan the unit.

2. All drain connections on air handling units to terminate at the side of the unit.

H. Filters: 4-inch-thick Merv-13 (see drawings) media contained in a rigid frame. Filters to have a rigid supporting maze across both the entering and leaving faces of the media.

Size filters so as not to exceed scheduled face velocities. Provide manometer, mounted on exterior of unit, across filter section.

I. Fans:

1. Forward curve (FC) as required for proper operation, (reference Drawings).

2. Certify housed fan performance as complying with ARI 430-99. Dynamically balanced centrifugal fans at the factory as a complete fan assembly (fan wheel, motor, drive and belts). Fan shafts not to exceed 75 percent of their first critical speed at any cataloged RPM.

3. Equip fans with self-aligning anti-friction pillow block bearings with a minimum life of 200,000 hours. Equip bearings with grease lines allowing for lubrication from one side of the fan.

4. Internally isolate fan and motor assembly unit casing with spring isolators (2-inch deflection with seismic snubbers), furnished and installed by unit manufacturer. Isolate fan scroll from the unit by a flexible canvas duct.

J. Motors: Mount motors integral to an isolated fan assembly furnished by unit manufacturer. Mount motors inside the unit casing. Mount motors side base to permit adjustment of drive belt tension. Motors to be inverter rated and listed for use with variable frequency drives.

K. Coils:

1. All water coils shall be provided to meet the scheduled performance. All coil performance shall be certified in accordance with ARI Standard 410. All water coils shall be tested at 450 psig air pressure.

2. General Fabrication:
   a. Water coils shall have minimum 5/8-in. OD copper tubes mechanically expanded into fins to ensure high thermal performance with lower total flow and pumping requirements. Minimum tube wall thickness shall be 0.020 inches.

   b. Aluminum plate fin type with belled collars.

   c. Aluminum-finned coils shall be supplied with dieformed casing and tube sheets of mill galvanized steel or stainless steel as specified.

   d. Fins to have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion of the tubes. Use no soldering or tinning in the bonding process. Mount coils in the unit casing to be accessible for service and can be removed from the unit either through the side or top. Certify capacities, pressure drops and selection procedure in accordance with ARI 410-2001.

3. Hydronic Heating and Cooling Coils:
   a. Headers shall be constructed of non-ferrous material (red brass or copper) with MPT connections. Headers shall have drain and vent connections accessible from the exterior of the unit. Provide non-ferrous nipples.
   b. Configuration: Coils shall be drainable, with non-trapping circuits. Coils will be tested and suitable for a design working pressure of 300 psig at 200 F.

L. Electrical: Single point electrical connection for each fan. Unit main control panel has factory mounted unit, fused disconnect switch, full voltage, non reducing, variable frequency drive , control power disconnect switch, 115V convenience outlet, and marine light, all accessible through integral front panel. Fans to be factory wired complete to load side of disconnect switch. Provide 24V control power transformer. Provide auxiliary relay to shut down unit on signal from ionization detector

M. Manufacturers: Carrier, Trane, McQuay, Temtrol or approved

AHU-1: MODEL # CAH006GDAC
AHU-2: MODEL # CAH014GDAC

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under units to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 UNIT INSTALLATION

A. General: Install units in accordance with manufacturer's installation instructions, plumb and level, and firmly anchor in locations indicated. Maintain manufacturer's recommended clearances.

B. Ductwork: Connect supply and return to unit with flexible duct connections. Provide transitions to exactly match unit duct connection size.

C. Drain Piping: Provide trap at condensate drain; construct at least 1 inch deeper than fan pressure in inches of water.

D. Start-Up: Start up in accordance with manufacturer's instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

E. Air Handling Units:

1. Install units on neoprene pad and secure as detailed (see structural drawings).
2. Rig and set units in place. Ensure that spreader bars are used and the units are protected from the lifting cables.
3. Entire air handling unit is to be leveled. Remove all internal hold down bolts and shipping fasteners, and install parts shipped loose.
4. Check and realign all access doors and dampers to ensure smooth operation through the entire range of travel.
5. Upon start-up each fan motor is to be checked for fan rotations, and amp draw for each phase. Amp readings are to be marked on the fan scroll.
6. All belt drives are to be readjusted for tension and alignment.
7. Provide a drain valve on each coil drain fitting, and a vent valve on each coil vent.
8. All pipe and conduit penetrations to the casing are to be thoroughly sealed and caulked to prevent air leakage.

9. Test installed unit for vibration and noise.

3.03 SPARE PARTS

A. Furnish to Owner, with receipt, for each unit:

1. One set matched fan belts for each belt-driven fan.

2. One complete set filters for each unit, not including new filters to be installed after testing and balancing.

3.04 INSULATION

A. Insulate piping, condensate drains, drip pans, and all other associated appurtenances per Section 23 07 00, HVAC Insulation.

END OF SECTION

SECTION 25 55 00

BUILDING MANAGEMENT AND CONTROL SYSTEM (BMS)

SMS MECHANICAL INC. W/ T.A.C
2OHNERT PARK, CA
707-585-0120
SUBMITTAL # 21

PART 1 – GENERAL

1.01 SUMMARY

A. Description: Furnish all labor, materials, equipment, and service necessary to design, program, install and commission a complete and operating facility management and control system. The system shall be fully compatible throughout the Campus and shall utilize Direct Digital Controls, pneumatic/electronic interfaces and actuation devices, as described within the bid package and as additionally described herein. The BMS shall be capable of total integration of the facility infrastructure systems with user access to all system data either locally or over a secure Intranet within the building or by remote access utilizing a standard Web Browser (MS Explorer 6 0) over the Internet. This shall include the ability to perform HVAC control, electrical, gas and water metering, energy management, alarm monitoring, security and personnel access control, fire and life safety systems and all trending, reporting and maintenance management functions related to normal building operations.

B. The Drawings, Diagrams, Points Lists and Schematics are diagrammatic only and are intended to describe the overall concept and magnitude of the project. All labor, material, equipment and software not specifically referred to herein or on the Drawings, Diagrams, Points Lists and Schematics, that are required to meet the functional intent, shall be provided without additional cost to the Owner. The Contractor shall provide for all power required for control devices as well as structural support and attachments with any calculations and drawings required for permitting

C. All labor, material, equipment and software not specifically referred to herein that are required to meet the functional intent of this specification, shall be provided without additional cost to the owner.

1.02 SYSTEM DESCRIPTION, GENERAL

A. The entire BMS shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open protocol communication network to a host computer within the facility and communicating via the intranet to a host computer in a remote location.

B. The BMS shall be able to communicate to third party systems such as chillers, boilers, air handling systems, energy metering systems and other energy management systems, access control systems, fire-life safety systems and other building management related devices with open interoperable communication capabilities.

C. The BMS devices for this project shall be able to be part and fully interoperate with the existing Yamas YNET Building Control Wide Area Network existing throughout the District, without having to use additional programming and configuration software

Pursuant to Section 3400 of the Public Contract: Yamas YNET Building Control Wide Area Network and Web Interface Systems is now in use on the particular public improvement described as San Mateo County Community College District. At each instance in these specifications that "Yamas YNET Building Control Wide Area Network and Web Interface Systems" is designated by brand name, said manufacturer's system is required and is designated to coordinate with existing systems that are in place at Skyline College, College of San Mateo, Cañada College and the District Administration Building. The Contractor will furnish and install only "Yamas YNET Building Control Wide Area Network and Web Interface Systems" systems and devices as required, and no substitutions shall be deemed to be "or equal" or allowed.

1.03 SUBMITTALS

A. A detailed work plan, phasing plan and proposed implementation schedule shall be submitted within 90 days of contract award.

Six copies of shop drawings of proposed system architecture and proposed products and equipment utilized in control system shall be submitted. The shop drawings shall consist of a complete list of equipment and materials, including manufacturers catalog data sheets and installation instructions. Shop drawings shall also contain complete wiring and schematic diagrams, software descriptions, calculations, and any other details required to demonstrate that the system will properly function as intended. At the time each modernization project is contracted and in coordination with the efforts of the respective contractors on the modernization work, shop drawings shall be prepared and forwarded to the General Contractor for the work related to that contract. The shop drawings shall respect the timing and sequencing of the General Contractor's schedule for submittals, and shall be complete in all respects for the scope of work under which the specific General Contractor would be responsible. Additionally, the shop drawings shall address how the control systems depicted would interface with and integrate with the overall system. Terminal identification for all control wiring shall be shown on the shop drawings. A complete written Sequence of Operation as well as a hard copy graphical depiction of the application control programs shall also be included with each submittal package.

C. Submittals shall also include a trunk cable schematic diagram depicting the Graphical User Interface (GUI) computer, control panel locations and a description of the communication type, media and protocol.

D. Upon completion of the work, provide a complete set of 'as-built' drawings and application software on compact disk. Drawings shall be provided as AutoCAD™ files.

1.04 RELATED WORK SPECIFIED UNDER SEPARATE SECTIONS

A. Division 22, Plumbing, and Division 23, Heating, Ventilating & Air Conditioning:

- Providing taps and installation of wells in piping for control system sensors and flow measurement devices
- Installation of any control system dampers.

B. Division 25, Integrated Automation, and Division 26, Electrical:

- Providing motor starters and disconnect switches (unless otherwise noted).
- Provision, installation and wiring of smoke detectors (unless otherwise noted)
- Provide power to all DDC control panels

1.05 AGENCY AND CODE APPROVALS

A. All products of the BMS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Systems or products not currently offering the following approvals are not acceptable.

- UL-916; Energy Management Systems
- ULC; UL - Canadian Standards Association
- FCC, Part 15, Subpart J, Class A Computing Devices

1.06 SOFTWARE LICENSE AGREEMENT

A. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.

1.07 DELIVERY, STORAGE AND HANDLING

A Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

1.08 JOB CONDITIONS

A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to insure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

1.09 QUALITY ASSURANCE

A. The Manufacturer of the Temperature Control System shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). Product literature provided by the temperature control system manufacturer shall contain the ISO-9001 Certification Mark from the applicable registrar.

1.10 QUALIFICATIONS OF BIDDER

A. All bidders must be temperature control contractors in the business of installing direct digital temperature controls for five (5) years.

B All bidders must have installed and completed at least five (5) direct digital temperature control jobs of similar design equipment as specified.

C. All bidders must be able to provide 24 hour service with 2 hour response time. This scope is provided under a separate contract.

D. All bidders must be an authorized distributor of the pre-qualified manufacturers specified and listed below.

E All bidders must have capabilities of doing component level repairs on electronic systems.

F Complete turnkey in-house staff for: Installation, Engineering, Programming, Test, Training, and Check-out.

G The following bidder and product is pre-qualified:

1. YNET Web Interface System - Installed by Yamas Controls

Yamas Controls
Janey Kaster
1 South Linden Avenue Suite 1
South San Francisco, CA 94080
(650) 616-7420
jkaster@yamas com

PART 2 - PRODUCTS

2.01 GENERAL

A. The BUILDING MANAGEMENT AND CONTROL SYSTEM (BMS) shall be comprised of a network of interoperable, stand-alone digital controllers, host computer system(s) with GUI software, portable operator's terminals, modems, printers and other devices as specified herein.

B. The installed system shall provide secure password access to all features, functions and data contained in the overall BMS.

C. Specification Nomenclature:

BMS	BUILDING MANAGEMENT AND CONTROL SYSTEM
NAC	Network Area Controller
SDC	Standalone Digital Controller
IDC	Interoperable Digital Controller
IA	IA Series, Interoperable LONMARK Controller
LIDC	Lighting Interface Digital Controller
WBI	Web Browser Interface
POT	Portable Operator's Terminal
POI	Power Measurement Interface
DDC	Direct Digital Controls
LAN	Local Area Network
WAN	Wide Area Network
OOT	Object Oriented Technology
PICS	Product Interoperability Compliance Statement
GP	Graphical Programmer
HMI	Human Machine Interface
PAC	Personnel Access Controller
YNET	Yamas Graphical User Interface

2.02 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate LonWorks Technologies using Free Topology Transceivers (FTT-10), and specific conformance to the LONMARK Interoperability Association's v3.1 Physical and logical Layer guidelines in all unitary,

terminal unit and other devices or both communication protocols in one interoperable system.

B. The supplied computer software system shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including LonMark to assure interoperability between all system components is required. For each LonWorks device that does not have LonMark certification, the device supplier must provide an XIF file for the device.

C. All components and controllers supplied under this contract shall be true "peer-to-peer" communicating devices. Components or controllers requiring "polling" by a host to pass data shall not be acceptable.

D. The supplied system must incorporate the ability to access all data using Java enabled browsers without requiring proprietary operator interface and configuration programs. An Open DataBase Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on a supplier-installed server for all database access. Systems requiring proprietary database and user interface programs shall not be acceptable.

E. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network. Systems employing a "flat" single tiered architecture shall not be acceptable.

1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.

2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.03 NETWORKS

A. The Local Area Network (LAN) shall be residing on the existing SMCCCD Ethernet network supporting Java, XML, HTTP and COBRA IIOP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (NACs), user workstations and, if specified, a local host computer system.

B. Access to the system from a remote location shall be via the utilizing an adequate PC with standard web browser and from a local computer system (by owner) via direct connection to the Ethernet LAN or thru VPN.

C. Local area network minimum physical and media access requirements:
1. Ethernet; IEEE standard 802 3
2. Cable; 10 base-T, UTP-8 wire, category 5
3. Minimum throughput; 10Mbps with ability to increase to 100 Mbps

2.04 NETWORK AREA CONTROLLER (NAC)

A. The Network Area Controller (NAC) shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of LonWorks controller data
7. Network management functions for all LonWorks devices

B. The NAC shall provide multiple user access to the system and support for ODBC or SQL. An embedded database resident on the NAC must be an ODBC-compliant database or must provide an ODBC data access or must provide an ODBC data access mechanism to read and write data stored within it.

C. The NAC must provide the following hardware features as a minimum:

1. One Ethernet port –10 / 100 Mbps
2. Two RS-232 ports
3. One LonWorks port – 78KB FTT-10A
4. Battery backup
5. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1-gigabyte storage capacity)
6. The NAC must be capable of operation over a temperature range of 0-55°C
7. The NAC must be capable of withstanding storage temperatures of between 0 and 70°C
8. The NAC must be capable of operation over a humidity range of 5-95% non-condensing

D. The NAC must provide all tools for Java enabled Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users in its minimum configuration

E. Event Alarm Notification and Actions

1. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.

2. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.

3. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
   a) To alarm
   b) Return to normal
   c) To fault

4. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc

5. Provide timed (schedule) routing of alarms by class, object or node.

6. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

7. Control equipment and network failures shall be treated as alarms and annunciated.

8. The systems shall be capable to annunciate alarms in the following manners:
   a) Screen message text
   b) Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on day of the week, time of day and recipient.
   c) Pagers via paging services that initiate a page on receipt of email message
   d) Graphic with flashing alarm object(s)
   e) Printed message, routed directly to a dedicated alarm printer
   f) Audio messages

9. The following shall be recorded by the NAC for each alarm (at a minimum):
   a) Time and date
   b) Location (building, floor, zone, etc
   c) Equipment (air handler, etc.)
   d) Acknowledge time, date and user who issued acknowledgement
   e) Number of occurrences since last acknowledgement

10. Alarm actions may be initiated by user defined programmable objects created for that purpose.

11. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.

12. A log of alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.

13. Provide a "query" feature to allow review of specific alarms by user defined parameters.

14. A separate log for system alerts (controller failures, network failures, etc.) shall provided and available for review by the user.

15. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

F. Data Collection and Storage

1. The NAC shall be provided with the ability to collect data for any property of any object and store this data for future use

2. The data collection shall be performed by a log object that shall have, at a minimum, the following configurable properties:

   a) Designating the log as interval or deviation.

   b) For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.

   c) For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.

d) For all logs, provide the ability to set the maximum number of data stores and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.

e) Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.

3. All log data shall be stored in a relational data base in the NAC and the data shall be accessed from a server (if the system is so configured) or a standard Web Browser.

4. All log data shall be available to the user in the following formats:
   a) HTML
   b) XML
   c) Plain text
   d) Comma or tab separated values

5. The NAC shall have the ability to archive it's log data via a server on the network Provide the ability to configure the following archiving properties, at a minimum:

   a) Archive on time of day

   b) Archive on user-defined number of data stores in the log (buffer size)

   c) Archive when log has reached it's user-defined capacity of data stores

   d) Provide ability to clear logs once archived

6. The NAC shall provide and maintain an Audit Log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached it's user-defined buffer size. Provide the ability to archive the log locally (to the NAC), to another NAC on the network, or to a server. For each log entry, provide the following data:

   a) Time and date

   b) User ID

   c) Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

7. Data Base back up and storage:

   a) The NAC shall have the ability to automatically backup its database. The database shall be backed up monthly.

   b) Copies of the current database and, at the most recently saved database shall be stored in the NAC.

   c) The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

2.05 STANDALONE DIGITAL CONTROLLERS (INVENSYS IA-SERIES)

General

A. The SDC controllers shall permit the simultaneous operation of all control, communication facilities management and operator interface software, as programmed by the Contractor or User. Modification of the on-board SDC controller database shall be performed on-line using the built-in interface. Systems that require the SDC to be removed from service while DDC control sequences are modified shall not be acceptable.

B. SDC controllers shall utilize true floating-point arithmetic capabilities. To accommodate totalization of large totalized values, SDCs with reporting capability shall support the calculation, accumulation and display of values within the range of +/-10 to the 10th power. The SDC shall employ a multi-tasking, multi-user operating system.

C. All programming defining the functions to be performed by the SDC, including but not limited to application programs and point database within each SDC shall be protected from loss due to power failure for a minimum of six months. Systems not providing non-volatile memory shall provide a system rechargeable battery backup system sufficient to provide protection for the specified 6 month period

D. SDC controllers shall be equipped with a minimum of two operator service ports for the connection of serial devices such as the GP, HMI, modems, printers, etc. Connection of a service device, to a service port, shall not cause the SDC controller to lose communications with its peers or other networked device controllers. The SDC shall be able to route alarms, trends, and reports to any serial device connected to the network. This shall also include the auto dialing to remote locations. The SDC shall be capable of dialing out to a minimum of ten remote locations for the annunciation of alarms. Alarms shall include the time, date, and alarm condition, in addition to a user-defined detailed message detailing the condition.

E. The SDC shall provide Alarming, point trending and Energy report generation capabilities. Alarming points shall be uniquely definable, with multiple alarms assignable to a single point. Such alarms shall be provided with a unique 80-character message. Systems utilizing an alarm messages library, shall describe the size of the library and verify how all alarming within the SDC will be guaranteed unique 80 character messages.

F. The quantities of trended point values shall be limited only by total controller memory space. If necessary, a SDC may be dedicated fully to a trending task, allowing all controller memory to be available for the trend storage. Each unique trend report shall contain a minimum of 4 different points and a minimum of 128 samples per point. Trending frequency for each report shall be operator definable from a sample once a second to a sample once every 24 hours. Trend reports shall be internally formatted by the SDC and shall be reportable directly to a serial printer, a VT-100 display terminal, a CCS, CHS or any other device capable of receiving a formatted ASCII data file.

G. The energy reports shall not be limited in quantities only by available memory within the GDC Each Energy report shall be fully formatted and reportable to a serial printer, a VT-100 display terminal, a CCS, a CHS or any other device capable of receiving a formatted ASCII data file. As a minimum, each Energy report shall provide a daily report and a monthly report with summary information such as outside air temperature, outside air humidity, total energy consumed and degree-day calculations.

H. The SDC controller shall provide a built-in operator interface, which consists of an alphanumeric LCD display of 4 lines x 20 characters, and a multi-function keyboard. Devices without such built-in displays shall provide a permanently connected HMI as described elsewhere in this specification, one per SDC.

I. The SDC shall provide for logical grouping of network variables and allow for viewing and editing of system parameters. Logical grouping menus shall allow for detailed descriptions of system variables of a minimum of 20 characters.

J. The SDC shall communicate via the BMS Network Interfaces to the enterprise LAN, whether dedicated or common. The SDC shall provide communications connectivity to the LonWorks bus and shall support any LONMARK/LonWorks compliant devices.

K. The SDC shall provide connectivity to the currently marketed BMS solutions offered by the manufacturer. The SDC shall be interoperable these BMS offerings for scheduling, global data sharing, Energy Demand Limiting, alarming, optimized start/stop, and systems integrations for all other data within the entire BMS. In addition, the SDC shall provide connectivity to existing DDC controllers currently marketed by the manufacturer.

L. The SDC shall be compliant with the current and previously marketed HMIs of the manufacturer, and shall be capable of full bi-directional communications through the LAN, with previously manufactured SDC controllers sold for the last ten years by the manufacturer.

2.6 INTEROPERABLE LONMARK CONTROLLERS (INVENSYS IA-SERIES)

General

A. Controls shall be microprocessor based Interoperable Invensys IA Series Controllers (IA), bearing the applicable LONMARK interoperability logo on each product delivered. IAs shall be provided for Unit Ventilators, Fan Coils, Heat Pumps, VAV Terminal Boxes and other applications as shown on the drawings. IAs shall be based on the Echelon Neuron 3150 microprocessor working from software program memory which is physically located in the IA. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.

B. To simplify controls and mechanical service troubleshooting, the IA shall be mounted directly in the control compartment of the unitary system. The IA shall be provided with a sheet metal or polymeric enclosure that is constructed of material allowing for the direct mounting within the primary air stream, as defined by UL-465. The direct mounting shall allow all controls maintenance and troubleshooting to be made while at the unitary equipment.

C. The IAs shall communicate with the SDC at a baud rate of not less than 78.8K baud. The IA shall provide LED indication of communication and controller performance to the technician, without cover removal.

D. The IAs shall be fully supported and communicate with any and all GUI(s) on the bus.

E. S-Bus Sensor

The S-Bus Sensor shall connect directly to the IA controller and shall not utilize any of the I/O points of the controller. The S-Bus Sensor shall provide a two-wire connection to the controller that is polarity and wire type insensitive. The S-Bus Sensor shall provide a communications jack for connection to the LON communication trunk to which the IA controller is connected. The S-Bus Sensor, the connected controller, and all other devices on the LON bus shall be accessible by the Graphical Programming tool

The S-Bus Sensor shall be available in the following variations;
Tamper-resistant (no display)
Tamper-resistant with tenant override
Basic user functions (LCD display and setpoint adjustment and tenant override)
Full user functions (LCD display and network-variable access and tenant override)
ASHRAE 95 compliance (LCD display and sub-base functionality)

The S-Bus Sensor shall be provided in a modular configuration that allows for the rough in of all wiring without the presence of the electronics or esthetic covering. The IA Sensor shall allow for the customization of the color on the esthetic covering as a standard offering. User interface with the IA Sensor shall be provided as a configurable function by the BMS, and shall offer password protection for access to network variable editing. Multiple network variables shall be accessible and editable by the IA Sensor. Icons shall be utilized to represent sensor and controller function status, affording independence from a single language for use interface

F. IA Controller Functionality

The IA CONTROLLER shall provide a –40 to 140 degree Fahrenheit ambient operating temperature range. The IA CONTROLLER shall be provided in a modular configuration that allows for the rough in of all wiring without the presence of any of the IA Controller electronics. IA Controller devices that require the electronics to be present at the time of wiring, will require an additional controller to be provided for every 10 devices on the drawings, to allow for the preconfiguration and storing for service purposes.

G. All input/output signals shall be directly hardwired to the IA Controller. For all non-VAV terminal applications, a minimum of two input points of the IA Controller shall employ a universal configuration that allows for flexibility in application ranging from dry contact, resistive, to voltage/current sourced inputs. If universal points are not available, a minimum of two input points (each) of the dry contact, resistive and analog voltage/current types must be provided on every controller. The outputs of the IA Controller shall be of the relay and universal analog form. All digital outputs shall be relay type. IA Controller devices utilizing non-relay outputs shall provide an interface relay for all points. All analog outputs shall be programmable for their start points and span to accommodate the control devices. Configuration of all I/O points shall be accomplished without physical hardware jumpers, switches or settings. Troubleshooting of input/output signals shall be easily executed with the Graphical Programming tool (GP) or a volt-ohm meter (VOM). All I/O points shall be utilized by the local IA Controller or shall be available as I/O points for other controllers throughout the network.

H. All IA Contollers shall be fully application programmable and shall at all times maintain their LONMARK certification. Controllers offering application selection only (non-programmable), require a 10% spare point capacity to be provided for all applications. All control sequences within or programmed into the IA Controller shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

I The IA Controller shall be provided with the ability to interface with the Graphical

Programming tool. The interface port shall be provided at the wall sensor or within the unitary equipment, as specified on the plans. The interface port shall allow the GP to have full functionality as described in GP section of this specification. Through the connected controller all IA Contoller devices on the LON bus shall be accessible by the Graphical Programming tool.

J. Mechanical equipment manufacturers desiring to provide IA Controller type controls as factory mounted equipment, shall provide a separate bid for their products less all controls, actuators, valve assemblies and sensors, which are specified to be provided by the BMS contractor.

K. VAV Controller Functionality (INVENSYS IA-SERIES)

1. Controls shall be microprocessor based Pressure Independent Variable Air Volume Digital Controllers, as shown in the drawings. The VAV IA controller shall be a single integrated package consisting of a microprocessor, power supply, damper actuator, differential pressure transducer, field terminations, and application software. An alternate model shall be offered that allows for direct connectivity to an external actuator for those applications that employ a non-butterfly style damper configuration. All input/output signals shall be directly hardwired to the VAV IA controller. The internal actuator shall employ a manual override that allows for powered or non-powered adjustment of the damper position. In all cases, the controller shall automatically resume proper operation following the return of power to, or control by the IA. Programming, configuring and/or troubleshooting of input/output signals shall be easily executed through the IA sensor or GP tool connected at the wall sensor location.

2. The VAV IA control algorithms shall be designed to limit the frequency of damper repositioning, to assure a minimum 10-year life from all components. The VAV IA contoller shall provide internal differential pressure transducer for pressure independent applications with an accuracy of ± 5 %. Flows through transducers requiring filter maintenance are not acceptable. The VAV IA shall provide zone control accuracy equal to or better than +/- 1 degree Fahrenheit. Systems providing control accuracy's greater than +/- 1 degrees Fahrenheit are not acceptable. With the submittal package, contractor shall provide performance data that verifies control accuracy of the VAV IA controller.

3. All input/output signals shall be directly hardwired to the VAV IA controller. A minimum of one input point of the VAV IA controller shall employ a universal configuration that allows for flexibility in application ranging from dry contact, resistive, to voltage/current sourced inputs. If a universal point is not available, a minimum of one input point (each) of the dry contact, resistive and analog voltage/current types must be provided on every controller. The outputs of the IA controller shall be of the relay and universal analog form. All digital outputs shall be relay type. IA devices utilizing non-relay outputs shall provide an interface relay for all points. All analog outputs shall be programmable for their start points and span to accommodate the control devices. Configuration of all I/O points shall be accomplished without physical hardware jumpers, switches or settings. Troubleshooting of input/output signals shall be easily executed with the Graphical Programming tool or a volt-ohm meter (VOM). All I/O points shall be utilized by the local IA controller or shall be available as I/O points for other controllers throughout the network.

4. The BMS contractor shall provide VAV IA controller to the VAV box manufacturer, for factory mounting. The VAV terminal unit supplier shall include in its price all costs for mounting of VAV IA controller, connection of actuator to damper shaft, wiring of device power, wiring of VAV IA controller to fan (fan powered terminal) and wiring to electric reheat coils or reheat valve actuator as specified on drawing.

5. The VAV terminal manufacturer shall provide a multi-point, averaging, differential pressure sensor mounted on the inlet to each VAV box. The VAV terminal unit manufacturer shall supply a line to low voltage transformer, of sufficient capacity, to power the VAV IA controller plus all reheat valves and/or contactors and fan circuits associated with the VAV terminal and actuator assemblies. The BMS contractor shall provide all reheat control valves to the mechanical contractor for mounting and piping. The BMS contractor shall provide and install all wiring between the valve and VAV IA controller and between the room sensor and the VAV IA controller.

L. IA VAV - Air Balancing

Through the portable tool, the VAV IA controller shall support a fully prompted Air Balance sequence. The GP tool shall, when connected through the wall sensor, access the connected VAV IA unit. The air balance sequence shall step the balancing contractor through the checkout and calibration of the VAV IA controller. Upon completion of the balancing sequence, the flow values presented by the VAV IA shall match those observed by the balancing contractor's measurement equipment. Additionally, upon completion of the air balance, the SDC shall automatically archive the balance settings for future use if the controller were to require replacement. The BMS contractor will provide the software tool and cable to the balancer at no cost with a one time one hour instruction. The balancing contractor is required to return the tool in working order as soon as he completes his work.

2.07 SYSTEM PROGRAMMING

A. The system supplied by the installer must be programmed using "Java" objects. A library of control, application, and graphical objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and "wiring" them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User screens are created in the same fashion. Data for the user screens is obtained by graphically linking the user screen objects to the application objects to provide "real-time" data updates. Any real-time data value or object property may be connected to display its current value on a user screen. Systems requiring separate software tools or processes to create applications and user interface screens shall not be acceptable.

B. Programming Methods

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user's application. Objects shall be linked by a graphical soft-wiring scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects shall maintain their connections to other objects regardless of where they positioned on the page and shall show link identification for links to objects on other pages for easy identification. Links will vary in color depending on the type of link; i.e., internal, external, hardware, etc.

2. Configuration of each object will be done through the object's property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.

3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode will provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line, the monitor mode will allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system.

4. All programming shall be done in real-time. Uploading, editing, and downloading of database objects shall not be allowed.

5. The system shall support object duplication within a customer's database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

2.08 GRAPHICAL USER INTERFACE SOFTWARE (Add to existing YNET System)

A. Operating System: The GUI shall run on Microsoft Windows 2000 or later.

B. The GUI shall employ browser-like functionality for ease of navigation. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.

C. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and functions:

1. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures.

2. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.

3. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.

4. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

5. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.

6. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

7. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

8. Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required

D. System Configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:

1. Create, delete or modify control strategies.
2. Add/delete objects to the system.
3. Tune control loops through the adjustment of control loop parameters.
4. Enable or disable control strategies.
5. Generate hard copy records or control strategies on a printer.
6. Select points to be alarmable and define the alarm state.
7. Select points to be trended over a period of time and initiate the recording of values automatically.

E. On-Line Help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.

F Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

G. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

H. Alarm Console

1. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator

2. When the Alarm Console is enabled, a separate alarm notification window will supercede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

2.09 WEB BROWSER CLIENTS

A. The system shall be capable of supporting an unlimited number of clients using a standard Web browser such as Internet Explorer™ or Netscape Navigator™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.

B. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the BMS, shall not be acceptable.

C. The Web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc , and provide the same interface methodology as is provided by the Graphical User Interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted.

D. The Web browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented.

2. Graphical screens developed for the GUI shall be the same screens used for the Web browser client. Any animated graphical objects supported by the GUI shall be supported by the Web browser interface.

3. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.

4. Storage of the graphical screens shall be in the Network Area Controller (NAC), without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.

5. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.

6. User's shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
    a) Modify common application objects, such as schedules, calendars, and set points in a graphical manner.
    b) Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
    c) Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
    d) Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
    e) View logs and charts
    f) View and acknowledge alarms

7. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to just their defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.

8. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

2.10 DDE DEVICE INTEGRATION

A. The NAC shall support the integration of device data via Dynamic Data Exchange (DDE), over the Ethernet Network. The NAC shall act as a DDE client to another software application that functions as a DDE server.

B. Provide the required objects in the library, included with the Graphical User Interface programming software, to support the integration of these devices into the BMS. Objects provided shall include at a minimum:
1. DDE Generic AI Object
2. DDE Generic AO Object
3. DDE Generic BO Object
4 DDE Generic BI Object

2.11 LonWorks NETWORK MANAGEMENT

A. The Graphical User Interface software (GUI) shall provide a complete set of integrated LonWorks network management tools for working with LonWorks networks. These tools shall manage a database for all LonWorks devices by type and revision, and shall provide a software mechanism for identifying each device on the network. These tools shall also be capable of defining network data connections between LonWorks devices, known as "binding". Systems requiring the use of third party LonWorks network management tools shall not be accepted.

B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device maintenance and network variable binding.

C. The Network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.

D. These tools shall provide the ability to "learn" an existing LonWorks network, regardless of what network management tool(s) were used to install the existing network, so that existing LonWorks devices and newly added devices are part of a single network management database.

E. The network management database shall be resident in the Network Area Controller (NAC), ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management databases that are not resident, at all times, within the control system shall not be accepted.

2.12 GRAPHICAL USER INTERFACE COMPUTER (provided by owner if required)

A. The desktop computer shall be an Intel Pentium based computer (minimum processing speed of 400 Mhz with 256 MB RAM and a 10-gigabyte minimum hard drive). It shall include a 32X CD-ROM drive, 3.5" floppy drive, a 100 MB Zip drive, 2-parallel ports, 2-asynchronous serial ports and 2-USB ports. A minimum 17", 28-dot pitch SVGA color monitor with a minimum 80 Hz refresh rate shall also be included.

B. A system printer shall be provided. Printer shall be laser type with a minimum 600 x 600-dpi resolution and rated for 8-ppm print speed minimum.

2.13 OTHER CONTROL SYSTEM HARDWARE

A. Control Damper Actuators (where furnished by the Temperature Control sub-contractor): Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be spring return type. Provide one actuator per damper minimum. Pneumatic actuators shall be sized to provide a minimum of 5 in-lb torque per square foot of damper area and shall include positive positioning pneumatic relays when sequenced with other actuators or when control action is to be proportional.

B. Control Valves: Control valves shall be 2-way or 3-way pattern as shown constructed for tight shutoff and shall operate satisfactorily against system pressures and differentials. Two-position valves shall be 'line' size. Proportional control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (except as may be noted on the drawings). Valves with sizes up to and including 2 inches shall be "screwed" configuration and 2-1/2 inch and larger valves shall be "flanged" configuration. Electrically controlled valves shall include spring return type actuators sized for tight shut-off against system pressures and furnished with integral switches for indication of valve position (open-closed). Pneumatically actuators for valves, when utilized, shall be sized for tight shut-off against system pressures. Three-way butterfly valves, when utilized, shall include a separate actuator for each butterfly segment.

C. Wall Mount Room Thermostats: Each room thermostat shall provide temperature indication to the digital controller, provide the capability for a software-limited set point adjustment and operation override capability. An integral LCD shall annunciate ~~current room temperature and~~ set point as well as override status indication. In addition, the thermostat shall include a port for connection of the portable operator's terminal described elsewhere in this specification.

D. Duct Mount, Pipe Mount and Outside Air Temperature Sensors: 10,000-ohm thermistor temperature sensors with an accuracy of ± 0.2°C. Outside air sensors shall include an integral sun shield.

E. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.

H. Power Monitoring Interface: The Power Measurement Interface (PMI) device shall include the appropriate current and potential (voltage) transformers. The PMI shall be certified under UL-3111. The PMI shall perform continuous true RMS measurement based on 32 samples-per-cycle sampling on all voltage and current signals. The PMI shall provide outputs to the BMS based on the measurement and calculation of the following parameters: (a) current for each phase and average of all three phases, (b) kW for each phase and total of all three phases, (c) power factor for each phase and all three phases, (d) percent voltage unbalance and (e) percent current unbalance. These output values shall be hard-wired inputs to the BMS or shall be communicated to the BMS over the open-protocol LAN.

I. Water Flow Meters (when required): Water flow meters shall be axial turbine style flow meters which translate liquid motion into electronic output signals proportional to the flow sensed. Flow sensing turbine rotors shall be non-metallic and not impaired by magnetic drag. Flow meters shall be 'insertion' type complete with 'hot-tap' isolation valves to enable sensor removal without water supply system shutdown. Accuracy shall be ±2% of actual reading from 0.4 to 20 feet per second flow velocities.

J. Water Differential Pressure Switch: Switch shall measure the pressure difference between two sources and activate a SPDT switch upon an adjustable change in pressure differential. Pressure differential set point shall be adjustable between 8-70 psi. Switches shall be selected to withstand expected system pressures. Switch electrical rating shall be 20 amp at 120 VAC.

K. Ambient Light Sensor: Ambient light sensor designed to provide an analog output signal proportional to the ambient light present. Sensor shall contain a precision photo-diode type cell for light measurement. Sensor shall be designed for outdoor application and be directed towards the north sky, away from lighted signs, outdoor lights or similar light producing equipment. Maximum range shall be adjustable from 5 to 750 foot-candles at the sensor face. Accuracy shall be ±1% at 70 degrees F.

L. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. Control panels shall meet all requirements of Title 24, California Administrative Code. All electrical devices within a control panel shall be factory wired. All external wiring shall be connected to terminal strips mounted within the panel. Provide engraved phenolic nameplates identifying all devices mounted on the face of control panels. A complete set of 'as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel.

M. **Variable Frequency Drives: Furnished and installed by BMS installer. See specification Section 23 09 13.**

N. **Air Flow Measuring Stations (AFMD): Furnished and installed by BMS installer. See control diagrams for use in measuring outside airflow.**

1. **Ebtron GTX 116 Thermal Dispersion type or equal. Must be able to accurately measure airflow and temperature to be considered.**
2. **Each sensor shall have (2) bead-in-glass thermistors**
3. **Operating range 0 to 5,000 FPM**
4. **Airflow accuracy shall be +/-2% of reading over entire operating airflow range.**
5. **Temperature accuracy shall be +/- 0.15°F over the entire operating temperature range of -20F to 160F.**
6. **Probes shall be constructed of extruded, gold anodized 6063 aluminum tube. All wires within the tube shall be kynar coated.**
7. **Probe mounting brackets shall be 304 stainless steel.**
8. **Transmitter shall have LCD display capable of simultaneously displaying air flow and temperature.**
9. **Transmitter shall have a power switch and operate on 24 VAC power (supplied by BMS installer, not isolated).**
10. **Linear analog output signals for air flow and temperature: field selectable, fuse protected and isolated, 0-10VDC or 0-24mA (4 wire).**
11. **AFMS shall be UL listed and CE labeled as an entire assembly.**

O. **Differential Pressure Sensor (Dry Media): As manufactured by Veris, Setra, BAPI, or Modus.**

1. Sensor shall have multiple ranges available.
2. Sensor shall have provision for zeroing by pushbutton or digital input.
3. Sensor shall have field selectable outputs of 0-5v, 0-10v, and 4-20ma.
4. Sensor shall be available with unidirectional or bi-directional mode.
5. Sensor shall have brass-barb fittings.
6. Sensor shall operate from 24vdc or 24vac. (AC power applies to operation in voltage mode only)
7. Sensor housing dimensions shall be 4.5" x 4.5" x 2"
8. Sensor shall have LCD display.
9. Sensor accuracy shall be +/-1% FS selected range.
10. Sensor overpressure rating shall be 3 PSID proof, and 5 PSID burst.

P. Raceways and wiring shall comply with Division 26 00 00 unless otherwise specified herein:
1. Wire insulation shall be 600 volt, Type THW or THHN.
2. Line voltage shall be #12 or larger.
3. Low Voltage shall be #16 or larger
4. Sensor and signal wiring shall be #18 AWG unless otherwise specifically required by the connected equipment.

Q. BTU Measurement System
1. The entire BTU Measurement System shall be manufactured by a single manufacturer, ONICON Incorporated, and shall consist of a turbine flow meter, two solid state temperature sensors, a BTU meter, thermowells, all required mechanical installation hardware, and color-coded interconnecting cable.
2. The entire system shall be serialized and include a factory calibration of the complete system. All equipment shall be covered by manufacturer's transferable two-year "No Fault" warranty.

R. UtilityVision Panel - Contractor shall purchase from distributor Chevron Monitoring Services. The UtilityVision Panel will contain the following:
1. One AcquiSuite A8812 metering platform
2. One Isobar Ultra4 plug-in strip
3. One AcquiSuite A8812 110V ac to 24V DC power transformer
4. One 2x4 junction box with dual 110V AC outlets installed. Ready for field connection to 110V AC circuit.

Note: Additional electronic monitoring devices and their associated wiring terminal strips may also be required based on possible custom UtilityVison panel requirements that can arise. Contact Chevron Energy Solutions, Stan Gray (913-748-8667) for additional information as required.

5. Contractor shall terminate all wiring to the appropriate terminal strips.

PART 3 - EXECUTION

3.01 INSTALLATION

A All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the temperature control system manufacturer or its exclusive factory authorized installing contracting field office (representative). The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company's relationship with the

manufacturer. Supervision, calibration and checkout of the system shall be by the employees of the local exclusive factory authorized temperature control contracting field office (branch or representative).

B. Install system and materials in accordance with manufacturer's instructions.

C. Line voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by Div. 16.

D. Equipment furnished by the HVAC Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the Temperature Control sub-contractor.

E. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

3.02 CONTROL SYSTEM WIRING

A. All electrical control wiring and low voltage power wiring to the control panels shall be the responsibility of the BMS contractor. All 120 V power for control panels by Div. 16.

B. All wiring shall be in accordance with Division 16, the National Electrical Code and any applicable local codes. All BMS wiring shall be installed in the conduit types specified in the Project Electrical Specifications (Division 16) unless otherwise allowed by the National Electrical Code or applicable local codes. Where BMS plenum rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

C. All exposed wiring shall be routed within surface metal raceway painted to match adjacent surfaces and routed in a neat, unobtrusive manner, parallel to surfaces. The routing may often take a non-direct route to minimize its appearance and as such Contractor shall assume extra material and labor to allow for approach.

3.03 BTU MEASUREMENT SYSTEM, THERMOWELLS AND UTILITY VISION PANELS

A. Furnish and install all labor, materials, equipment, and service necessary to install and commission a complete and operable UtilityVision Monitoring System.

B. Mount UtilityVision Panel in an accessible location in specified utility equipment room, and provide 120Volt Power to the panel. The power source shall be a separate line with its own circuit breaker or circuit protection device, though it can share the same power supply as the BTU meter. Use a three wire service in which one wire is protective earth ground.

C. Install a ½ " EMT with a CAT 6 cable and RJ45 connectors each end from the UtilityVision Panel to the District's IT network switch. Final connections to the IT switch to be made by the District's Information Technology Department.

D. Furnish and install the Onicon System-10 BTU Meters per manufacturer's Installation and Operation Guide, which is summarized below. Contractor shall complete System-10 Lon Order Form prior to ordering BTU meter.

1. BTU Meter

a. Furnish an ONICON System-10-MOD BTU Meter. The BTU meter

electronics shall be housed in a steel 8"x10"x4" NEMA-13 enclosure and shall include a front panel mounted two-line alphanumeric LCD display for local indication of Energy Total, Energy Rate, Flow Rate, Flow Total, Supply Temperature and Return Temperature. A single 24VAC connection to the BTU shall provide power to the BTU meter electronics and to the ONICON turbine flow meter (120 VAC input is optional). Each BTU meter shall be factory programmed for its specific application, and shall be re-programmable by the user using the front panel keypad (no special interface device or computer required). A certificate of calibration shall be provided with each BTU meter.

b. The contractor shall locate the BTU meter on a vibration free surface that can be easily read by the plant operators, mount the unit, and provide 120VAC power source. The power source should be a separate line with its own circuit breaker or circuit protection device, though it can share the same power supply as the UtilityVision Panel. Use a three wire service in which one wire is protective earth ground.

c. Terminate the wire connections from the temperature sensors to the BTU Meter T3 terminal strip, per installation instructions.

d. Terminate the wire connections from the flow sensors to the BTU Meter T4 terminal strip, per installation instructions.

e. The BTU meter shall provide communication conforming toModbus RTU / 9600 baud communication protocol, and shall provide the following information via Modbus: Energy Total, Energy Rate, Flow Rate, Flow Total, Supply Temperature and Return Temperature. Install and connect ½ " EMT with Modbus network utilizing 18 gauge twisted pair (Belden 1120A 2-wire, or equivalent) connecting the two (2) System 10 Lon BTU Meters to the UtilityVision Panel. Multiple meters should be daisy chained per manufacturer's instructions.

2. Flow Meter Installation

a. The turbine flow meter shall sense the turbine rotation by means of electronic impedance sensing (magnetic sensing not acceptable). Each flow meter shall be individually wet calibrated against a volumetric standard accurate to within 0.1% and traceable to the U.S. National Institute of Standards and Technology (NIST). A certificate of calibration shall be provided with each flow meter. Flow meter accuracy shall be within ± 0.5% at calibrated typical flow rate, within ± 1% of reading over a 10:1 turndown (3.0 to 30 ft/s) and shall be within ± 2% of reading over a 50:1 turndown from 0.4 ft/s through 20.0 ft/s velocity. Flow meter shall be rated for line pressure up to 400 PSI. The turbine flow meter shall be manufactured by ONICON Incorporated and shall be a Model F-1200 Dual Turbine Insertion Flow Meter, Frequency Output.

b. The contractor shall locate the flow meter in the supply or return pipe on the respective hot water or chilled water system, whichever pipe offers the best arrangement. The meter should have obstacle clearances of 10 pipe diameters upstream and 5 meters downstream.

The flow meter itself can be mounted in a horizontal pipe from 0 to 180 degrees, however do not install the meter on the highest horizontal pipe as it may contain air pockets. The meter can also be installed in vertical pipe though the meter shall not be installed in vertical piping where the water is traveling downward as it may contain air pockets.

c. The thermowells may be installed as a hot tap using a wet tap drilling machine and the hot tap installation kit, per the installation instructions. The installation kit consists of a 1-1/4" weld-a-let, 1-1/4" close nipple, 1-1/4" full port ball valve, and a 1" reducer. See the attached F1100 Hot Tap detail for additional information.

d. Contractor shall install the 22 gauge twisted shielded 7-conductor cable, typically provided through the meter order, from the temperature sensor to the BTU meter.

3. Thermowell and Temperature Sensor Installation

a. Temperature sensors shall be bath calibrated against a NIST traceable standard and matched for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within ± 0.150F (including the error from individual temperature sensors, sensor matching, input offsets, and calculations). Temperature data shall be transmitted to the BTU meter via a current loop.

b. The contractor shall locate the temperature sensors as close as possible to the beginning and end of the loop in which the transfer of thermal energy will be measured.

c. The thermowells may be installed as a hot tap using a wet tap drilling machine, per the installation instructions.

d. The temperature sensors are factory matched and tagged by serial number to each specific BTU meter, and are also labeled as Supply and Return. Install temperature sensors into thermowells per installation instructions.

e. Contractor shall install the 22 gauge twisted shielded cable, typically provided through the meter order, from the temperature sensor to the BTU meter.

E. All work shall be in conformance with Division 26 00 00.

F. Tag and label. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding per Division 26 00 00, where applicable.

G. Test-meter installation for proper operation, accuracy, and usability of output data.

H. Coordinate with the Chevron Metering Division to verify that they are able to "view" all installed components from a remote location. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.04 WARRANTY

A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.

B. Within this period, upon notice by the Owner, any defects in the BMS due to faulty materials, methods of installation or workmanship shall be promptly (within 48 hours after receipt of notice) repaired or replaced by the Temperature Control sub-contractor at no expense to the Owner

3.05 WARRANTY ACCESS

A. The Owner shall grant to the Temperature Control sub-contractor, reasonable access to the BMS during the warranty period. The owner shall provide VPN access at no cost to the contractor, for remote communication to the BMS during this period.

3.06 ACCEPTANCE TESTING

A. Upon completion of the installation, the Temperature Control sub-contractor shall load all system software and start-up the system. The Temperature Control sub-contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.

B Graphical User Interface software documentation shall be provided in HTML document format with context-sensitive hyperlinks is an integral part of the graphical user interface and does not require separate hard-copy manuals.

C The Temperature Control sub-contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.

D Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in presence of Owner's Representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner's Representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.

E System Acceptance: Satisfactory completion is when the Temperature Control sub-contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.06 OPERATOR INSTRUCTION, TRAINING

A. During system check-out and testing and at such time acceptable performance of the BMS hardware and software has been established the Temperature Control sub-contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

B. The Temperature Control sub-contractor shall provide 16 hours of instruction to the owner's designated personnel on the operation of the BMS system and describe its intended use with respect to the programmed functions specified. Operator orientation of

the BMS system shall include, but not be limited to; the overall operation program, equipment functions (both individually and as part of the total integrated system), commands, systems generation, advisories, and appropriate operator intervention required in responding to the System's operation.

C. The training shall be in two sessions as follows:

1. Initial Training: One day session (8 hours) after system is started up and at least one week before first acceptance test. Manual shall have been submitted at least two weeks prior to training so that the owners' personnel can start to familiarize themselves with the system before classroom instruction begins.

2. First Follow-Up Training: One days (8 hours) approximately two weeks after initial training, and before Formal Acceptance. These sessions will deal with more advanced topics and answer questions.

END OF SECTION

SECTION 26 00 00

BASIC ELECTRICAL REQUIREMENTS

INTERMOUNTAIN ELECT. CO.
SAN CARLOS, CA
650-591-7118
SUBMITTAL #14

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Electrical systems required for this work includes labor, materials, equipment, and services necessary to complete installation of electrical work shown on Drawings, specified herein or required for a complete operable facility and not specifically described in other Sections of these Specifications. Among the items required are:
   a. Distribution equipment.
   b. Feeders to distribution panels, HVAC equipment, Owner provided equipment and other equipment.
   c. Branch circuit wiring from distribution panels for lighting, receptacles, motors, signal systems, and other detailed wiring.
   d. Luminaires, control switches, receptacles, relays, supports, and other accessory items.
   e. Wiring and power connections for motors installed for heating, cooling, and ventilation.
   f. Fire alarm system.
   g. Low voltage systems.

1.02 DEFINITIONS

A. Following is a list of abbreviations generally used in Division 26:

1. ADA Americans With Disabilities Act
2. AHJ Authority Having Jurisdiction
3. ANSI American National Standards Institute
4. APWA American Public Works Association
5. ASTM American Society for Testing and Materials
6. CBC California Building Code
7. CEC California Electrical Code
8. CFC California Fire Code
9. FCC Federal Communications Commission
10. HVAC Heating, Ventilating and Air Conditioning
11. IEC International Electrotechnical Commission
12. IEEEInstitute of Electrical and Electronics Engineers.
13. IETA International Electrical Testing Association
14. FM FM Global
15. NEMANational Electrical Manufacturers Association
16. NFPA National Fire Protection Association
17. OSHAOccupational Safety and Health Administration
18. UL Underwriters Laboratories Inc.

B. Provide: To furnish and install, complete and ready for the intended use.

C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.

D. Install. Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site to complete items of work furnished by others.

1.03 ADDITIONAL REQUIREMENTS TO DIVISION 01

A. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, test data, product data, guarantees, warranties, and the like.

B. Shop Drawings: When requested by individual Sections provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

C. Closeout Documentation: Submit electrical code authority certification of inspection. Include documentation of on-site electrical testing that was performed.

D. Record Drawings:
1. Show changes and deviations from the Drawings. Include written Addendum and change order items.
2. Show exact routes of feeders 100 amp and larger; and service entrance conduits.
3. Show exact location of switchboards, distribution panelboards, safety disconnects, motor controllers, and the like.
4. Make changes to drawings in electronic format. Obtain electronic copy from Architect, use the same version of AutoCAD to prepare record drawings as was used by the Architect. Provide electronic copy and hard copy to Architect for review.
5. Provide a full size Record Drawing of the one-line power diagram sealed in a plastic coating. Mount on the wall of the electric room.

1.04 QUALITY ASSURANCE

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Conform to latest adopted version of the CBC with amendments by local AHJs.

C. Obtain and pay for electrical permits and inspections from local AHJs.

D. Furnish products listed by UL or other testing firm acceptable to AHJ.

1.05 SEQUENCING AND SCHEDULING

A. For the proper execution of the work cooperate with other crafts and contracts as needed.

B. To avoid installation conflicts, thoroughly examine the complete set of Contract Documents. Resolve conflicts with Engineer prior to installation.

C. Prior to installation of feeders to equipment requiring electrical connections, examine the manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that the electrical characteristics detailed in the Contract Documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide like items from one manufacturer, such as luminaire types, switches, receptacles, breakers, panels, and the like.

2.02 MATERIALS

A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand name and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.

B. Provide material and equipment that is acceptable to AHJ as suitable for the use indicated. For example, provide wet labeled equipment in locations that are wet.

C. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.

D. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system, in a safe and satisfactory working condition.

2.03 FIRESTOPPING

A. Foam Sealant: Foam sealant for use around conduit penetrations to prevent passage of smoke, fire, toxic gas or water. Maintain seal before, during and after fire. In and around conduit for thermal break at penetration of barrier between heated and unheated spaces. Chase Technology Corporation, Fire Foam, Thomas & Betts, or approved.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Construction Documents:
   1. Drawings are diagrammatic with symbols representing electrical equipment, outlets, luminaires, and wiring.
   2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
   3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.

B. Clarification:
   1. The Drawings govern in matters of quantity, the Specification in matters of quality. In event of conflict on Drawings or in the Specifications, the greater quantity and the higher quality apply.
   2. Should the Electrical Documents indicate a condition conflicting with the governing codes and regulations, refrain from installing that portion of the work until clarified by Engineer.

3.02 INSTALLATION

A. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the electrical equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Engineer prior to proceeding with the installation.

B. Do not install electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.

C. Noise Control:
1. Do not install outlet boxes back to back. Do not use straight through boxes.
2. Do not place contactors, transformers, starters and similar noise producing devices on walls which are common to occupied spaces unless specifically called for on Drawings. Where such devices must be mounted on walls common to occupied spaces, mount or isolate in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.

D. Firestopping:
1. Coordinate with the Drawings the location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated by electrical equipment, seal around the equipment with approved firestopping material.
2. Install firestopping material complete as directed per the manufacturer's installation instructions.

3.03 FIELD QUALITY CONTROL

A. Tests:
1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 26. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
2. During site evaluations by Engineer, provide an electrician with tools to remove and replace trims, covers, devices, and the like, so that a proper evaluation of the installation can be performed.

3.04 CLEANING

A. Remove dirt and debris caused by the execution of the electrical work.

B. Leave the entire electrical system installed under this Contract in clean, dust-free and proper working order.

C. Vacuum clean interiors of all new and modified electrical signal and communication equipment enclosures.

3.05 DEMOLITION

A. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas. The Owner will cooperate to the best of their ability to assist in a coordinated schedule, but will remain the final authority as to time of work permitted.

B. Examination: Determine the exact location of existing utilities and equipment before commencing work, compensate the Owner for damages caused by the failure to locate and preserve utilities. Replace damaged items with new material to match existing.

C. Promptly notify Owner if utilities are found which are not shown on Drawings.

D. Execution:
1. Remove existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
2. Maintain electrical continuity of existing systems. Remove or relocate electrical

boxes, conduit, wiring, equipment, luminaires, and the like, as encountered in removed or remodeled areas in the existing construction affected by this work.

3. Remove and restore wiring which serves usable existing outlets clear of the construction or demolition
4. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass the abandoned outlets.
5. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of the construction or demolition and maintain service to the existing load.
6. Extend circuiting and devices in existing walls to be furred out.
7. Remove abandoned wiring to leave site clean.
8. If existing electrical equipment contains PCBs (polychlorinated biphenyl), replace with new. Dispose of material containing PCBs as required by federal and local regulations.
9. Repair adjacent construction and finishes damaged during demolition work.
10. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

3.06 CONTINUITY OF SERVICE

A. No interruption of services to any part of existing facilities will be permitted without express permission in each instance from the Owner. Requests for outages shall state the specific dates and hours and the maximum durations, with the outages kept to these specific dates and hours and the maximum durations. Obtain written permission from the Owner for any interruption of power, lighting or signal circuits and systems.

B. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work, due to maintaining continuity of service herein required.

C. Organize work to minimize duration of power interruption.

END OF SECTION

SECTION 26 01 00

BASIC MATERIALS AND METHODS

INTERMOUNTAIN ELECT. CO.
SAN CARLOS, CA
650 591-7118
SUBMITTAL #14

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Raceways.
2. Wires, cables and connectors.
3. Outlet boxes.
4. Devices and plates.
5. Identification.
6. Safety disconnect switches.

1.02 SYSTEM DESCRIPTION

A. Provide raceways, wires, cables, connector, boxes, devices, finish plates and the like for a complete and operational electrical system.

B. Electrical Connections: Connect equipment, whether furnished by Owner or other Divisions of the Contract, electrically complete.

C. Supporting Devices: Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Bracing to comply with Seismic Zone 4 requirements.

1.03 SUBMITTALS

A. Provide shop drawings and product data for the following:
1. Raceways.
2. Wires, cables and connectors.
3. Identification equipment.
4. Safety disconnect switches.

B. Provide the following operating and maintenance instructions from the manufacturer for project closeout, see project closeout requirements in Division 01:
1. Devices and plates.
2. Safety disconnect switches.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Conduits.
1. Galvanized Rigid Steel Conduit (GRC): Hot-dip galvanized after thread cutting. Manufacture in conformance with Federal Specification WWC-581 and ANSI

C80.1.

2. Electrical Metallic Tubing (EMT): Hot-dip galvanized and chromate coated. Manufacture in conformance with Federal Specification WWC-563 and ANSI C80.3.
3. Flexible Conduit: Reduced wall flexible steel conduit. Hot-dip galvanized. Manufacture in conformance with Federal Specification A-A-55810.
4. Flexible Conduit, PVC Coated: Hot-dip galvanized steel. PVC chemical resistant jacket extruded to core, up to 1-inch trade size. PVC chemical resistant jacket, tubed over core, up to 4-inch trade size.

B. Conduit Fittings:
1. Bushings: Malleable iron with plastic insulator lining, 150C rated.
2. Ground Bushings: Malleable iron with plastic insulating liner and aluminum grounding lug rated for copper or aluminum conductor, 150C rated.
3. EMT Connectors and Couplings:
   a. Compression Type: Zinc plated steel, insulated throat connectors, raintight up to 2 inches.
4. Rigid Steel Conduit Ells: PVC coated or painted with No. 51 bitumastic material, long radius ells, minimum radius of 36 inches.
5. Expansion/Deflection Fittings:
   a. EMT: Use O-Z Gedney Type TX.
   b. GRC: Use O-Z Gedney Type AX, DX and AXDX.

2.02 WIRES AND CABLES

A. Copper, 600 volt rated throughout. Conductors 14AWG to 10AWG, solid. Conductors 8AWG and larger, stranded. Phase color to be consistent at feeder terminations; A-B-C, top to bottom, left to right, front to back. Conductors 3AWG and larger, minimum insulation rating of 75C. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits. Color code conductors as follows:

PHASE	208 VOLT WYE	240 VOLT DELTA	480 VOLT
A	Black	Black	Brown
B	Red	Orange (High Leg)	Orange
C	Blue	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green
Isolated Ground	Green w/yellow trace	N/A	N/A

B. Service Entrance Cable: Copper conductor, 600 volt insulation, XHHW, Type SE.

2.03 CONNECTORS

A. Copper Pads: Drilled and tapped for multiple conductor terminals.

B. Lugs: Indent/compression type for use with stranded branch circuit or control conductors. Manufacturers: Anderson, Ilsco, Panduit, Thomas & Betts, 3M, or approved.

C. Conductor Branch Circuits: Wire nuts with integral spring connectors for conductors 18 through 8AWG. Push-in type connectors where conductors are not required to be twisted together are not acceptable. Manufacturers: 3M, Ideal, or approved.

2.04 BOXES

A. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

B. Weatherproof Outlet Boxes: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket, blank plugs and corrosionproof fasteners. Weatherproof boxes to be constructed to have smooth sides, gray finish. Bell, Carlon, Red Dot, or approved.

C. Junction and Pull Boxes: Provide ANSI 49 gray enamel painted sheet steel junction and pull boxes, with screw-on covers, of the type shape and size, to suit each respective location and installation, with welded seams and equipped with steel nuts, bolts, screws and washers. Circle AW, Hoffman, or approved.

D. Box Extension Adapter: Die-cast aluminum construction. Install over flush wall outlet boxes to permit flexible raceway extension to equipment. Bell 940 Series, Carlon, Red Dot IHE4 Series, or approved.

E. Conduit Fittings: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation. O-Z Gedney, Thomas & Betts, or approved.

2.05 WIRING DEVICES

A. Wall Switches:
1 Toggle Type Characteristics: Quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage. Cooper 1221, Leviton 1221, Hubbell 1221, Pass & Seymour 20ACI.

B Receptacles:
1. Finish: Same exposed finish as switches.
Duplex Receptacle Characteristics: Straight parallel blade, 125 volt, 2 pole, 3 wire grounding. Industrial Grade: Back and side wired. Single piece, rivetless. Brass grounding system and mounting strap. 20 amp. Cooper 5362, Hubbell 5362, Leviton 5362A, Pass & Seymour 5362A.
2 Ground Fault Circuit Interrupter (GFCI) Receptacle: Meets or exceeds UL943 (Class A GFCI), UL498. Feed through type, back-and-side wired, 20 amp, 125VAC, Cooper XGF20, Hubbell GF5362, Leviton 8898, Pass & Seymour 2094.
3. UL Wet-Listed Covers While-In-Use: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord cap with bottom aperture for cord exit. UV stabilized polycarbonate cover with closed cell neoprene foam gasket. Pass & Seymour WIUC10, Leviton 5977, Hubbell WP826MP, Cooper 4966.
4 Special Purpose Receptacles. Refer to drawings for NEMA Standard Specification.

C. Finish Plates: Match district standard.

D. Surface Covers:
1. Material: Galvanized or cadmium plated steel, 1/2-inch raised industrial type with openings appropriate for devices installed in surface outlets.
2. Cast Box and Extension Adaptors: Aluminum, with gasket, blank. One gang, Bell 240-ALF, Carlon; two gang, Bell 236-ALF, Carlon, or approved.

2.06 SAFETY DISCONNECTS

A. Toggle Type Disconnect Switches: 120 volt, 1 pole, 20 amp, 1 HP maximum. NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.

B. Manual Motor Starters: Quick-make, quick-break. Thermal overload protection. Device labeled with maximum voltage, current and horsepower. Eaton Electrical, General Electric, Siemens, Square D Class 2510, or approved. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors.

C. Safety Switches: Heavy duty, fused type, dual rated, quick-make, quick-break with fuse rejection feature for use with Class R fuses only, unless other fuse type is specifically noted. Provide NEMA 1 enclosure for indoors, NEMA 3R enclosure for outdoors. Switches clearly marked for maximum voltage, current and horsepower. Equip enclosure with defeatable cover interlock. Switches rated for maximum available fault current. Manufacturers: Eaton Electrical, General Electric, Siemens, Square D, or approved.

2.07 ELECTRICAL IDENTIFICATION

A. Engraved Labels: Melamine plastic laminate, white with black core, 1/16 inch thick, manufactured by Lamicoid. Engravers standard letter style, minimum 3/16-inch high letters, capitals. Drill or punch labels for mechanical fastening except where adhesive mounting is necessary because of substrate. Use self-tapping stainless steel screws.

B. Conductor Numbers: Manufacturers standard vinyl-cloth self-adhesive cable and conductor markers of the wraparound type. Preprinted black numbers on yellow field. Brady, Panduit, or approved.

C. Circuit Breaker Identification: Provide permanent identification number in or on panelboard or motol control center dead-front adjacent to each circuit breaker pole position.

PART 3 - EXECUTION

3.01 ELECTRICAL CHARACTERISTICS

A. Verify electrical characteristics of equipment prior to installation of conduits and wiring for equipment. Coordinate HVAC voltage requirements with drawings and equipment submittals prior to rough in.

3.02 MOTOR BRANCH CIRCUIT WIRING

A. Do not install electrical equipment or wiring on mechanical equipment without approval of Architect.

B. Provide moisture tight equipment wiring and switches in ducts or plenums used for environmental air.

C. Connect motor branch circuits complete from panel to motor as required by code and manner herein described.

D. Motor starter, control devices and control wiring provided by other Divisions unless noted on drawings.

3.03 APPLIANCE/UTILIZATION EQUIPMENT

A. Provide appropriate cable and cord cap for final connection unless equipment is provided with same. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering devices and coverplates.

3.04 INSTALLATION

A. Conduit:

1. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal PVC conduit joints with solvent cement and metal conduit with metal thread primer. Rigid conduit connections to be threaded, clean and tight (metal to metal)
2. Conduit Placement:
   a. Install continuous conduit and raceways for electrical power wiring and signal systems wiring.
   b. Conceal conduits. Exposed conduits are permitted only in the following areas:
      1) Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished materials.
      2) Existing walls that are concrete or block construction.
      3) Where specifically noted on the drawings.
   c. Where exposed conduits are permitted install parallel or at right angles to building lines, tight to finished surfaces and neatly offset into boxes.
   d. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block the area passage's intended usage.
   e. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors.
   f. Route raceway at least 6 inches from hot surfaces above 120F, including noninsulated steam lines, heat ducts, and the like.
3. Maximum Bends: Install code sized pull boxes to limit sum of bends in a run of conduit to 270 degrees.
4. Flexible Conduit: Install 12-inch minimum slack loop on flexible metallic conduit and PVC coated flexible metallic conduit.

5. Conduit Size: Size as indicated on drawings. Where size is not indicated, provide conduit in minimum code permitted size for THW conductors of quantity required for complete operation. Minimum trade size 1/2 inch.
6. Provide pull cord in empty conduits that exceed 10 feet in length or the total sum of bends exceed 90 degree radius.
7. Conduit Use Locations:
   a. Underground: PVC.
   b. Wet Locations, and areas subject to Mechanical Damage: GRC,.
   c. Damp Locations and Locations Exposed to Rain: GRC, , and EMT up to 2 inches in diameter.
   d. Dry, Protected: GRC, C, EMT.
   e. Sharp Bends and Elbows: GRC, EMT use factory elbows.
   f. Install pull wire or nylon cord in empty raceways provided for other systems. Secure wire or cord at each end.
   g. Elbow for Low Energy Signal Systems: Use long radius factory ells where linking sections of raceway for installation of signal cable.
   h. Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.
   i. Motors and equipment connections subject to movement or vibration and subjected to any of the following conditions; exterior location, moist or humid atmosphere, water spray, oil or grease use PVC coated liquid tight flexible metallic conduit.
8. Branch Circuits: Do not change the intent of the branch circuits or controls without approval. Homeruns for 20 amp branch circuits may be combined to a maximum of six current carrying conductors in a homerun. Apply derating factors as required by CEC. Increase conductor size as needed.
9. Feeders: Do not combine or change feeder runs.
10. Unless otherwise indicated, provide raceway systems for lighting, power and Class 1 remote-control and signaling circuits and Class 2 and 3 remote-control signaling and communication circuits.

B. Conduit Fittings:
1. Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2 inches in diameter.
2. Use threaded type fittings in wet locations, and damp or rain-exposed locations where conduit size is greater than 2 inches.
3. Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes and the like that have feeders 60 amperes and greater.
4. Provide bushing or EMT connector for conduits that do not terminate in box, enclosure, or the like.
5. Provide conduit expansion fittings at building expansion joints and at locations where conduit is exposed to thermal expansion and contraction.
6. Condulets and Conduit Bodies: Do not use condulets and conduit bodies in conduits for signal wiring, in feeders 100 amp and larger.

C. Sleeves and Chases: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceiling or walls. Maintain integrity of fire-rated assemblies at penetrations of walls, ceilings or floors.

D Conductors, Wires and Cables:

1. Conductor Installation: Install conductors in raceways having adequate, code size cross-sectional area for wires indicated. Install conductors with care to avoid damage to insulation. Do not apply greater tension on conductors than recommended by manufacturer during installation. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFCI circuit breakers or GFCI receptacles.
2. Conductor Size and Quantity: Install no conductors smaller than 12AWG unless otherwise shown. Provide required conductors for a fully operable system.
3. Provide dedicated neutrals (one neutral conductor for each phase conductor) in the following single phase circuits:
   a. Isolated ground circuits.
   b. Ground fault protected circuits where a GFCI breaker is used in a panelboard.
   c. Other electronic equipment that produces a high level of harmonic distortion including, but not limited to, computers, printers, plotters, copy machines, and fax machines.

E Connectors: Retighten lugs and connectors for conductors to equipment prior to Substantial Completion.

F. Boxes:

1. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
2. Round Boxes: Avoid using round boxes where conduit must enter through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.
3. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
4. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
5. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
6. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, and other necessary components.
7. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC, except as noted otherwise.
8. Flush Outlets in Finished Spaces: Maintain integrity of insulation and vapor barrier. Surface outlets are only acceptable in areas with surface conduit.
9. Mount center of outlet boxes as required by ADA, or noted on drawings, the following distance above the floor:
   a. Control Switches: 48 inches.
   b. Receptacles: 18 inches.
   c. Telecom Outlets: 18 inches.
   d. Other Outlets: As indicated in other Sections of Specifications or as detailed on drawings.
10. Coordinate electrical device locations (switches, receptacles, and the like) with drawings to prevent mounting devices in mirrors, back splashes, behind cabinets, and the like.

G Wiring Devices.

1. Wall-Mounted Receptacles: Install with long dimension oriented vertically at centerline height shown on drawings or specified herein.

2. Vertical Alignment: When more than one outlet is shown on drawings in close proximity to each other, but at different elevations, align the outlets on a common vertical center line for best appearance. Verify with Architect.
3. GFCI Outlets: One GFCI receptacle may be used to provide GFCI protection to downstream duplex receptacles on the same branch circuit provided the following conditions are met:
   a. The downstream receptacles are in the same room as the upstream GFCI duplex receptacles, and
   b. The downstream duplex receptacles are labeled as being protected by an upstream GFCI receptacle in the same room.

H. Provide CEC-required disconnect switches whether specifically shown on drawings or not. Provide disconnect switch in sight of each motor location unless otherwise noted. Provide disconnect switch in site of each motor controller. Motor controller disconnect equipped with lock-out/tag-out padlock provisions do not require a disconnect switch at the controlled motor location. Coordinate fuse ampere rating with installed equipment. Fuse ampere rating variance between original design information and installed equipment, size in accordance with Bussmann Fusetron 40C recommendations. Do not provide fuses of lower ampere rating than motor starter thermal units.

I. Supporting Devices:
1. Verify mounting height of luminaires or items prior to installation when heights are not detailed.
2. Install vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
3. Do not use other trade's fastening devices as supporting means for electrical equipment, materials or luminaires. Do not use supports or fastening devices to support other than one particular item.
4. Support conduits within 18 inches of outlets, boxes, panels, cabinets and deflections. Maximum distance between supports not to exceed 8 foot spacing.
5. Securely suspend junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from the floor above or roof structure to prevent sagging and swaying.
6. Provide seismic bracing per CBC requirements for this building location.

J. Electrical Identification:
1. Graphics: Coordinate names, abbreviations and designations used on drawings with equipment labels.
2. Conductor Identification: Apply markers on each conductor for power, control, signaling and communications circuits.
3. Install an engraved label on each major unit of electrical equipment indicating both equipment name and circuit serving equipment (e.g. "EF-1, CKT. 2P1-1,3,5), including but not limited to the following items: Disconnect switches, relays, contactors, time switches, override switches, service disconnects, distribution switches, branch circuit panelboards, and central or master unit of each electrical system including communication/signal systems.
4. Install engraved labels on the inside of flush panels, visible when door is opened. Install label on outside of surface panel.
5. Install signs at locations detailed or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment.

3.05 FIELD QUALITY CONTROL

A. Wiring Device Tests: Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct any defective wiring.

B. Feeder Tests:

1. Test conductor insulation on feeders of 100 amp and greater for conformity with +1000 volt megohmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.
2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmeter test. Submit report with operating and maintenance manual.

END OF SECTION

SECTION 26 08 05

ELECTRICAL ACCEPTANCE TESTING

INTERMOUNTAIN ELECTRICAL CO.
SAN CARLOS, CA
650-591-7113

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Testing, evaluation and calibration of equipment provided, installed and connected in Division 26.
2. Evaluation of connection and normal operation of utilization equipment, provided in other Divisions, for installation and connection in Division 26.

1.02 REFERENCES

A. Acceptance Testing Criteria: Latest edition of Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, published by IETA.

B. Applicable Codes, Standards and References:
1. California Electrical Code (CEC).
2. National Electrical Manufacturer's Association (NEMA).
3. American Society for Testing and Materials (ASTM).
4. Institute of Electrical and Electronic Engineers (IEEE).
5. International Electrical Testing Association (IETA).
6. American National Standards Institute (ANSI).
7. State and local codes and ordinances.
8. Insulated Power Cable Engineers Association (IPCEA).
9. Association of Edison Illuminating Companies (AEIC).
10. OSHA Part 1910; Subpart S, 1910.308.
11. National Fire Protection Association (NFPA).

1.03 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Retain the services of a recognized independent testing firm for the purpose of performing inspections and tests as specified herein.
2. Independent test firm providing report direct to Architect.
3. Material, equipment, labor and technical supervision to perform tests and inspections provided by testing firm.
4. It is the intent of these tests to assure that electrical equipment, Contractor or Owner supplied, is operational within industry and manufacturer's tolerances and is installed in accordance with design Specifications.
5. Tests and inspections determine suitability for energization.
6. Supply to the independent testing organization complete sets of approved shop drawings, coordination study (provided by Contractor's equipment supplier under Contractor's direction, setting of adjustable devices and other information requested by testing agency).

B. Scope of Testing, Evaluation and Calibration:
1. Distribution transformers.
2. Low voltage circuit breakers (greater than 100 amp).
3. Grounding systems.
4. Motor control centers.

1.04 SUBMITTALS

A. Test Reports:
1. Maintain written record of tests.
2. At completion of project, assemble and certify a final test report. Submit report to Architect prior to final acceptance to include:
   a. Summary of project
   b. Description of equipment tested.
   c. Visual inspection report
   d. Description of tests.
   e. Test results.
   f. Conclusions and recommendations.

1.05 QUALITY ASSURANCE

A. Qualifications of Testing Firm:
1. Corporately independent testing organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by testing firms.
2. Independent organization as defined by OSHA Title 29, Part 1936 and IETA.
3. Regularly engaged in the testing of electrical materials, devices, appliances, electrical installations and systems for the purpose of preventing injury to persons or damage to property and other equipment.
4. Engaged in testing practices for minimum of 2 years.
5. Use only full-time technicians, regularly employed by firm for testing services. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians and line workers may assist, but may not perform testing or inspection services.
6. Submit proof of above qualifications with Bid Documents.

B. Certifications:
1. Comply with OSHA criteria for accreditation of testing laboratories, Title 29, Parts 1907, 1910 and 1936. Full membership in the IETA constitutes proof of such criteria.
2. Lead, on site, technical person currently certified by IETA in Electrical Power Distribution System Testing.
3. Instruments used by testing firm to evaluate electrical performance meet IETA Specifications for Test Instruments.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Tests:
1. Contractor's Responsibilities:
   a. Perform routine insulation resistance, continuity and rotation tests for distribution and utilization equipment prior to and in addition to tests performed by testing firm.
   b. Notify the testing firm when equipment becomes available for acceptance tests. Coordinate work to expedite project scheduling.
2. Testing Firm's Responsibilities:
   a. Notify Architect prior to commencement of any testing.
   b. Report directly to Architect any systems, material or installation found defective on the basis of acceptance tests.
   c. Provide auxiliary portable power supply necessary for conducting tests.

3.02 ADJUSTING

A. Final Settings: Testing firm responsible for implementing final settings and adjustments on protective devices and tap changes in accordance with Architect's specified values.

END OF SECTION

SECTION 26 09 15

LIGHTING RELAY CONTROL PANEL

INTERMOUNTAIN ELECTRIC
SAN CARLOS, CA
650 591-7118
SUBMITTAL #14

PART 1 - GENERAL

1.01 INTRODUCTION

A. The work covered in this Section is subject to requirements in the General Conditions of the Specifications.

B. Coordinate the work in this Section with the trades covered in the other Sections of the Specification to provide a complete and operative system.

1.02 DESCRIPTION OF WORK

A. Extent of lighting control system work is indicated by drawings, and by the requirements of this section. It is defined to include lighting relay control panels, switch inputs, intertie to other building systems (fire alarm, security and energy management system for HVAC) and wiring.

B. Requirements are indicated elsewhere in these specifications for work including, but not limited to, raceways and electrical boxes and fittings required for installation of control equipment and wiring.

C. Basis of Design: Lighting relay panels on Drawings are designed based on PCI Lighting Litekeeper product line. Approved manufacturers listed below are allowed on condition of meeting the specified conditions including the available space for the equipment (including Code required working clearances). Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.

1.03 QUALITY ASSURANCE

A. Approvals:
1. Test the control panels and list under the UL 916 Energy Management Equipment standards.
2. CEC Compliance: Comply with applicable CEC regarding electrical wiring standards.
3. NEMA Compliance: Comply with applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.
4. Component Pretesting: Control equipment shall undergo strict inspection standards. Previously test the equipment and burn-in at the factory prior to installation.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on lighting control system and components, including recommended spare parts list.

B. Shop Drawings: Submit drawings of lighting control panel and accessories including, but not necessarily limited to the riser diagram / system diagram, low voltage relay panels, power and communications wiring and termination, input/output schedules and sequence of operation for each control zone.

1.05 APPROVED MANUFACTURERS

A. Approved Manufacturers: PCI LiteKeeper 8, Leviton Lighting Controls, Douglas Lighting Controls, Intelligent Lighting Controls, Lighting Control & Design.

MODEL Z-MAX8
STAND-ALONE RELAY SYSTEM

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. System Description:
1. The lighting control system consists of low voltage relay control panels with 64 programmable switch inputs and up to 8 relays.
2. Each low voltage lighting control panel is microprocessor controlled. Accomplish programming through either the RS-232 port or through the network connection employing the Keeper Enterprise software or with an integral 2 x 16 – 32 character self-prompting LCD display and programming keypad.
3. Programmable intelligence includes time-of-day control, 32 holiday dates, a Warn Off to warn occupants of an impending OFF, timed inputs, preset control, auto daylight savings, astronomical clock w/offsets, and local control, digital switches and network overrides.
4. When control panel provides a Warn Off (flash the lights) to inform the occupants of an impending OFF command. The Warn Off command will allow 10 extra minutes for the occupants to override their lights or exit the premises.
5. Control panels permits lighting to be overridden ON for after-hours use or cleaning. Provide these overrides with hard-wired inputs or voice-guided touch-tone telephone control.
6. Control panel enclosures offer a maximum space of 8 relays.

2.02 HARDWARE FEATURES

A Diagnostic Aids:
1. Each control panel shall incorporate diagnostic aids for confirmation of proper operation, or in case of failure these aids shall guide the individual in rapid troubleshooting of the system.
2. The control panels shall employ both a backlit LCD and LED's to indicate:
   a. POWER (LED)
   b. SYSTEM OK (LED)
   c. ON/OFF STATUS of EACH RELAY (LED & LCD)
   d. SYSTEM CLOCK AND DATE (LCD)
   e. PROGRAMMING CONFIRMATION (LCD)
3. Control systems that do not provide visual self-help diagnostics shall not be acceptable.

B. Status Indication of Relays: The system shall provide visible status indication of all relays through the window of each control panel. The visual indication shall disclose On/Off status and relay number. Systems that do not provide relay status while the enclosure door is closed shall not be acceptable.

C. Operator Interface: The control panel programming interface resides in firmware in the control panel. The programming interface shall consist of a circuit board mounted keypad and 2 line x 16 character LCD display. The integral keypad shall provide access to the main programming features. The keypad shall permit the user to manually command any or all relays individually. It shall also allow the user to link switch inputs and time schedules to relay outputs. Each panel shall control its own loads from internal memory. A control system that relies on a central control computer/processor or external time clocks shall not be permitted. Systems that utilize blocking diode technology for relay assignments shall not be acceptable.

D. Low voltage switches (Overrides): The controller shall provide timers for each low voltage switch (override). Each low voltage switch (override) timer shall be capable of 0-999 minutes. Software shall enable or disable low voltage switches (overrides) based on Priorities, Masks or Time of Day scheduling.

E. Digital Switch: The lighting controller shall support digitally addressable LED annunciated switches. The maximum total number of digital switches that may exist on the lighting control network is 16,320. Each Subnet shall support 64 buttons. The digital switch network requires CAT 5 cable between switches. The digital switches shall control any relay group combination on the PCI-Net lighting control network. Data communications status feedback for system checkout and troubleshooting (transmit and receive LED'S) shall be visible on the interface. The digital switch configuration system shall permit custom labeling for multiple button switch locations. The digital switch configuration shall be Decora® form and function.

F. Dry Contact Inputs: The control system shall permit 8 dry contacts inputs for override purposes. Support momentary 3 wire or 2 wire (toggle) inputs. Support maintained contacts as 2 wire (SPST) inputs. Inputs shall be dry contacts (24VDC at 12 ma. internally supplied to the inputs). The 24VDC power supply is provided with an auto-resettable fuse. Should an inappropriate electrical connection be made the design shall protect the board and switches until the fault is removed. Software link switch input to any number of relays for override control. The control panel shall have dry contact inputs on the logic board. Control systems that utilize separate accessories to allow for dry contact switches shall not be acceptable. Control systems that do not supply both digital switches and analog switches from the same controller shall not be permitted.

G. Photocell Control: The controller shall accept dry contact ambient light sensors. The controller shall provide power for the sensor thereby eliminating any external power supply. Sensors shall provide for outdoor and indoor applications and issue a command to the controller once the threshold is reached. The sensor shall provide user adjustable dead band control.

H. Remote Overrides: The controller shall accept remote commands issued from other inputs. The controller shall provide this feature without the need to add extra equipment to the controller. Remote overrides can be issued from the Telephone Interface Module (TIM), Photocells, Motion Sensors, Digital or Dry Contact Switches. Lighting systems that need to add extra equipment to receive remote overrides are not acceptable.

I. Service Override & Priority Override. The control panel shall provide a three position master-service override for the control unit. The service override shall not be accessible from the exterior. Systems that provide a service override on the exterior of the controller shall not be acceptable.

J. Modular Design:

1. The control system shall employ all modular connectors to avoid repeat wiring in case of component failure. Mount the system CPU board on quick-release

spring pins that shall permit an entire change out of the processor and input board.

2. Connections for the switch inputs shall incorporate modular connectors. Provide modular relay board designed for rapid field replacement or upgrading. Systems that do not employ modular connectors shall not be acceptable.

K. Battery Back-up: The system shall utilize a memory back-up device that is system integrated and non-serviceable. Protect the data in RAM against power interruptions lasting as long as 10 years. Provide maintenance free power interrupt protection circuit.

L. Multi-tapped Transformer: The control panel incorporates the use of a multi-tapped transformer. The panel shall not require specification of voltage for each control location. The voltages of 120 and 277VAC available with each standard control panel.

M. Status Indication of Relays: The system shall provide visible status indication of all relays through the window of each control panel. The visual indication shall disclose ON/OFF status and relay number.

N. Service Override: The control panel shall provide a 3 position service override for the entire panel. The service override shall not be accessible from the exterior.

O. Lockable Enclosure: Enclose each control panel in a lockable NEMA Class 1 enclosure and shall provide pre-punched knockouts.

P. Relays: Electrically held 20amp 120/277VAC relays. Relays must be specified Normally Open or Normally Closed. Rate the relays for 10 million mechanical operations.

1. Standard Relay Module (SRM-NC): The system shall utilize normally closed control relays, which are rated to 20 amps at 120/277VAC. Magnetically hold the relays and provide on a card of eight relays per card. The wire terminations shall be able to accept 10 AWG. Rate the relays for 10 million mechanical operations. Provide a limited 10-year warranty on the individual relay cards. Systems that do not offer a limited 10-year warranty on all installations are not acceptable.
2. Latching Relay Card (LRC): The controller shall provide an option to provide latching relays that are rated to 20 amps at 347VAC. The relay shall provide an integral switch for both manual hand operation and visual indication of relay status. Rate the relays for 10 million mechanical operations. The wire terminations shall be able to accept 6 AWG wire. Provide a limited 10-year warranty on the individual relays. Systems that do not offer a limited 10-year warranty on all installations are not acceptable.
3. Latching Relay Card (LRC-RR7): The controller shall provide an option for remote placement of the control relays. A modular card shall connect into the relay compartment. Twisted (3) conductor cable shall power and control the remote mounted relays. Maximum distance is 500 feet employing 18 AWG conductor.
4. The following features shall be standard in the PC based software:
   a. Standard Software Features:
      1) Real Time Relay Status Monitoring
      2) Alpha-Numeric Descriptors
      3) Communications: Direct, TCP/IP and Modem
      4) Status Indication
      5) Global Software Modifications
      6) Manual Relay Commands
      7) Relay Pattern Commands
      8) Preset Options
      9) User Management – Password protection and privilege modification for multi-user security.
      10) Logging of Controller Actions (switch inputs, TIM commands, &

relay actuations)

b. File Maintenance
   1) Archive Programs
   2) Data Base Restoration
   3) Uploading and Downloading of Programs
   4) Snap Shots — indication of changes and flawless panel restoration.

c. Software package shall permit the PC to be utilized for other functions (i e word processing, database, & etc.) besides lighting control. Systems that require an "on-line" dedicated computer for control system operation shall not be acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION AND DOCUMENTATION

A. Installation: Install the control system and fully wire as shown on the drawings by the installing contractor. Complete all electrical connections to all control circuits, and override wiring.

B. Documentation: Provide accurate "as-built" drawings to the owner for correct programming and proper maintenance of the control system. The "as-builts" shall indicate the load controlled by each relay and the relay panel number.

C. Operation and Service Manuals: The factory shall supply all operation and service manuals.

3.02 PRODUCT SUPPORT AND SERVICE

A. Factory Support: Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

3.03 SYSTEM ACCEPTANCE

A. Test to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings and specifications.

B. Functionally test sequences of operation to ensure operation in accordance with approved drawings and specifications.

C. Prepare and complete report of test procedures and results and file with the Owner.

D. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.

E. Demonstration of program integrity during normal operation and pursuant to a power outage.

F. Provide a minimum of 4 hours training on the operation and use of the control system.

G. Lighting System Control Testing and Commissioning:
1. Test lighting controls to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with Drawings and Specifications. Provide functional testing of sequences of operation to ensure operation in accordance with Drawings and Specifications. Provide complete report of test procedures and results to engineer and insert approved copy into project closeout documents.
2. Testing shall include:
   a. Occupant sensing automatic controls.
   b. Automatic time and override controls for interior lighting.
   c. Automatic time and photo controls for exterior lighting.

3.04 WARRANTY

A. Warranty: Manufacturer shall supply a 3-year warranty on all hardware and software. Systems that provided special warranties based on installation shall not be acceptable.

END OF SECTION

SECTION 26 09 21

OCCUPANCY SENSORS

INTERMOUNTAIN ELECTRIC
SAN CARLOS, CA
650-591-7118
SUBMITTAL #14

PART 1 - GENERAL

1.01 SUMMARY

A Section Includes:
1 Occupancy sensors
2 Combined occupancy sensor/wall switches ("sensor/switches").
3 Automatic switches

1.02 SYSTEM DESCRIPTION

A Provide occupancy sensors to sense the presence of human activity within the desired space and enable or disable the on/off manual lighting control function provided by local switches.

B Upon detection of human activity by the detector, sensor initiates a time delay to maintain the lights on for a preset period of time. Field adjustable time delay setting from 30 seconds to 15 minutes.

C Factory set sensors for maximum sensitivity

D LED lamp built into sensor indicates when occupant is detected.

E Provide zero cross relay control with sensors and sensor/switches; relay contacts close and open when AC voltage signal is at zero

F Where line voltage sensors and sensor/switches are used, provide to match voltage of controlled circuit

G Line Voltage Sensors, Control Units, and Relays: UL listed

1.03 SUBMITTALS

A Provide, on reproducible architectural floor plan, a layout of sensors indicating their sensing distribution

B Provide wiring diagrams indicating low voltage and line voltage wiring requirements.

PART 2 - PRODUCTS

2.01 OCCUPANCY SENSORS (CEILING AND WALL MOUNTED)

A Passive Infrared Sensors:
1 Sensor Function: Detects human presence in the floor area being controlled by detecting changes in the Infrared energy. Sensor detects small movements, i e , when a person is writing while seated at a desk.
2 Provide a temperature compensated dual element pyro-electric sensor and with multielement Fresnel lens
3 Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity

4. Provide a daylight filter to ensure that the sensor is insensitive to short-wavelength infrared waves, i.e., those emitted by the sun
5. Conceal adjustments and mounting hardware under a removable cover to prevent tampering with adjustments and hardware.
6. Sensor utilizes advanced digital signal processing technology to reduce false offs without reducing sensitivity
7. Ceiling-Mounted Sensor:
   a. 360 degree sensor range; coverage: 1200 square feet, unless otherwise noted on Drawings
   b. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
   c. Manufacturers: Watt Stopper CI-300 Series, or approved.
8. Wall-Mounted Sensor:
   a. 90 degree sensor range with dense wide angle lens; coverage: 1000 square feet for desktop motion, unless otherwise noted on Drawings.
   b. Swivel mounting bracket for corner mounting to wall or ceiling.
   c. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.
   d. Manufacturers: Wattstopper CX Series, or approved

B. Ultrasonic Occupancy Sensors:
1. Sensor Function: Detects human presence in the controlled floor area by detecting Doppler shifts in 40kHz ultrasound created by sensor
2. Sensors are precision crystal controlled and do not interfere with each other when two or more are placed in the same area. Sensor includes advanced digital signal processing to reduce false on signals without decreasing sensitivity, as well as immunity to RFI/EMI sources.
3. Depluggable terminal for plug-and-play replacement.
4. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
5. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas
6. Ceiling-Mounted Sensor:
   a. Maximum protrusion of 1.1 inches and blend in aesthetically with the ceiling.
   b. Coverage: 360 degree sensor range; coverage: 2,000 square feet, unless otherwise noted on Drawings.
   c. Manufacturers: The Watt Stopper UT Series, or approved.
7. Ceiling Mounted Sensor – Hallway Sensor Coverage:
   a. Maximum protrusion of 1.5 inches and blend in aesthetically with the ceiling.
   b. Coverage: 90 lineal feet
   c. Manufacturers: The Watt Stopper WT-2250 Series, or approved.

C. Dual Technology Sensors:
1. General: Sensor has combined capability of passive infrared and ultrasonic sensors as described above.
2. Function: Upon a person entering a space, motion must be sensed by both technologies before lighting will be turned on. After this has occurred, detection by either technology will hold lighting on for the set time period. Sensor shall have a retrigger time delay where only one motion is necessary to turn on the lights within 5 seconds after turning off.
3. Wall-Mounted Sensor:
   a. 90 degree sensor range with dense wide angle lens; coverage: 1000 square feet for desktop motion, unless otherwise noted on Drawings.
   b. Swivel mounting bracket for corner mounting to wall or ceiling

c. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas.

d. Manufacturers: Wattstopper DT Series, or approved.

4 Ceiling-Mounted Sensor:

a. 360 degree sensor range; coverage: 1000 square feet for half-step motion, unless otherwise noted on Drawings

b. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel allow coverage of large areas

5 Manufacturers: Watt Stopper DT-300 Series, or approved.

2.02 COMBINED OCCUPANCY SENSOR/WALL SWITCHES ("SENSOR/SWITCHES")

A. Completely self-contained sensor system that fits into a standard single gang box. Internal transformer power supply, latching dry contact relay switching mechanism compatible with electronic ballasts, compact fluorescent, and inductive loads. Triac and other harmonic generating devices are not allowed.

B. Passive infrared sensor technology includes advanced signal processing to reduce false triggers without increasing sensitivity.

C. Rated to switch loads: 800 watts incandescent or 120-volt ballast; 1000 watts 277 volt ballast.

D. Provide adjustable daylight feature that holds lighting "off" when a desired footcandle level is present.

E. Provide integral off override switch with no leakage current to the load or ground.

F. Provide hard 1mm poly IR2 lens; soft lens is not acceptable.

G. Alerts for impending shut-off: light flash, audible, both or none.

H. Standard Sensor/Switch:

1 180 degree sensor range; coverage: 150 square feet for desktop activity

2 Manufacturers: The Watt Stopper WA-200 Series, or approved.

2.03 AUTOMATIC SWITCHES

A. Automatic ("Sentry") Switch:

1 Controls up to 1800 watts at 120-volt, 4100-watts at 277-volt, suitable for ballast and motor loads.

2 Compatible with Decora style faceplate

3 Zero crossing circuitry

4 Capable of being connected with other sentry switches to produce 3 and 4 way switching

5 Based on power interruptions of the following durations from an upstream control panel, produces the following effects:

a. 5 Seconds: Turns lighting off with no delay

b. 3 Seconds: Turns lighting on with no delay

c. 1 to 2 Seconds: Delayed off. Blinks lights and provides audible signal to room occupant. If switch push button is not pressed within 5 minutes, lights are turned off.

6 Manufacturers: Wattstopper AS-100 Series, or approved.

B. Digital Timer Switch:

1. Controls up to 1800 watts at 120 volt, 4100 watts at 277 volt, suitable for ballast and motor loads.
2. Compatible with Decora style faceplate.
3. Provide low voltage (24VAC/VDC) version where used as input to lighting relay panel; includes single-pole, double-throw isolated relay rated for 1A at 30VDC.
4. Electroluminescent LCD display shows timer countdown.
5. Time out setting range from 5 minutes to 12 hours. Lights can be turned off before the time-out setting by holding down the on/off button.
6. Timer countdown can be reset to beginning by holding down push button for 2 seconds.
7. Zero crossing circuitry.
8. Room lighting flashed and switch beeps 5 minutes and 1 minute prior to switching room lighting off. Either visible or audible features can be disabled.
9. Manufacturers: Wattstopper TS-400 Series, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install occupancy sensors as directed by manufacturer's instructions. Provide connections to control circuits, occupancy sensors, power supply pack and low voltage wiring.

B. Drawings were laid out using Watt Stopper sensors as the basis of design. If another manufacturer is approved for installation under this Contract, verify with manufacturer representative that sensors are laid out to provide coverage across room space, adding additional sensors as needed.

C. Provide power packs for the sensor to control the number of circuits and/or switch legs within its area of coverage.

D. Field adjust each sensor to maximize its coverage of the room space.

E. Relocate sensors with ultrasonic technology to avoid being closer to HVAC diffusers and power packs than recommended by manufacturer.

F. Field set time delay for each device as noted below:
   1. Classrooms and Conference Rooms: 30 minutes
   2. Restrooms: 30 minutes
   3. Storage Rooms, Janitor's Closets, Unisex Restrooms: 5 minutes
   4. All Other Spaces: 15 minutes.
   5. Timer Switches: 2 hours.

3.02 QUALITY CONTROL

A. Use manufacturer's published testing and adjusting procedures to adjust sensors time delay, daylight sensitivity, and passive infrared sensitivity to satisfaction of the Owner.

B. Prepare and complete report of test procedures and results. Submit these test procedures and results to Owner and Architect.

END OF SECTION

SECTION 26 20 00

LOW VOLTAGE ELECTRICAL DISTRIBUTION

INTERMOUNTAIN ELECTRIC
SAN CARLOS, CA
650-591-7118
SUBMITTAL #14

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Grounding.
2. Dry-type transformers.
3. Power distribution panelboards.
4. Lighting and appliance branch panelboards.
5. Overcurrent protection devices.

1.02 SYSTEM DESCRIPTION

A. Basis of Design: Switchboards, dry-type transformers, and power distribution panelboards, on Drawings are designed based on Square D product line. Approved manufacturers listed below are allowed on condition of meeting the specified conditions including the available space for the equipment (including Code required working clearances) Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.

1.03 SUBMITTALS

A. Provide Shop Drawings and Product Data for the Following Equipment:
1. Grounding.
2. Dry-type transformers.
3. Power distribution panelboards.
4. Lighting and appliance branch panelboards.
5. Overcurrent protection devices.

B. Provide operating and maintenance instructions from the manufacturer for project closeout, see Project Closeout Requirements in Division 01.
1. Dry-type transformers.
2. Power distribution panelboards.
3. Lighting and appliance branch panelboards.
4. Overcurrent protection devices.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Furnish products listed by UL or other testing firm acceptable to AHJ.

C. Conform to SMCCD requirements and standards.

PART 2 - PRODUCTS

2.01 GROUNDING MATERIALS

A. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied

connectors. Mechanical type of connectors are not acceptable. Manufacturers: Burndy Hyground Compression System, Erico/Cadweld, Amp Ampact Grounding System, or approved.

B. Grounding Electrode Conductor: Bare copper stranded conductor.

2.02 DRY-TYPE TRANSFORMERS

A. Manufacturers: Eaton Electrical, Federal Pacific, General Electric, Jefferson Electric, Siemens, Square D, Controlled Power Co., or approved.

B. Voltage: Unless otherwise indicated on Drawings, operate transformers at 3 phase, nominal 480VAC delta primary to 3 phase 120/208VAC wye secondary. Provide standard NEMA, ANSI 3 phase primary taps; that is, 10 percent range of tap voltage adjustment for transformers smaller than 30KVA and 15 percent range tap voltage adjustment for 30KVA and larger.

C. Maximum temperature rise at full load: 150 degrees above 40C ambient temperature. NEMA TP-1 compliant.

D. Provide transformer coils of the continuous wire wound construction and impregnate with non-hygroscopic, thermosetting varnish prior to baking.

E. Visibly ground the core of the transformer to enclosure by means of a flexible ground strap.

F. Mount transformers, core and coil, on vibration mounting pads designed to suppress transmission of 120-cycle frequencies and harmonics thereof. Arrange and select pads in consideration of core and coil weight.

G. Transformer Supports: Provide vibration isolation hangers and pads, brackets and supports for a complete installation.

H. Provide weather resistant enclosure and factory rating for exterior locations.

I. Lugs: Provide mechanical type lugs for conductor terminations.

2.03 LIGHTING AND APPLIANCE BRANCH PANELBOARDS

A. Manufacturers: Eaton Electrical, General Electric, Siemens, Square D, or approved.

B. Enclosures:
1. Flush Panelboards Rated 400 Amp or Less: Maximum enclosure depth, 5-3/4 inches.
2. Wiring Gutter Size: 5 inches at sides, 6 inches top and bottom.
3. Finish: Galvanized steel constructed in accordance with UL 50 requirements. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
4. Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key panelboards alike.

C. Interior:
1. Copper ground bar with suitable electroplating (tin) for corrosion control at connection.
2. Provide copper ground bar to accommodate specified terminal lugs.
3. Predrill bus for bolt-on type circuit breakers.
4. Provide double lugs or landing pads for feed through feeders.

5. Provide feed through feeder lugs for field connection of multi-section flush panel sections, where applicable.
6. When distribution panel is feeding isolated ground circuits, provide isolated ground bar, insulated from panelboard enclosure, to accommodate specified terminal lugs.
7. Provide fully rated integrated equipment rating greater than the available fault current. See drawings for available fault currentMinimum rating is 10,000 amps rms symmetrical for 208 volt panelboards; 14,000 amps rms symmetrical for 480 volt panelboards.
8. Lugs: Mechanical type rated for both aluminum and copper conductors.
9. Provide interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating on the interior or in a booklet format inserted in a sleeve inside the panel cover.

D. Main Circuit Breaker, Where Applicable: UL listed to accept solid or stranded, copper conductors. Lugs suitable for 90C rated wire sized according to the 75C temperature rating per CEC.

E. Branch Circuit Breakers:
1. Bolt-on type bus connectors.
2. UL listed to accept solid or stranded, copper conductors. Lugs suitable for 90C rated wire sized according to the 75C temperature rating per CEC
3. UL listed for use with the following factory installed accessories: Shunt trip, auxiliary switch and alarm switch.
4. UL listed with the following ratings:
   a. 15 to 125 amp breakers: Heating, Air Conditioning, and Refrigeration (HACR).
   b. 15 to 30 amp breakers: High Intensity Discharge (HID) lighting.
   c. 15 to 20 amp breakers: Switch Duty (SWD).

F. When indicated on Drawings, provide an isolated ground bus in addition to the equipment ground bus.

2.04 POWER DISTRIBUTION PANELBOARDS

A. Manufacturers: Eaton Electrical, General Electric, Siemens, Square D, or approved.

B. Enclosures:
1. Provide boxes with removable blank end walls and interior mounting studs. Provide interior support bracket for ease of interior installation.
2. Finish: Galvanized steel constructed in accordance with UL 50 requirements. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
3. Hinged door with door-in-door construction, flush lift latch and lock, two keys per panel. Key panelboards alike.

C. Interior:
1. Copper bar with suitable electroplating (tin) for corrosion control at connection.
2. Provide copper ground bar to accommodate specified terminal lugs
3. Panelboard Interior: Three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. Molded polyester insulators shall support and provide phase isolation to entire length of bus
4. Predrill bus for bolt-on type circuit breakers.
5. Provide double lugs or landing pads for feed through feeders.
6. Provide feed through feeder lugs for field connection of multi-section flush panel sections.
7. When distribution panel is feeding isolated ground circuits, provide isolated

ground bar, insulated from panelboard enclosure, to accommodate specified terminal lugs.

8. Fully equip unused spaces for future devices, including manufacturer required connectors and mounting hardware.
9. Provide fully rated integrated equipment rating greater than the available fault current. See drawings for available fault current. If drawings do not have the available fault currents, then coordinate with serving electric utility. Minimum rating is 25,000 amps rms symmetrical for 480 volt panelboards.
10. Lugs: Mechanical type rated for both aluminum and copper conductors.
11. Provide interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating on the interior or in a booklet format inserted in a sleeve inside the panel cover.

D. When indicated on Drawings, provide an isolated ground bus in addition to the equipment ground bus.

2.05 OVERCURRENT PROTECTION DEVICES

A. Molded Case Circuit Breakers:

1. 1-, 2-, or 3-pole bolt-on, single-handle common trip, 600VAC or 250VAC as indicated on Drawings.
2. Overcenter toggle-type mechanism, quick-make, quick-break action. Trip indication is by handle position.
3. Calibrate for operation in 40C ambient temperature.
4. 15 to 150 Amp Breakers: Permanent trip unit containing individual thermal and magnetic trip elements in each pole.
5. 151 to 400 Amp Breakers: Variable magnetic trip elements. Provide push-to-trip button on cover of breaker for mechanical tripping.
6. Greater than 401 Amp: Electronic trip type with adjustments for long-time, instantaneous, and short-time functions. Provide ground fault function for breakers greater than 400 amps.
7. Manufacturers: Eaton Electrical, General Electric, Siemens, Square D, or approved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Raceway Grounding:

1. Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay-in lug.
2. Connect metal raceways, which terminate within an enclosure but without mechanical connection to the enclosure, by grounding bushings and ground wire to the grounding bus.
3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.
4. Install equipment grounding conductor, code size minimum unless noted on Drawings, in nonmetallic raceway systems

B. Feeders and Branch Circuits Grounding:

1. Provide separate, equipment grounding insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
2. Where installed in a continuous solid metallic raceway system and larger sizes

are not detailed, provide insulated equipment ground conductors for feeders and branch circuits sized in accordance with Table 250.122.

C. Boxes, Cabinets, Enclosures and Panelboards Grounding: Bond grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.

D. Motors, Equipment and Appliance Grounding: Install code size equipment grounding conductor from outlet box to (motor) equipment frame or manufacturer's designated ground terminal.

E. Receptacle Grounding: Connect ground terminal of receptacle to equipment ground system by No. 12 conductor bolted to outlet box except isolated grounds where noted. Self grounding nature of receptacle devices does not eliminate conductor bolted to outlet box.

F. Telecommunications Grounding System: Mount telecommunications main grounding busbar (TMGB) in each IDF. Mount a telecommunications grounding busbar (TGB) in each IDF. Install main telecommunications bonding backbone (TBB) conductor continuous from the MDF to every IDF. Bond the TMGB to the main building electrical grounding system and the nearest acceptable structural ground with a 3/0 AWG copper equipment grounding conductor.

G. Separately Derived Systems: Ground each separately derived system.

H. Panelboards (Power Distribution Panelboards and Lighting and Appliance Branch Panelboards):
1. Install panelboards as directed by manufacturer's installation instructions.
2. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
3. Install panelboards surface or flush mounted in accessible locations as indicated on drawings. Maintain or exceed minimum clearances required by code.
4. Where flush panels are installed, verify available recessing depth and coordinate wall framing with other divisions.
5. Feeder conductors to enter directly in line with lug terminals wherever practicable. Feeder conductors, except ground and neutral, not to exceed 45 degree deflection from raceway entry to feeder phase lugs.
6. Where panels are installed flush, provide two 2-inch spare conduits from panel to accessible space above.
7. Where panels are installed flush in fire rated walls maintain fire rating of wall.
8. Surface panels to have metal trim covers with no sharp edges or corners. Surface panel enclosure finish to match trim cover.
9. Where two or more panels are installed side-by-side, provide covers of same height with each trim independently removable without disturbing the other sections.
10. Provision for Future: Where provision for "future" or "space" is noted on Drawings, equip the space with bus connections to the future overcurrent device with suitable insulation and bracing to maintain proper short circuit rating and physical clearance. Provide buses for the ampere rating as shown for the future device.

I. Control Devices:
1. Install time switches and other automatic control devices in accessible locations near the source of power or grouped at a common location in mechanical rooms or similar spaces.
2. Install photoelectric control devices at such locations as necessary to be most

effective. Avoid locating photoelectric devices in or at locations where they can be influenced by other than natural light or under eaves. Verify location of equipment with Architect.

J. Dry-Type Transformers:
1. Comply with other applicable Sections of this Specification. Transformers up to 45KVA may be floor-mounted, wall-mounted or suspended where so indicated on Drawings. Floor-mount transformers above 45KVA rating.
2. Provide transformers with concrete working or housekeeping pad minimum 8 inches larger than transformer and minimum 3 inches above finish grade. Install plumb and level.
3. Do not mount transformers closer to combustible materials than allowed by CEC. Provide adequate ventilation, mount transformers away from adjacent surfaces as recommended by manufacturer.
4. Mount transformers on vibration isolating pads suitable for isolating the transformer housing from building structure.
5. Use flexible conduit, 18 inch minimum length, for connections to transformer case. Make connections to side panel or bottom of enclosure. Include ground conductor in flex.
6. Provide seismic restraints per local requirements.
7. Mount wall-mounted transformers with a minimum of 6 feet 6 inches of headroom below unit.
8. Field Quality Control:
   a. Check for damage and tight connections prior to energizing transformers.
   b. Measure primary and secondary voltages and make appropriate tap adjustments.
   c. Revise the installation of noisy units to achieve an acceptable noise level or replace with a new unit with an acceptable sound level.

3.02 CLEANING

A. Thoroughly clean the exterior and the interior of each distribution panelboard in accordance with manufacturer's installation instructions.

B. Vacuum construction dust, dirt and debris out of each switchboard and distribution panelboard.

C. Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

3.03 TESTING

A. Test to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings and specifications.
1. Daylight sensing automatic lighting controls.
2. Occupant sensing automatic lighting controls.
3. Automatic time switches for lighting control.

B. Functionally test sequences of operation to ensure operation in accordance with approved drawings and specifications.

C. Prepare and complete report of test procedures and results and file with the Owner.

END OF SECTION

SECTION 26 50 00

LIGHTING

INTERMOUNTAIN ELECT. CO.
SAN CARLOS, CA
650-591-7118

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Luminaires and lampholders.
2. Ballasts.
3. Lamps.

1.02 SUBMITTALS

A. Submit for:
1. Luminaires: Include electrical ratings, dimensions, mounting, material, required clearances, terminations, wiring and connection diagrams, photometric data, diffusers, and louvers.
2. Ballasts.
3. Lamps.

B. Provide the following operating and maintenance instructions from the manufacturer for project closeout, see Project Closeout Requirements in Division 1:
1. Luminaires.
2. Ballasts.
3. Lamps.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Provide luminaires acceptable to code authority for application and location as indicated.
2. Comply with applicable ANSI standards pertaining to lamp materials, lamp ballasts and transformers, and luminaires.
3. Comply with applicable NEMA standards pertaining to lighting equipment.
4. Provide luminaires and lampholders which comply with UL standards and have been UL listed and labeled for location and use indicated.
5. Comply with CEC applicable to installation and construction of luminaires.
6. Comply with fallout and retention requirements of CBC for diffusers, baffles, louvers, and the like.

1.04 WARRANTY

A. Ballast Manufacturer's Warranty: Not less than 2 years for magnetic type ballasts and 5 years for electronic type ballasts, based on date of manufacturer embossed on ballast, current with installation date. Warranty includes normal cost of labor for replacement of ballast.

B. Lamp Warranty: 6 months for compact fluorescent, 12 months for fluorescent and HID lamps.

1.05 MAINTENANCE

A. Furnish 2 percent extra lens or louvers for each size and type of fluorescent luminaire.

B. Furnish 10 percent extra lamps for each size and type installed.

C. Furnish 5 percent extra ballasts for each size and type.

PART 2 - PRODUCTS

2.01 LUMINAIRES

A. Luminaires: Refer to description and manufacturers in Luminaire schedule.

B. Where recessed luminaires are installed in cavities intended to be insulated, provide IC rated luminaires or other code approved installation.

C. UL label luminaires installed under canopies, roof or open porches, and similar damp or wet locations, as suitable for damp or wet locations.

D. Recessed Luminaires: Frame compatible with ceiling material installed at particular luminaire location. Provide proper factory trim and frame for luminaire to fit location and ceiling material.

E. Finishes:
1. Manufacturer's standard finish (unless otherwise indicated) over a corrosion resistant primer.
2. Interior Light Reflecting Finishes: White or specular finish with not less than 85 percent reflectances.
3. Exterior Finishes: As detailed in luminaire schedule or on Drawings. Refer cases of uncertain applicability to Architect for resolution prior to release for fabrication.

TYPE E FIXTURE : SEMI-GLOSS SATIN PER RFI 46.

F. Light Transmitting Components:
1. Plastic diffusers, molded or extruded of 100 percent virgin acrylic.
2. Prismatic acrylic, extruded, flat diffusers, 0.125 inch overall thickness, unless otherwise noted.

G. Fluorescent Luminaires:
1. Provide open lamp fluorescent luminaires without diffusers or guards with turret type, spring loaded sockets.
2. To facilitate multilevel lamp switching, wire lamps within luminaire with outermost lamp at both sides of luminaire on the same ballast, the next inward pair on another ballast and so on to innermost lamp (or pair of lamps).
3. For T5HO lamps, provide twist and lock design sockets, socket body rated to 110C and socket rotor rated to 140C.
4. Provide wire lamp guards on exposed lamp fluorescent luminaires.

2.02 BALLASTS

A. General:
1. Provide ballasts UL rated for specified lamps
2. Thermal Protection: Internal UL Class 'P' with automatic reset.
3. Sound Ratings: Class 'A'. Where not available as standard product from any specified manufacturer, provide quietest rating available.

4. Total Harmonic Distortion: Not to exceed 20 percent of the input current unless otherwise indicated
5. Input Voltage: Provide universal voltage ballast matching branch circuit supply voltage
6. Provide quantity of ballasts to provide switching as indicated on Drawings.
7. Provide factory printed wiring diagram on ballast housing.
8. Ballasts used in enclosed and gasketed luminaires shall be of Type 1 construction.
9. Comply with FCC rules and regulations Part 18, Class A concerning generation of both electromagnetic interference and radio frequency interference.
10. Provide 3-year warranty against defects in materials and workmanship, including either a USD 10 replacement labor allowance or complete replacement including labor by an agent of the manufacturer.

B. Ballasts for Linear Fluorescent Lamps:
1. Power Factor: Minimum 97 percent.
2. Do not provide magnetic fluorescent ballasts.
3. Nondimming Electronic:
   a. Tandem wiring between luminaires may be used to minimize the number of ballasts while accomplishing the switching requirements shown on Drawings. Provide label in lamp compartment of luminaire to identify the function of ballast. Label shall not be visible from room.
   b. Provide ballasts that meet requirements of UL 935, ANSI C82.11 and bear the appropriate UL label
   c. Provide ballasts that withstand input power line transients as defined in ANSI C62.41, Category-A and IEEE 587
   d. Provide series wired programmed start ballast unless noted on drawings.
   e. High frequency operation: Not less than 42kHz.
   f. Lamp Crest Factor: Maximum 1.7 for programmed rapid start ballasts and maximum 1.85 or less for instant start ballasts.
   g. Average Ballast Factor (BF): Minimum 88 percent or as indicated in the luminaire schedule.
   h. Provide 0 degree Fahrenheit minimum starting temperature ballasts for luminaires installed where exposed to anticipated ambient temperature less than 55F.
   i. Manufacturers: Advance, Universal Lighting Technologies, OSRAM/Sylvania, or approved

C. Ballasts for Compact Fluorescent Lamps:
1. Power Factor: Minimum 97 percent.
2. Provide ballasts which meet requirements of UL 935, ANSI C82.11 and bear the appropriate UL label. TYPE F FIXTURE HAS UNIVERSAL BALLAST PER SUBMITTAL #14.
3. With integral end of lamp life detection and shutdown circuit with automatic reset
4. Nondimming Electronic:
   a. Series wired, programmed rapid start circuitry.
   b. High frequency operation: Not less than 50kHz.
   c. Lamp Crest Factor: Maximum 1.5.
   d. Average Ballast Factor (BF): Minimum 98 percent.
   e. 0 degree Fahrenheit minimum starting temperature.
   f. Manufacturers: Advance, OSRAM/Sylvania, Universal Lighting Technologies, or approved.

D. Provide special types as indicated in the luminaire schedule.

2.03 LAMPS

A. Provide lamps for luminaires.

B. Provide lamp cataloged for specified luminaire type

C. Provide similar lamps by a common manufacturer unless indicated in the luminaire schedule

D. Manufacturers: General Electric, Philips, OSRAM/Sylvania (OSI), Venture, Ushio (MR only), EYE (MR only), or approved unless specific manufacturer is indicated in the luminaire schedule

E Incandescent: Not allowed unless noted in luminaire schedule.

F. Fluorescent:
1. Provide 3500K fluorescent lamps unless noted in luminaire schedule
2. Linear Fluorescent:
   a. T-8: Provide the following:
      1) Bi-pin base, tri-phosphor coated
      2) CRI equal to or exceeding 85.
      3) 30000 hours rated on 3 hour switching cycle when used with programmed start ballast.
      4) Compatible with dimming ballasts.
      5) Length and wattage as indicated in the luminaire schedule.
   b. T-5: Provide the following:
      1) bi-pin base, tri-phosphor coated
      2) CRI equal to or exceeding 85.
      3) Compatible with dimming ballasts.
      4) Length and wattage as indicated in the luminaire schedule.
   c. Do not provide T-12 lamps.
3. Compact Fluorescent:
   a. Single ended, four-pin plug-in base, tri-phosphor coated, CRI exceeding 81, CCT, wattage and configuration as indicated in the luminaire schedule.
   b. Do not provide self ballasted screw-in type unless indicated in the luminaire schedule.
   c Do not provide magnetic starter type luminaires, ballasts or lamps.

G. Special types as indicated in the luminaire schedule.

PART 3 - EXECUTION

3.01 COORDINATION

A. Verification of Conditions: Verify ceiling construction, recessing depth and other construction details prior to release of luminaire for shipment. Refer cases of uncertain applicability to Architect for resolution prior to release of luminaires for shipment

B Provide lighting indicated on Drawings with a luminaire of the type designated and appropriate for location. Where outlet symbols appear on Drawings without a type designation, provide a luminaire the same as those used in similar or like locations.

C Provide fluorescent and HID luminaires with ballast compatible to lighting control system as shown in drawings and specifications.

3.02 INSTALLATION

A. Install luminaire of types indicated where shown and at indicated heights in accordance with manufacturer's written instructions and with recognized industry practices to ensure

that luminaires comply with requirements and serve intended purposes.

B. Align, mount and level luminaires uniformly. Use ball hangers for suspended stem mounted luminaires.

C. Avoid interference with and provide clearance for equipment. Where indicated locations for luminaires conflict with locations for equipment, change locations for luminaire by minimum distance necessary as directed by Architect.

D. Suspended Luminaires: Mounting heights indicate clearances between bottom of luminaire and finished floors.

E. Egress Luminaires: Provide unswitched emergency circuit to exit signs and emergency luminaires.

F. Interior Luminaire Supports:
1. Support Luminaires: Anchor supports to structural slab or to structural members within a partition, or above a suspended ceiling.
2. Maintain luminaire positions after cleaning and relamping.
3. Support luminaires without causing ceiling or partition to deflect.
4. Provide recessed fluorescent luminaires with four supports as required by DSA.

G. Wiring:
1. Recessed luminaires to be installed using flexible metallic conduit with luminaire conductors to branch circuit conductors in a nearby accessible junction box over ceiling. Junction box fastened to a building structural member within 6 feet of luminaire.
2. Install luminaires for lift out and removal from ceiling pattern without disconnecting conductors or defacing ceiling materials.
3. Flexible connections where permitted to exposed luminaires; neat and straight, without excess slack, attached to support device.
4. Install junction box, flexible conduit and high temperature insulated conductors for through wiring of recessed luminaires.
5. Unit Battery Equipment in Egress Luminaires: Provide unswitched conductor to each egress luminaire from serving circuit. This is for the transfer electronics to determine when power has actually been lost.

H. Relamp luminaires which have failed lamps at completion of work

3.03 ADJUSTING

A. Focus and adjust floodlights, spotlights and other adjustable luminaires, with Architect, at such time of day or night as required.

B. Align luminaires that are not straight and parallel/perpendicular to structure.

3.04 CLEANING

A. Clean paint splatters, dirt, dust, fingerprints, and debris from luminaires.

B. Where finish of luminaires and poles has been damaged, touch up finish as directed by manufacturer's instructions.

END OF SECTION

SECTION 26 90 00

BUILDING LIGHTING ACCEPTANCE TESTING AND DOCUMENTATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section describes the Acceptance Testing and documentation of the lighting system(s) and outlines the duties and responsibilities of the contracting team for Acceptance Testing.

B. Supply the acceptance requirements to products, equipment and systems provided under this Division, where indicated on plans, and where required by California Title 24 requirements.

C. Engage the services of a firm specializing in commissioning of lighting systems or shall submit contractor qualifications for review by architect where testing and documentation is to be performed by contractor

1.02 THE COMMISSIONING TEAM

A. Form the Commissioning Team of:
1. Electrical contractor's representative
2. Lighting controls manufacturer's representative
3. Inspector of record
4. Owner's staff representative

PART 2 - PRODUCTS

2.01 DUTIES OF THE TEAM

A. The duties of the Team are as outlined in the Title 24 Requirements and summarized below:
1. Plan, organize and implement the Acceptance Testing process and within 1 month of the award of the contract, submit the names and addresses of the Testing team member(s).
2. The Acceptance testing team shall submit a complete description of the testing procedures and systems to be tested to the architect for review.
3. The Acceptance testing team shall coordinate tests of systems and equipment and assemble documentation related to tests. Submit documentation relative to tests and proposed procedures to design engineer for review prior to submitting documentation to Authority having Jurisdiction (AHJ) Team responsible for performing data analysis, calculation of performance indices and crosschecking of results with the requirements of Title 24 and the Contract documents. The installing contractor or agent responsible for testing and documentation shall record their State of California Contractor's license number or their State of California Professional Registration License number on each Certificate of Acceptance for submittal.
4. Responsible for submitting Certificate of Acceptance including paper and electronic copies of measurements and monitoring results and supporting documentation to the AHJ. Where AHJ questions results or requires additional testing, complete additional testing and provide required documentation at no additional cost to the Owner

2.02 TIME SCHEDULE

A. Determine the time period of the commissioning of the systems by the general contractor and Acceptance testing team. It is important to note that AHJ will not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the Title 24 standards.

2.03 ACCEPTANCE TESTING – PHASE I - DOCUMENTATION

A. Team shall assemble documentation showing lighting fixture locations, lighting control device locations, control sequences and notes.

B. Per Title 24 requirements, team shall provide record drawings to building owner within 90 days of receiving a final occupancy permit (refer to other specification sections for requirements on record drawings)

C. Per Title 24 requirements, team shall provide operating and maintenance manuals to the building owner (refer to other specification sections for requirements on operation and maintenance manuals.)

2.04 ACCEPTANCE TESTING – PHASE II – INSPECTION AND TESTING

A. Team shall review the installation, perform acceptance testing and document results for the following systems:
1. Occupancy Sensors
2. Manual Daylight Controls
3. Automatic Daylight Controls
4. Automatic Time Switch Controls

B. Review of installation shall confirm lighting fixtures and lighting controls are properly located, identified, calibrated, and set points and schedules programmed per contract document requirements

2.05 ACCEPTANCE TESTING - PHASE III - CERTIFICATION

A. Team shall document operating and maintenance information, complete installation certificate, and indicate test results on the Certificate of Acceptance, and submit the Certificate to the AHJ prior to receiving final occupancy permit. Team shall submit forms LTG-1-A through LTG-3-A as required by Title 24 requirements.

PART 3 - EXECUTION

3.01 ACCEPTANCE TESTS AND DOCUMENTATION

A. Refer to California Title 24, Non-residential manual for specific testing procedures and documentation requirements. The detailed requirements can be found at http://www.energy.ca.gov/title 24/2005standards/index.html. Contractor is responsible for reviewing and complying with these standards

END OF SECTION

SECTION 27 00 00

TELECOMMUNICATIONS BASIC REQUIREMENTS

INTERMOUNTAIN ELECTRIC, CO W/ NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes general administrative and procedural requirements for Sections under Division 27, and is intended to supplement, not supersede, Division 1 requirements.

B. The requirements described herein include the following:
1. References
2. Definitions
3. Submittals
4. Quality Assurance
5. Delivery, Storage And Handling
6. Scheduling
7. Warranty
8. Project Management and Coordination Services
9. Field quality control.
10. Project Closeout and Record Documents

C. Related Sections
1. Consult other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation
2. General and Supplementary Conditions and general provisions of Contract apply to 27 00 00 series Sections.
3. Division 0 and Division 1 of the Project Manual apply to 27 00 00 series Sections
4. Section 27 05 26 - Telecommunications Bonding
5. Section 27 05 28 - Telecommunications Building Pathways
6. Section 27 08 00 – Telecommunications Testing
7. Section 27 11 00 - Telecommunications Rooms
8. Section 27 13 10 - Telecommunications Backbone ISP Cabling
9. Section 27 13 14 - Telecommunications Backbone OSP Twisted Pair Cabling
10. Section 27 13 24 - Telecommunications Backbone OSP Fiber Optic Cabling
11. Section 27 15 13 - Telecommunications Horizontal Cabling

1.02 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.

B. Codes: Perform Work executed under this Section in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
1. United States Department Of Labor (DOL) Regulations (Standards - 29 CFR) Part 1910, "Occupational Safety and Health Standards"
2. National Fire Protection Agency (NFPA)
   a. NFPA 70, "National Electrical Code" (NEC).
   b. NFPA 75, "Protection Of Information Technology Equipment"

3. California Code of Regulations (CCR) Title 24, California Building Standards Code Part 2, Basic Building Regulations and Part 3, California Electrical Code (CEC)
4. Uniform Building Code (UBC)
5. Uniform Fire Code (UFC)
6. Uniform Mechanical Code (UMC)
7. National, State, Local and any other binding building and fire codes.
8. FCC Regulations:
   a. Part 15 – Radio Frequency Devices & Radiation Limits
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network

C. Standards: Equipment and materials furnished under this Section shall conform to the following standards where applicable:
1. Underwriter's Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:
   a. UL 444: Communications Cables
   b. UL 497: Protectors for Paired-Conductor Communication Circuits
   c. UL 1651: Optical Fiber Cable
   d. UL 1690: Data-Processing Cable
   e. UL 1963: Communications-Circuit Accessories
   f. UL 2024A: Optical Fiber Cable Routing Assemblies.
2. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard.
   a. Part 1: General Requirements
   b. Part 2: Balanced Twisted-Pair Cabling Components
   c. Part 2, Addendum 1: Transmission Performance Specifications For 4-Pair 100 Ohm Category 6 Cabling
   d. Part 3: Optical Fiber Cabling Components Standard
3. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces, including the following addenda:
   a. TIA/EIA-569-A-1 Surface Raceways
   b. TIA/EIA-569-A-2 Furniture Pathways and Spaces
   c. TIA/EIA-569-A-3 Access Floors
   d. TIA/EIA-569-A-4 Poke-Thru Fittings
   e. TIA/EIA-569-A-6 Multi-Tenant Pathways and Spaces
   f. TIA/EIA-569-A-7 Cable Trays and Wirelines
4. ANSI/TIA/EIA-598-B Optical Fiber Cable Color Coding.
5. ANSI/TIA/EIA-606-A Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
6. ANSI/J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
7. ANSI/TIA/EIA-758 Customer-Owner Outside Plant Telecommunications Cabling Standard.
   a. TIA/EIA-758-1 Addendum No. 1
8. EIA testing standards.
9. Insulated Cable Engineers Association (ICEA):
   a. ANSI/ICEA S-80-576-2002 Category 1 & 2 Individually Unshielded Twisted Pair Indoor Cables for Use in Communications Wiring Systems
   b. ANSI/ICEA S-83-596-1994 Fiber Optic Premises Distribution Cable
   c. ANSI/ICEA S-87-640-1999 Fiber Optic Outside Plant Communications Cable
   d. ANSI/ICEA S-90-661-2002 Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems
   e. ICEA S-104-696-2001 Standard For Indoor-Outdoor Optical Cable
10. Building Industry Consulting Services International (BICSI):
    a. Telecommunications Distribution Methods Manual (TDMM)
    b. Customer-Owner Outside Plant Design Manual

c Wireless Design Reference Manual (WDRM)
d Network Design Reference Manual (NDRM)

D. Make a copy of each document readily available during the course of construction for reference by field personnel

1.03 DEFINITIONS

A The Definitions of Division 0 shall apply to the 27 00 00 sections.

B In addition to those Definitions of Division 0, the following list of terms as used in this Section and Sections 27 00 00 shall be defined as follows:
1 "Connect": To install required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
2 "Cabling": A combination of cables, wire, cords, and connecting hardware [e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling].
3 "Identifier": A unique code assigned to an element of the telecommunications infrastructure that links it to its corresponding record.
4 "Engineer" and "Engineer Of Record": [Interface Engineering Inc.].

1.04 SYSTEM DESCRIPTION

A. In circumstances where the Specifications and Drawings conflict, the most stringent requirement shall apply. Generally, the Drawings shall govern quantity and the Specifications shall govern quality.

1.05 SUBMITTALS Submit required submittals in accordance with Section 01 25 00.

B. Obtain approval in writing by the Engineer for the Product Data submittals and for the Shop Drawings (as required) prior to release of order for products and equipment, and prior to installation.

C. Product Data Submittal Requirements
1 Quantity: Submit quantity of product data submittals as described in Section 01 25 00. In the absence of requirements given, submit nine product data submittals.
2 Format:
a Product data sheets shall be 8-1/2 x 11 inch pages or 11x17 for oversized information.
b Package each submittal with an outer cover. Examples include:
1) 3-ring binder with front cover and spine having clear pockets for insertion of the submittal information.
2) 3-hole report cover with transparent front cover. Clearly label each submittal on the outer cover with the following information:
3) Project name and address.
4) Submittal Title (e.g., "Product Data Submittal For Telecommunications Equipment Rooms")
5) Project submittal number.
6) Specification section number/s (e.g., "Section 27 11 00").
7) Date and revision; date format: <month> <day>, <year> (e.g., "January 1, 2000")
8) General Contractor / Prime Builder
9) Telecommunications Installer.
c Include index dividers for improved navigation through the submittal

Dividers shall match the Table Of Contents.

3 Content:

a. Table Of Contents: Include a Table Of Contents at the beginning of submittal that lists materials by article and paragraph number (e.g., "2.02-A Equipment Racks")

b. Cover Letter: Include a cover letter that states the scope of the submittal and states the submittal is in full compliance with the requirements of the Contract Documents, with a specific reference that the submittal complies with Section 01 25 00 procedures. The cover letter shall be signed (and stamped, if applicable) by the person who prepared the submittal. Failure to comply with this requirement shall constitute grounds for rejection of submittal.

c Product Information: Product Data submittal shall consist of manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary). Also include applicable Materials Safety Data Sheet (MSDS) for each item complying with OSHA's Hazard Communication Standard 29 CFR 1910.1200. This data shall clearly describe the product's characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories, which are included and those which are excluded. At a minimum, include products listed in the specifications numbering 27 00 00. Also include relevant products that will be installed, which are not listed in the specifications.

d Seismic Calculations: Where required, include in the product data submittal the manufacturer's anchorage calculations for floor-mounted, fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for drilled-in anchors, if used. A Structural Engineer currently registered in the State of California shall prepare calculations and shall wet stamp and sign them. Forward calculations to the Owner for review and approval.

e. Resubmittals: Resubmittals shall include a cover letter that lists the action taken and revisions made to each product submittal in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

D. Shop Drawings Submittal Requirements

1. Quantity: Submit quantity of shop drawings as described in Section 01 25 00. In the absence of requirements given, submit six sets of shop drawings.

2. Media: Submit shop drawings on media as described in Section 01 25 00. In the absence of requirements given, submit shop drawings full size on bond or eco-bond.

3. Format:

a. Prepare shop drawings using AutoCAD 2000 or later.

b. Full size shall equal the Contract Documents.

c. Use the project title block. Insert company information in title block.

d. Text shall be 3/32" high, minimum, when plotted full size.

e. Device symbols shall match those used in the Contract Drawings.

f. Screen background information

g. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.

h. Label each sheet in the shop drawings set with the Specification Section Number (e g , "27 13 10")

i. Scaling:

1) Scale floor plans and reflected ceiling plans at 1/8"=1'-0"

2) Scale enlarged room plans at 1/4"=1'-0"

3) Scale wall elevations at 1/2"=1'-0"

4) Scale rack elevations at 1"=1'-0"

4. Content:

a. Submit detailed shop drawings if the proposed installation differs from the Contract Documents or the design intent.

b. Cover Letter: Accompany each shop drawing submittal with a cover letter stating that the shop drawings have been thoroughly reviewed by the Contractor and are in full compliance with the requirements of the Contract Documents. Cover letters shall include a drawing index, and shall be signed (and stamped, if applicable) by the person who prepared the submittal. Failure to comply with this requirement shall constitute grounds for rejection of submittal

c. Drawings: Shop drawing submittals shall consist of floor plans, reflected ceiling plans, enlarged room plans, wall and rack elevations, installation details, and any other aspect of the system that differs from the Contract Documents or the design intent. Scales shall be the same as the Drawings (e g , 1/4" = 1'-0" for enlarged room plans)

d. Seismic Calculations: As part of the shop drawings submittal, the manufacturer shall provide anchorage calculations for floor mounted fully loaded distribution frames such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for drilled-in anchors, if used. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the Owner for review and approval.

e. Resubmittals: Accompany resubmittals with a cover letter that lists the revisions made to each drawing in response to Submittal Review Comments. Resubmittals will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

E. As-Built Drawings Submittal Requirements

1. Quantity: Submit quantity of as-built drawings as described in Section 01 25 00. In the absence of requirements given, submit six sets of as-built drawings.

2. Media: Submit shop drawings on media as described in Section 01 25 00. In the absence of requirements given, submit shop drawings full size on bond or eco-bond.

3. Format:

a. Prepare as-built drawings using AutoCAD 2000 or later.

b. Use the same sheet size as the Contract Documents, and use the project title block.

c. Text: minimum of 3/32" high when plotted at full size.

d. Use symbols identical to the symbols shown on the Drawings

e. Screen background information.

f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.

4. Content:

a. As-Built Drawings shall fully represent actual installed conditions and shall incorporate revisions made during the course of construction.

b. Floor plans shall show:

5. Locations and identifiers of outlets/devices.
6. Size, quantity, location, and routes of pathways (such as cable basket, conduits, cable hangers, and other cable support devices). Enlarged room floor plans scaled at 1/2"=1'-0" showing exact placement of equipment cabinets/frames, rack bays, and other equipment. Enlarged room overhead plans scaled at 1/2"=1'-0" showing exact placement of overhead cable support devices (e.g., cable basket, cable runway, conduit sleeves, etc.).
7. Applicable rooms: Telecommunications Room
   a. Wall elevations scaled at 1"=1'-0" showing exact placement of termination hardware (e.g., termination/cross-connect blocks).
   b. Installation details.

F. Operation and Maintenance (O & M) Manuals Submittal Requirements
1. Quantity: Submit quantity of O&M Manuals as described in Section 01 25 00. In the absence of requirements given, submit six product data submittals.
2. Format:
   a. Package each O & M Manual in a white, 3-ring binder with front cover and spine having clear pockets for insertion of the project information.
   b. Clearly label the cover of each O & M Manual with the following information:
      1) Client name.
      2) Project name and address.
      3) Manual title (e.g., "Operation And Maintenance Manual for Telecommunications Cabling System").
      4) Date; date format: <month> <day>, <year> (e.g., "January 1, 2000").
      5) Telecommunications Installer and General Contractor names. Include tabbed separators for improved navigation through the manual.
3. Content:
   a. Include a Table Of Contents at the beginning that lists the contents.
   b. 11"x17" prints of As-Built Drawings, as described above
   c. One CD-ROM of AutoCAD files of as-built drawings
   d. Manufacturer's original catalog information sheets for each component provided under applicable Section.
   e. Warranty certificate from the manufacturer and the Contractor.
   f. Manufacturer's instructions for system or component use.
   g. Instructions for maintenance and warranty issues.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications
1. Five continuous years, minimum, design and manufacture of the materials and equipment specified herein.
2. Manufacturer(s) of all products and equipment specified herein shall demonstrate that they have a quality assurance program in place to assure that all of the specifications are met. The program shall include, as a minimum, provisions for:
   a. Incoming inspection of raw materials
   b. In-process inspection and final inspection of the cable product
   c. Calibration procedures of all test equipment to be used in the qualifications of the product
   d. Recall procedures in the event that out of calibration equipment is identified.
3. Conformance to certain government standards on quality assurance may be required for some applications within these specifications.

B. Contractor Qualifications

1. Current, active, and valid C7 or C10 California State Contractors License. Provide a copy of Contractors License in the bid submission
2. Five, minimum, continuous years experience.
3. Five, minimum, completed projects similar to scope and cost. Provide a list of projects, including references, in the bid submission.
4. Technicians qualified for the work. Provide evidence in the bid submission of Technician qualifications. Evidence shall consist of manufacturer certifications, manufacturer training, industry training, relevant project experience, etc
5. Also refer to additional requirements stated in Sections 27 05 26 through 27 15 13

C. Materials
1. Materials and equipment furnished shall be new, unused and without defects.
2. Furnish only specified products and equipment, or products and equipment that have been approved in writing.

D. Regulatory Requirements
1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Nothing in these specifications is to be construed to permit work not conforming to the most stringent of the applicable codes.
2. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
3. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this series of Sections, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The Contract Documents address the minimum requirements for construction.

E. Project Management And Coordination Services
1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility shall include, but shall not be limited to the items listed in this section.
2. Review of Shop Drawings Prepared by Other Subcontractors:
   a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with Division 26 work.
   b. Perform a thorough review of the shop drawings to confirm compliance with the service requirements contained in the Division 26 contract documents. Document any discrepancy or deviation as follows:
      1) Prepare memo summarizing the discrepancy
      2) Provide a copy of the specific shop drawing, indicating via cloud, the discrepancy.
      3) Prepare and maintain a shop drawing review log indicating the following information:
      4) Shop drawing number and brief description of the system/material
      5) Date of your review.
      6) Indication if follow-up coordination is required

F Drawings
1. Layout: Follow the general layout shown on the Drawings except where other work may conflict with the Drawings.
2. Accuracy: Drawings for the Work within this Division are essentially diagrammatic within the constraints of the symbology applied
3. The Drawings do not fully represent the entire installation for the Telecommunications Cabling System. Drawings indicate the general route for the cables and the location of outlets
4. Complete the details necessary for point-to-point design. This allows the Contractor to achieve desired results applying their own procedures and methods. Submit shop drawings for review prior to installation.

G Role of the Engineer
1. During construction, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and 'process') relevant Requests for Information (RFIs), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for general compliance with the Contract Documents and to ensure that the installation meets the design intent of the system.
3. In summary, the Engineer will perform the following specific services during the construction phase:
   a. Review product submittals and shop drawings (as required) for general compliance with the contract drawings and specifications.
   b. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.
   c. Observe progress of the construction, and report observations back to the Owner.
   d. Review the testing procedures to confirm compliance with project requirements and industry-accepted practices.

1.07 DELIVERY, STORAGE AND HANDLING

A Delivery
1. Products shall not be delivered to the site until protected storage space is available.
2. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
3. Deliver materials in manufacturer's original, unopened, undamaged packaging and containers with identification labels (name of the manufacturer, product name and number, type, grade, UL classification, etc) intact.
4. Replace equipment damaged during shipping at no cost to the Owner.

B Storage and Protection
1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.
2. Comply with manufacturer's requirements for each product. Comply with recommended procedures, precautions or remedies as described in the Material Safety Data Sheets (MSDS) as applicable.
3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
4. Storage outdoors covered by rainproof material is not acceptable.
5. Provide heat where required to prevent condensation or temperature related damage.

C Handling
1 Handle in accordance with manufacturer's written instructions.
2 Damaged equipment shall not be installed.
3 Replace damaged equipment at no cost to the Owner.
4 Handle with care to prevent internal component damage, breakage, denting, and scoring.

1.08 SCHEDULING

A Unless otherwise specified, the construction schedules of the Sections 27 00 00 may be combined.

B Submit schedule within 30 days after Notice To Proceed.

1.09 WARRANTY

A Service must be rendered within 4 hours of system failure notification. Note any deviation – exceptions or improvements – to this requirement at the time of bid.

B Refer to Sections listed in 1.01, C for specific subsystem warranty period requirements.

C. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department or stocking distributor shall be located close enough to the job site area to supply replacement parts within a 4-hour period.

D. Warrant installed hardware, under normal use and service, to be free from defects and faulty workmanship during the warranty period. Keep the system in operating condition at no additional material or labor costs to the Owner during the warranty period.

E. The manufacturers shall demonstrate that a quality assurance program is in place to assure that the specifications are met. The program shall include, as a minimum, provisions for:
1 Incoming inspection of raw materials
2 In-process inspection and final inspection of the product
3 Calibration procedures of test equipment to be used in the qualifications of the product
4. Recall procedures in the event that out of calibration equipment is identified.

F Conformance to certain government standards on quality assurance may be required for some applications outlined in these specifications.

PART 2 - PRODUCTS

2.01 GENERAL

A Materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards, other applicable federal, state, and local laws.

B Product numbers listed in the 27 00 00 series sections are subject to change by the manufacturer without notification. In the event a product number is invalid or conflicts with the written description, notify the Owner in writing prior to ordering the material and performing any installation work. Provision and installation of the approved changed product will be at no additional cost to the Owner.

2.02 SUBSTITUTIONS

A. Requests for substitutions shall conform to the general requirements and procedure outlined in Division 1.

B. Where items are noted as "or equal", a product of equivalent function, design, construction, quality and performance will be considered. Include in the substitution request: catalog cuts, product information, and pertinent test data required to substantiate that the product is in fact equivalent to that specified. Only one substitution will be considered for each product specified.

C. Do not provide substitution material, processes or equipment without written authorization from the Engineer.

D. Substitutions shall be equivalent, in the opinion of the Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted product, component, article, or material to be equivalent to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Specifications.

E. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment that, in the opinion of the Owner, are equivalent in quality, utility and appearance will be approved as substitutions to that specified when "or equivalent" follows the manufacturers' names and model number(s).

F. Whenever any material, process or equipment is specified in accordance with a TIA/EIA specification, an ANSI specification, UL rating or other association standard, present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, submit supporting test data to substantiate compliance at no additional cost.

G. Pay expenses, without additional charge to the Owner, in connection with substitution materials, processes and equipment, including the effect of substitution on self, subcontractor's or other Contractor's work.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Conditions: Verify conditions, provided under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

B. Pathways: Verify that pathways and supporting devices, provided under other sections, are properly and permanently installed, and that temporary supports, devices, etc., have been removed.

C. Field Measurements: Verify dimensions of pathways, including length of pathways. For example, "true tape" the conduits to verify cabling distances.

3.02 FIELD QUALITY CONTROL

A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule.

B. Project Management: Coordinate and attend weekly status meetings to review the overall progress and issues to be resolved throughout the course of construction. Prepare and distribute meeting agenda prior to and meeting notes after meetings in a format acceptable to the General Contractor.

C. Scheduling: Prepare an overall construction schedule based on the results of the planning meetings with the General Contractor. Issue schedule to General Contractor for approval. Prepare and issue updated schedules whenever there are modifications.

D. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion, and inspection as required.

3.03 INSTALLATION

A. Conform to applicable federal, state and local codes, and telephone standards.

B. Coordinate the entire installation with the General Contractor, and their subcontractors, to meet the construction schedule. Include coordination meetings as required to fulfill this requirement.

C. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

D. Manufacturer's Instructions:
1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
2. Maintain jobsite file and comply with Material Safety Data Sheets (MSDS) for each product delivered to jobsite.

E. Adjusting:
1. Make changes and revisions to the system to optimize operation for final use.
2. Make changes to the system such that any defects in workmanship are corrected and cables and the associated termination hardware pass the minimum test requirements.

F. Protection:
1. Protect installed products and finish surfaces from damage during delivery and construction.
2. Provide protective coverings on adjacent surfaces for protection from dust.

3.04 REPAIR/RESTORATION

A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.

B. Paint damaged areas to existing painted surfaces caused by Work.

C Punch List:
1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
2. Provide punch list to Owner for review prior to performing punch walk with Owner.

D Re-Installation:
1 Make changes to adjust the system to optimum operation for final use. Make changes to the system such that any defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
2. Repair defects prior to system acceptance.

3.05 CLEANING

A. Clean daily. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

C. Repair or replace damaged installed products.

D. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Legally dispose of debris.

3.06 DEMONSTRATION

A. On completion of the acceptance test, schedule a time convenient with the Owner or Owner's Representative for instruction in the configuration, operation, and maintenance of the system.

B Provide 4 hours, minimum, of on-site orientation and training by a factory-trained representative. Document dates and times of training, and submit a "sign in" sheet for individuals trained, as part of the close out documentation.

3.07 CERTIFICATION

A Provide to Owner or Owner's Representative a written form of acceptance for signature. Corrections must be completed before Owner or Owner's Representative and Engineer will give acceptance.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

SECTION 27 05 26

TELECOMMUNICATIONS BONDING

INTERMOUNTAIN ELECTRIC CO. W/NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL # 30

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Bonding telecommunications infrastructure devices and equipment to Telecommunications Grounding Backbone

B. Related Sections
1. Comply with the Related Sections paragraph of Section 27 00 00
2. Division 26 – Grounding, Telecommunications Grounding Backbone

1.02 REFERENCES

A. Comply with the References requirements of Section 27 00 00.

B. In additional to those codes, standards, etc , list in Section 27 00 00, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
1. NFPA 70, National Electric Code:
   a. Chapter 8: Communications Systems
   b. Article 250: Grounding
2. Underwriters Laboratories, Inc. (UL) UL 467: Grounding and Bonding Equipment
3. Institute of Electrical and Electronics Engineers, Inc (IEEE):
   a. IEEE 467: IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
   b. IEEE P1100:IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems

1.03 DEFINITIONS

A. Definitions as described in Section 27 00 00 shall apply to this section

B. In addition, the following list of terms as used in this specification shall be defined as follows:
1. "CM": Circular Mil
2. "MBRGB": Main Building Reference Grounding Busbar.
3. "TBB": Telecommunications Bonding Backbone.
4. "TBC": Telecommunications Bonding Conductor
5. "TGB": Telecommunication Grounding Busbar
6. "TMGB": Telecommunication Main Grounding Busbar

1.04 SYSTEM DESCRIPTION

A. Grounding Backbone System – Provided under another section
1. Refer to Division 26 for detailed information regarding the Telecommunications Grounding Backbone system

2. The Telecommunications Grounding Backbone system contains grounding bus bars, grounding conductors, bonding conductors, and connecting devices (including but not limited to pressure connectors, lugs, clamps, or exothermic welds) These components provide a low impedance path to ground for stray voltages or spurious signals present on telecommunications media and equipment
3. TMGB: The TMGB is located in the Entrance Facility Room. The TMGB has a connection to the following:
   a. MBRGB
   b. Overhead cable tray within the room, via TBC
   c. Ground bushings installed on each entrance conduit within the Entrance Facility, via TBC
   d. Dedicated power panels within the Entrance Facility serving telecommunication equipment, via TBC
   e. Each TBB
4. TBB: TBBs originate in Entrance Facility, and route to the MDF and each IDF with a connection to each TGB.
5. TGB: A TGB exists in the MDF and each of the IDF rooms.

B. Base Bid Work
1. Provide labor, materials and equipment necessary to bond telecommunications infrastructure devices and equipment to Telecommunications Grounding Backbone.
2. TBCs within each telecommunications room from the TMGB and TGBs to the following components:
   a. Rack bay to TMGB/TGB
   b. Overhead cable support to TMGB/TGB
   c. Ground bushings installed on each conduit opening within the space if conduit is provided by Contractor to TMGB/TGB.
3. Bonding jumpers between cable basket and cable runway joints and splices, and between overhead cable support and equipment racks.

1.05 SUBMITTALS

A. General: Conform to Submittal requirements as described in Section 27 00 00

B. Quantity: Furnish quantities of each submittal as noted in Section 27 00 00

C. Product Data Submittal
1. Format: As described in Section 27 00 00
2. Content: In addition to requirements of Section 27 00 00, include the following:
   a. Product Data: "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) of bonding devices and installation accessories. This data shall clearly describe the physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish
   b. Clearly indicate by arrows or brackets precisely the model and accessories submitted on.

D. Substitutions
1. Requests for substitutions shall conform to the general requirements and procedure outlined in Section 27 00 00

1.06 QUALITY ASSURANCE

A. Comply with Quality Assurance requirements of Section 27 00 00

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with Delivery, Storage and Handling requirements of Section 27 00 00

1.08 WARRANTY

A. Match warranty of Section 27 11 00

PART 2 - PRODUCTS

2.01 BONDING CONDUCTORS

A. TBC
1. Conductor: #6 AWG (up to 25 feet) stranded copper.
2. Insulation: Low-smoke, green in color. The following shall be printed on the conductor's jacket: insulation grade, conductor gauge, and applicable UL jacket listings
3. Type THHN, or approved similar

B. Bonding Straps for Cable Basket, Cable Runway, and/or Cable Tray
1. Conductor: Flexible braided straps with factory terminated connectors
2. Manufacturer, or equal:
   a. Chatsworth Products Inc #12061-001
   b. Hoffman #LGK

2.02 CONNECTORS

A. General: Connectors shall be UL listed

B. TBC-To-TGB/TMGB Connection
1. Lug, one-hole standard barrel compression lug.
2. Manufacturer: Panduit, or equal:
   a. #LCD6-14A-L; two hole (1/4" dia. x 5/8" on center) standard barrel lug for #6 AWG conductor

C. TBC-To-Runway Connection
1. Lug, two-hole single barrel screw termination lug.
2. Manufacturer: Panduit, or equal:
   a. #HL4-2-X; one hole (¼") 'premium' single barrel screw lug for #6 AWG

D. TBC-To-Equipment Rack Connection
1. Lug, one-hole standard barrel compression lug.
2. Manufacturer: Panduit, or equal:
   a. #LCA6-14-L; one hole (¼") standard barrel compression lug for #6 AWG

E. TBC "C" Tap
1. C-type copper thick wall compression tap, for making copper-to-copper connection
2. Manufacturer: Panduit, or equal:
   a. #CTAPG4-6-L; C-type compression tap

2.03 MISCELLANEOUS

A. Wire Clamp
1. Material: nylon, UV stabilized
2. Color: black

3. Size: 0.25" holding diameter for 6 AWG; or size as required based on conductor size.
4. Manufacturer, or equal: Richco Inc. #N4B-BLK; clamp for 6 AWG.

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with the Execution requirements of Section 27 00 00.

3.02 EXAMINATION

A. Examine existing Telecommunications Grounding Backbone system prior to the start of work within this section. The Telecommunications Contractor is solely responsible to ensure work proposed within this section is fully compatible, in the opinion of the Engineer, with the existing Telecommunications Grounding Backbone system.

3.03 INSTALLATION

A. Provide TBC and appropriate grounding hardware from telecommunication conduit, cable tray, cable runway, equipment racks, and other metallic telecommunication infrastructure components to the nearest TMGB/TGB as shown on Drawings.

B. Telecommunication Bonding Conductors
1. Refer to Drawings for TBC sizing. If not shown, size TBCs as the greater of 6 AWG or based on length of run using 1000CM/linear foot.
2. Install TBCs in a manner that will protect them from physical and mechanical damage.
3. Routing:
   a. Route TBCs in the shortest possible path, using right-angles for turns and routed parallel to building lines.
   b. Utilize a minimum 1-foot bend radius.
4. At TMGB/TGBs:
   a. Thoroughly clean non electrotin-plated busbar prior to fastening the conductors, bolts, or connectors to the busbar.
   b. Attach lugs to busbar with appropriate size cadmium bronze bolt, flat washer and Belleville washer.
   c. Torque connections.

C. Rack Bay & Overhead Cable Support Bonding
1. Refer to Drawings for detailed diagrammatic requirements for rack bay bonding.
2. Rack Bay: Bond equipment racks, frames, frame bays, cabinets, server racks, and other similar support systems located within the same room or space as the TMGB/TGB to the busbar.
3. Overhead Cable Support:
   a. Bond overhead runway located within the same room or space as the TMGB/TGB to the busbar.
   b. Provide "grounding kit" (straps & connectors) to bond sections of cable runway for ground continuity. This requirement shall apply to sections of cable runway within a single communication room.

3.04 LABELING

A. General Requirements
   1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner's Representative before installation
   2. Permanently label TBCs. Affix label as close as practical to each end of the conductor.

B. Label Format
   1. Labels shall be permanent with machine-generated text; hand written labels will not be accepted.
   2. Labels on TBCs shall fully wrap around conductors with a self-laminating feature to provide permanent marking.

C. Identifier Assignment
   1. Separate label fields of the identifier with a hyphen.
   2. TBC:
      a. First field: "TBC" (the bonding conductor type).
      b. Second field: The room identity where TBC exists; for example: "B01-TDA".
      c. Third field: A unique sequential number; for example: "01", "02", etc.
      d. Example: "TBC–B01-TDA–01"

3.05 RECORDS

A. Communication Bonding System records shall conform to TIA/EIA-606-A Administration Standards. Each component shall have as a minimum, the information as outlined in Table 4 7-1 of TIA/EIA-606-A.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
~~MIER 12" x 12" Terminal Can, Moden, BW108BC~~	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
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1 – Manufacturer not approved.
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SECTION 27 05 28

TELECOMMUNICATIONS BUILDING PATHWAYS

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650-591-7118
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Telecommunications building pathways.

B. Related Sections
1. Comply with the Related Sections paragraph of Section 27 05 28
2. Section 27 15 13 – Telecommunications Horizontal Cabling
3. Section 27 13 10 – Telecommunications Backbone ISP Cabling
4. Section 27 13 14 – Telecommunications Backbone OSP Twisted Pair Cabling
5. Section 27 13 24 – Telecommunications Backbone OSP Fiber Optic Cabling
6. Division 26 – Basic Materials and Methods, Conduit, Cable Tray, Boxes

1.02 REFERENCES

A. Comply with the References requirements of Section 27 00 00.

B. In additional to those codes, standards, etc , list in Section 27 00 00, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
1. ASTM A 510 Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
2. ASTM B 633 Specifications for Electrodepositing Coatings of Zinc on Iron and Steel, Sections SC2 and SC3.
3. ASTM A 653 Specifications for Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process
4. ASTM A 591 Specifications for Electrodepositing Coatings of Zinc on steel wire or sheets.
5. ASTM A 123 Specifications for Zinc (Hot Galvanized) Coatings on Iron and Steel.

1.03 DEFINITIONS

A. Definitions as described in Section 27 00 00 shall apply to this section.

B. "Cable Hanger": A metal, most often steel, cable support device shaped (section view) similar to the letter J; alternately, a fabric strap. The device is available in different sizes supporting different quantities of cables, and is also available with different attachment hardware to be supported by different methods (e g., wire support, beam flange clip, etc.)

C. "J-Hook": Another name for cable hangers.

1.04 SYSTEM DESCRIPTION

A. Work Covered Under Other Sections: Conduit, pull boxes, device boxes.

B. Base Bid Work
1. The work under this section shall include the planning and coordination with General Contractor (and other trades) of telecommunications system building pathways, the furnishing of necessary materials, and the labor & associated services required to install pathways.

2 The Telecommunications Building Pathways consist of the following subsystems:
a ISP innerduct, from MDF to IDFs, as shown on Drawings
b Primary Pathways: Cable Basket, Cable Tray, Liner Ring Pathway, including supports
c Secondary Pathways: Cable Hangers, including supports
d Surface Raceway

1.05 SUBMITTALS

A General: Conform to Submittal requirements as described in Section 27 00 00.

B Quantity: Furnish quantities of each submittal as noted in Section 27 00 00.

C Submittal Requirements at Start Of Construction:
1 Product Data Submittal
2 Shop Drawings Submittal: Consisting of proposed changes to pathway route plans.

D Submittal Requirements at Close Out: As-Built Drawings Submittal (can be combined with shop drawings of Section 27 15 13).

E Substitutions: Requests for substitutions shall conform to the requirements and procedure in Section 27 00 00.

1.06 QUALITY ASSURANCE

A Comply with Quality Assurance requirements of Section 27 00 00.

B NFPA Compliance: Comply with NFPA 70B, "Recommended Practice for Electrical Equipment Maintenance" pertaining to cable tray series of specifications.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A Comply with Delivery, Storage and Handling requirements of Section 27 00 00.

1.08 WARRANTY

A Comply with Warranty requirements of Section 27 00 00.

PART 2 - PRODUCTS

2.01 INSIDE PLANT INNERDUCT, RISER RATED

A Application: Suitable for an indoor installation, typically within a riser system or backbone conduit, for the support of telecommunications fiber optic cables.

B Description: Designed and manufactured as a continuously extruded corrugated pipe.

C Material: Fabricated from Capron resin, or equivalent.

D Manufacturers, or equal:
1. Carlon "Riser Guard" series innerduct
2. Endot "Endocor/RI" series innerduct
3. Pyramid "Fire Flex Riser Duct" series innerduct

2.02 INSIDE PLANT INNERDUCT, PLENUM RATED

A. Application: Suitable for an indoor installation, typically within a riser system or backbone conduit, and within plenum spaces, such as above ceiling or within an access floor, for the support of telecommunications fiber optic cables.

B. Description: Designed and manufactured as a continuously extruded corrugated pipe.

C. Material: Fabricated from PVDF resin, or equivalent.

D. Manufacturers, or equal:
1 Carlon "Plenum Guard" series innerduct
2 Endot "Endocor/PL" series innerduct
3 Pyramid "Fire Flex Plenum Duct" series innerduct

2.03 CABLE BASKET

A. Application: Suitable for indoor installation to support, store, and manage telecommunications cables, either overhead or mounted vertically on a wall.

B. Description: Cable basket shall be made of high strength steel wires and formed into a mesh pattern with intersecting wires welded together. Wire ends along sides (flanges) shall be rounded during manufacturing for safety of cables and installers. Straight section longitudinal wires shall be straight with no bends.

C. Materials and Finishes: Material and finish specifications for each wire basket type pathway are as follows:
1. Yellow Zinc Dichromate: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510 and shall be electro-plated yellow zinc dichromate in accordance with ASTM B633 SC2.
2 Paint: Straight sections shall be painted flat black over Yellow Zinc Dichromate.
3 Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 Stainless Steel.

D. Refer to Drawings for sizes.

E. Manufacturers, or equal:
1. B-Line WB series
2 Cablofil EZ-Tray series
3. GS Metals Flextray series
4. Chalfant Wire Mesh series

2.04 CABLE HANGERS

A. Application: Suitable for indoor installation within ceiling space for the support of telecommunications cables.

B. Listings: UL 2043, for use in air handling spaces.

C. Manufacturers (or variation per installation method), or equal:
1 B-Line #BCH12-W2; hanger for up to 16 cables
2 B-Line #BCH21-W2; hanger for up to 50 cables
3 B-Line #BCH32-W2; hanger for up to 80 cables
4. Erico #CAT12; hanger for up to 16 cables
5. Erico #CAT2; hanger for up to 50 cables
6 Erico #CAT32; hanger for up to 80 cables

7. Panduit #JMJH2-X20; hanger for up to 30 cables
8. Panduit #JMJH2W-X20; hanger for up to 30 cables, wall-mount type

2.05 DROP WIRE

A. Application: Suitable for indoor installation within ceiling space into structure above (e.g., slab and/or deck) for the support of telecommunications support devices.

B. Listings: UL 2043, for use in air handling spaces.

C. Assembly shall be equipped with ceiling clip, pre-mounted fastening pin, plastic washer, and pre-tied wire.
1. Fastening pin shall be 7/8"
2. Wire shall be 12 gauge

D. Manufacturer, or equal: Hilti #CC27 X-AL-H22P8T xx ft PT; drop wire assembly, xx foot wire – where "xx" is the length.

2.06 LINEAR RING SYSTEM ("SNAKE TRAY SERIES 201")

A. Application: Suitable for indoor installation within ceiling space for the support of telecommunications cables.

B. Description: Designed and manufactured as sections from a single wire spine and multiple support rings. The sections shall be hand-bendable in any direction along any plane, and shall not require tools, cutting, clipping or modifications to the structure of the tray to create the bend. The system shall allow cables to enter or exit in any direction at any point along the length of the sections, while also providing for the addition or removal of cables without modification or manipulation of the system, including hanging hardware.

C. Material: Wire, both spine and rings, shall be cold rolled steel in accordance with ASTM A510 and zinc plated in accordance with ASTM B633 SC2.

D. Finish: Yellow Zinc Dichromate plated in accordance with ASTM A633 type II SC2.

E. Accessories
1. Accessories include, but are not limited to, threaded rod, coupling adapters, tray connectors, mounting brackets, turnout components and other necessary installation accessories.
2. Accessories shall be made from high strength steel wires and/or sheet steel formed, welded and plated as required as per applicable ASTM standards.

F. Manufacturer: Cable Management Solutions
1. #CM-201-3-8; Snake Tray Series 201, 3"D x 3"W ring size
2. #CM-201-425-8; Snake Tray Series 201, 4.25"D x 4.25"W ring size
3. #CM-201-6-8; Snake Tray Series 201, 4"D x 6"W ring size
4. #CM-201-425D-8; Snake Tray Series 201, 4.25"D x 4.25"W two sets of rings
5. #CB-10; tray connector
6. #WBN-201; wall mount bracket
7. #CBN-201; cabinet-top mount bracket
8. #TO-101; cable drop out

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with the Execution requirements of Section 27 00 00

3.02 EXAMINATION

A. Examine areas to receive overhead hanger/support system prior to the start of work within this section. Notify the General Contractor of conditions that would adversely affect the installation or subsequent utilization of the system. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Installer is responsible for the integrity of the structures to which the system is attached, including their capability of safely accepting the loads imposed as evaluated by a qualified engineer.

3.03 INSTALLATION

A. Innerduct
1. Provide innerduct for routing of fiber optic cables. The innerduct shall be continuous from originating room to destination room. Truncate the innerduct in either room prior to slack storage.
2. When routing through corridors, place innerduct in the cable tray / primary pathway / dedicated supports. When routing vertically through telecommunications rooms, support innerduct on vertical cable support (such as runway) and fasten using cable ties. When routing horizontally through telecommunications rooms, support innerduct on overhead cable support and fasten using cable ties. Install cable ties at 24-inch intervals.
3. Label innerducts at both ends. The label shall be visible to a technician standing at-ease.

B. Cable Basket
1. Install cable basket pathway system in accordance with manufacturer's instructions and recognized industry practices, and ensure that the installed system complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
2. Install system at locations indicated on the drawings. Routes are diagrammatic in nature. Field verify route prior to installation.
3. Provide center-support hangers, trapeze hangers, or wall brackets to support/hang the cable basket pathway. If not shown in the Drawings, provide 3/8-inch diameter threaded rods for the trapeze hangers and/or center-support hangers. For wall brackets, use approved fasteners depending on the mounting substrate. Support separation shall conform to applicable codes.
4. Splice straight sections using hardware specifically designed for the purpose with serrated flange locknuts.

C. Cable Hangers
1. Install hangers in accordance with recognized industry practices, to ensure that the installed system complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.

2. Provide dedicated supports at sixty inches (60") separation, maximum, per a given route. Supports shall consist of #12 wire or ¼" threaded rod. Suspend wire or rod using components appropriate for the structure – e.g., powder-actuated clip fastener for wire, beam flange clip or angled flange clip for either wire or rod, or an embedded anchor for the threaded rod. Do not share support (wire/rod) with other trades. Do not support the hanger on ceiling grid support wires. Do not support the hanger from ductwork, piping, or other equipment hangers.
3. Install hangers six inches (6"), minimum, from light fixtures or other EMI source. Install hangers between six inches (6") and twelve inches (12") above ceiling grid.

D. Linear Ring Pathway System
1. Install linear ring pathway system in accordance with manufacturer's instructions and recognized industry practices, and ensure that the installed system complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
2. Install system at locations indicated on the drawings. Routes are diagrammatic in nature. Field verify route prior to installation.
3. Provide dedicated supports for system at a maximum forty-eight inch (48") on center, per a given route. Supports shall consist of 3/8" (maximum size) threaded rod with appropriate hardware (nuts, washers, etc.). Do not share threaded rod with other trades.
4. Install system a minimum of six inches (6") from light fixtures, or other EMI sources. Install system between six inches (6") and twelve inches (12") above ceiling grid.
5. Provide materials necessary to properly support system from existing building construction per manufacturer's instructions, and meeting or exceeding recognized industry practices, and as appropriate for this project. Do not support from ductwork, piping, or other equipment hangers.
6. Splice system sections using UL classified connector bolt, supplied by the same manufacturer.
7. Ground system per NEC 70 Article 250. Provide approved connection bolt to join system sections such that the spine of the system is considered a bonding jumper. Properly bond system to approved ground, as per NEC Article 250. Provide external grounding strap at expansion joints, sleeves, crossovers, and at other locations where system continuity is interrupted.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

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Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

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			1	2	3	
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Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

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AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

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SECTION 27 08 00

TELECOMMUNICATION TESTING

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL #30

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Section Includes: Testing of Telecommunications Backbone and Horizontal Cabling subsystems

B. Related Sections
1. Consult all other Sections and Divisions, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to completely test a complete and operable system.
2. Section 27 00 00 – Basic Telecommunications Requirements
3. Section 27 15 13 - Telecommunications Horizontal Cabling
4. Section 27 13 10 – Telecommunications Backbone ISP Cabling
5. Section 27 13 14 – Telecommunications Backbone OSP Twisted Pair Cabling
6. Section 27 13 24 – Telecommunications Backbone OSP Fiber Optic Cabling

C. Products Furnished and Installed Under Other Sections: Telecommunications Cabling.

1.02 REFERENCES

A. Comply with Section 27 00 00 References requirements.

B. Additional references to those listed in Section 27 00 00.
1. TIA/EIA-526-14 ("OFSTP-14") Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant.
2. TIA/EIA-526-7 ("OFSTP-7") Measurement of Optical Power Loss of Installed Singlemode Fiber Cable Plant
3. TIA/EIA-455-171 Attenuation By Substitution Measurement – For Short-Length Multimode Graded-Index And Single-Mode Optical Fiber Cable Assemblies (a k a., FOTP-171)

1.03 DEFINITIONS

A. Refer to Definitions of Sections 27 00 00, 27 15 13, 27 13 10, 27 13 14, and 27 13 24

B. In addition, the following list of terms as used in this specification shall be defined as follows:
1. "Adapter" (associated with fiber connectivity): Shall mean a connecting device joining 2 fiber connectors, either like or unlike
2. "Channel": Shall mean a testing configuration which includes the Permanent Link and the line cord (at the workstation), the equipment cord, and, if a full crossconnection is implemented, a patch cord and the crossconnect termination/connecting apparatus.
3. "Connect": Shall mean install all required patch cords, equipment cords, cross-connect wire, etc to complete an electrical or optical circuit
4. "Cord": Shall mean a length of cordage having connectors at each end. The term "Cord" shall be synonymous with the term "Jumper". The cord may be:
   a. Unshielded twisted pair.
   b. Fiber (multimode or singlemode), jacketed & buffered
5. "Launch Cord": Shall mean the cord certified for use in fiber optic characterization testing, as described in this section.

6. "OTDR": Shall mean Optical Time Domain Reflectometer.
7. "Passive Link Segment": Shall mean the cable, connectors, couplings, and splices between two fiber optic termination units.
8. "Permanent Link": Shall mean the 'permanent' portion of the Horizontal cabling to each outlet with the test cords de-embedded from the measurements; this includes cable, consolidation point (if used), termination/connecting apparatus in the IDF and the connector at the outlet.
9. "System Cord": Shall mean the cord used in the operating electrical or optical circuit.
10. "Test Cord": Shall mean the cord certified for use in testing, as described in this section.

1.04 SYSTEM DESCRIPTION

A. Work Provided Under Other Sections
1. Refer to Section 27 15 13 for a more complete System Description.
2. Backbone Cabling: The Backbone Cabling includes twisted pair and fiber cabling.
3. Horizontal Cabling: The Horizontal Cabling, in general, consists of multiple 4-pair Category 6 UTP cables to each outlet. Refer to the Drawings for specific requirements.

B. Base Bid Work
1. Testing of a completed Telecommunications Cabling System, including:
   a. Procedures Submittals
   b. Equipment Submittals.
2. Testing Requirements:
   a. Fiber optic passive link segment(s):

Table 270800-1.1: Tests For Fiber Optic Passive Link Segments

Subsystem	Type	Test	Direction	Wavelength
Backbone	Multimode	Characterization	Both	850nm and 1300nm
Backbone	Singlemode	Characterization	Both	1310nm and 1550nm
Backbone	Multimode	Passive Link Ins. Loss	One	850nm and 1300nm
Backbone	Singlemode	Passive Link Ins. Loss	One	1310nm and 1550nm

   b. Multipair/UTP cabling:

Table 270800-1.2: Tests For Multipair/UTP Cabling

Subsystem	Type	Test	Configuration	Notes
Backbone	Riser	Wire map & length	-	-
Horizontal	CAT6	Category 6	Permanent Link	Per TIA/EIA-568-B.2-1

   c. Record Documents, including test reports.

1.05 SUBMITTALS

A. Refer to Submittals of to Section 27 00 00 for procedural, quantity, and format requirements.

B. Preconstruction Submittal Requirements:
1. Testing Procedures Submittal, describing step-by-step procedures used by the field technicians.
2. Product Submittal, including cut sheets of testing equipment to be used (note all software/firmware versions as applicable) and certificate of last calibration.
3. Schedule Submittal, consisting of proposed schedule of work. This schedule may be combined with the schedule developed for 27 00 00 series Sections.

C. Submittal Requirements at Closeout: Record Documents.

D. Submittal Description: Record Documents
1. Test Reports: Record documents submittal shall include test reports showing the

following information:
a. A title page which includes:
1) Client Name
2) Project Name
3) Project Address
4) General Contractor name / Telecommunications Installer name
5) Date of Submittal
b. Individual tabs which break down the test results by building, and then by telecommunications room.
c. All Backbone Fiber Optic "Post Installation" Passive Link Attenuation test results (utilize the forms provided in Part 4 of this specification for documentation of test results if the tester used does not have data storage capabilities) and Fiber Optic OTDR test results.
d. All Backbone UTP test results.
e. All Horizontal cable test results, per cable
2. Furnish all test results on CD-ROM in their native data format and an exported Microsoft Excel compatible format.
a. Include all necessary software to allow viewing and printing of individual test results.
b. CD shall be labeled with the project name, contractor name, and date of submission.

1.06 QUALITY ASSURANCE

A. Comply with the Quality Assurance requirements of Section 27 00 00

1.07 WARRANTY

A. Warrant the validity of the test results. Under no circumstances shall any cable's test results be substituted for another's. If a single instance of falsification is confirmed, the Contractor shall be liable for a complete retest of the cabling system at no additional cost to the Owner. This includes the retaining the services of a neutral party to observe all retesting.

PART 2 - PRODUCTS

2.01 GENERAL

A. The manufacturer may change the product numbers listed in this Section at any time, as well as software and firmware versions. In the event this Section contains an invalid product number or conflicts with the written description, or specifies an out-of-date software and/or firmware version, notify the Engineer in writing prior to issuing submittals or field testing.

2.02 FIBER OPTIC LIGHT SOURCE

A. All connection interfaces shall be factory installed. No field-configurable adapters will be allowed at the light source

B. Wavelengths output shall be continuous.

C. LED-based light source for multimode fiber testing shall have a:
1. Center wavelength of 850nm ± 30nm and 1300n ± 20nm.
2. Spectral width (FWHM) 30nm - 60nm at 850nm and 100nm - 140nm at 1300nm
3. Minimum output power level of ≥14dBm

D. VCSEL-based light source for multimode fiber testing shall have a:
   1. Center wavelength of 850nm ± 30nm and 1300n ± 20nm.
   2. Spectral width (FWHM) 30nm - 60nm at 850nm and 100nm - 140nm at 1300nm.
   3. Minimum output power level of ≥14dBm.

E. LASER-based light source for singlemode fiber testing shall have a:
   1. Center wavelength of 1310n ± 20nm and 1550n ± 20nm.
   2. Spectral width (FWHM) of ≤5nm at 1310nm and ≤5nm at 1550nm.
   3. Minimum output power level of ≥3dBm.

F. The light sources may contain internal lenses, pigtails, and modal conditioners, provided they meet the launch conditions as described in "Post-Installation" Passive Link Attenuation Testing Procedures (ref. PART 3 - EXECUTION).

G. Equipment shall be factory-calibrated within 12 months of testing date.

H. Equipment:
   1. Agilent Technologies' WireScope 350 test set
      a. #450-1070 Fiber SmartProbe testing adapter, multimode 850nm.
      b. #450-1080 Fiber SmartProbe testing adapter, multimode 1300nm.
      c. #450-2020 Fiber SmartProbe testing adapter, singlemode 1300nm.
      d. ScopeData management software (version 5.20 or higher).
   2. Corning Cable Systems
      a. #OS-301 light source
      b. #OS-302 light source
      c. #OS-100D light source
   3. Fluke Networks' DSP-4300 test set
      a. #DSP-4300; "CableAnalyzer" test kit, loaded with firmware version 3.0.4.
      b. #DSP-FTA420S; 'Multimode' fiber testing adapter, LED-based (850nm, 1300nm).
      c. #DSP-FTA430S; 'Singlemode' fiber testing adapter, LASER-based (1310nm, 1550nm).
      d. #DSP-FTA440S; 'Gigabit' fiber testing adapter, VCSEL-based (multimode @ 850nm and singlemode @ 1310nm).
      e. LinkWare; "LinkWare" management software (latest version).
   4. Laser Precision #5150 test set

2.03 FIBER OPTIC POWER METER

A. The power meter for both multimode and singlemode testing must be capable of measuring relative or absolute power, and must be independent of modal distributions.

B. All power meters used must be calibrated and traceable to the National Bureau of Standards.

C. All power meters used shall have the following performance:
   1. Dynamic range of 0dBm to -40dBm, minimum.
   2. Accuracy of ±0.2dB.

D. Equipment shall be factory-calibrated within 12 months of testing date.

E. Equipment:
   1. Agilent Technologies' WireScope 350 test set
      a. #450-1070 Fiber SmartProbe testing adapter, multimode 850nm.
      b. #450-1080 Fiber SmartProbe testing adapter, multimode 1300nm.
      c. #450-2020 Fiber SmartProbe testing adapter, singlemode 1310nm.
      d. ScopeData management software (version 5.20).

2 Corning Cable Systems,
a. #OTS-210 power meter, with data storage capacity
b. #OTS-310 power meter, with data storage capacity
3 Laser Precision #5025 test set

2.04 FIBER OPTIC MANDREL

A For jacketed (3.0 mm) fiber, mandrel diameter shall be 22 mm for 50/125 um fiber. For unjacketed buffered (0.9 mm) fiber, mandrel diameter shall be 25 mm for 50/125 um fiber

B Equipment: Fluke Networks
1. #NF-MANDREL-50; red mandrel for jacketed 50/125 um fiber

2.05 FIBER OPTIC OTDR

A. Multimode Source Module:

Wavelength	Dynamic Range	Attenuation Deadzone	Reflective Deadzone	Loss Resolution	Distance Accuracy
850nm	24dB	6.5mt	3.0mt	0.001dB	0.1mt
1300nm	27dB	7.0mt	3.0mt	0.001dB	0.1mt

B. Singlemode Source Module:

Wavelength	Dynamic Range	Attenuation Deadzone	Reflective Deadzone	Loss Resolution	Distance Accuracy
1310nm	40dB	6.0mt	3.5mt	0.001dB	0.1mt
1550nm	28dB	12.0mt	3.5mt	0.001dB	0.1mt

C. Equipment, including main unit and source modules, shall be factory-calibrated within 12 months of testing date.

D Equipment:
1. Agilent Technologies #8147, for multimode & singlemode systems
2. Corning Cable Systems,
a. 2001HR, for multimode & singlemode systems
b. 340 OTDR Plus Multitester II
c MiniOTDR+, for multimode & singlemode systems
3. Tektronix,
a. TFP2A FiberMaster
b. TFS3031 TekRanger2

2.06 FIBER OPTIC TEST CORDS

A. Multimode Fiber Optic Test Cord
1. The fiber of the multimode test cord(s) shall have the core diameter and numerical aperture nominally equal to that of the multimode fiber optic passive link.
2. The length of test cords used for insertion loss testing shall be between 1m and 5m
3. The connectors of the test cords shall be compatible with the connector types of the light source and the power meter.
a The connector of the test cords shall be that which the light source accepts
4 The connectors shall exhibit <= 0.5dB loss per connection @ both 850nm and 1300nm, as measured per FOTP-171 D2

B Singlemode Fiber Optic Test Cord
1 The fiber of the singlemode test cord(s) shall have the mode field diameter

nominally equal to that of the singlemode fiber optic passive link.

2. The length of test cords used for insertion loss testing shall be between 1m and 5m
3. The connectors of the test cords shall be compatible with the connector types of the light source and the power meter.
   a. The connector of the test cords shall be that which the light source accepts.
4. The connectors shall exhibit <= 0.5dB loss per connection @ both 1300nm and 1550nm, as measured per FOTP-171 D3
5. All singlemode connectors shall inhibit Fresnel reflections (i.e., have a "PC" finish).

2.07 CATEGORY 6 HORIZONTAL CABLE TESTER

A. Equipment shall meet TIA/EIA-568B.2 Addendum 1 requirements for Level III accuracy.

B. Test Standards (minimum): TIA Category 6 (per TIA/EIA-568B.2 Addendum 1); ISO/IEC 11801 Class C and D; ISO/IEC 11801-2000 Class C and D, 1000Base-T, 100Base-TX; IEEE 802.3 10Base-T; ANSI TP-PMD; IEEE 802.5

C. Areas of Test Measurement (minimum): Wire Map; Length; Insertion Loss; Near End Crosstalk (NEXT) loss, at both master unit and remote unit; Power Sum NEXT (PSNEXT) loss, at both master unit and remote unit; Equal Level Far End Crosstalk (ELFEXT), at both master unit and remote unit; Power Sum ELFEXT, at both master unit and remote unit; Return Loss (RL), at both master unit and remote unit; Propagation Delay and Delay Skew; Attenuation-to-Crosstalk Ratio (ACR), at both master unit and remote unit; Power Sum ACR (PSACR), at both master unit and remote unit; Characteristic Impedance; DC Loop Resistance

D. Equipment: Agilent Technologies
   1. #N2600A-100; "WireScope 350" test kit (main unit, remote unit, CAT6 permanent link probe, CAT6 channel probe, accessories), loaded with firmware version 3.1.1.
   2. "ScopeData Pro" reporting and documentation software latest version.

E. Equipment: Fluke Networks
   1. #DTX-1200 or #DTX-1800; "DTX CableAnalyzer" test kit (main unit, remote unit, CAT6 permanent link adapters, CAT6 channel adapters, accessories), loaded with latest version of firmware
   2. #DSP-4300; "CableAnalyzer" test kit (main unit, remote unit, CAT6 permanent link adapters, CAT6 channel adapters, accessories), loaded with firmware version 3.0.4.
   3. "LinkWare" reporting and documentation software (version 1.1, or higher)

2.08 BACKBONE UTP CABLING TESTERS

A. Wire Map (continuity, opens, shorts, crossed pairs, split pairs) tester, or equal:
   1. Siemon #MT-5000 test unit, with 25-pair adapter.

B. Length tester, or equal:
   1. Harris #TS-90 test unit

PART 3 - EXECUTION

3.01 SCHEDULING

A. Prepare a schedule for testing activities based on the schedule developed in Sections 27 15 13, 27 13 10, 27 13 14, and 27 13 24. Update testing schedule when changes in the cabling construction schedule occur.

B. Schedule both the Engineer of Record and a representative of the test equipment manufacturer for a demonstration of testing methods. Execute a demonstration of testing methods with aforementioned parties prior to 'production' testing activities. Test reports and acceptance testing will not be accepted without proof of methods demonstration.

3.02 FIELD QUALITY CONTROL

A. Complete testing as delineated below prior to system acceptance.

B. Permanently record all test results and presented in a format acceptable to the Owner or Engineer before system acceptance.

C. Remove and replace with new, at no cost to the Owner, any cables or conductors (copper or glass) failing to meet the indicated standards. The Owner will not accept the installation until testing has indicated a 100% availability of all cables and conductors or the Owner has approved any deviation from this requirement.

D. Calibrate test sets and associated equipment per the manufacturers printed instructions at the beginning of each day's testing and after each battery charge. Fully charge the test sets prior to each day's testing to ensure proper operation.

3.03 "PRE-INSTALLATION" CONTINUITY TESTING PROCEDURES

A. Ensure fiber continuity of all fiber strands of all cables prior to installation.

B. Reports from "pre-installation" continuity testing are not required to be submitted at project close out.

3.04 BACKBONE FIBER OPTIC CHARACTERIZATION TESTING

A. Test fiber optic passive links per "Base Bid Requirements" in Part 1 of this Section.

B. Precautions
   1. Adhere to the equipment manufacturer's instructions during testing activities.
   2. Prior to any testing activity or any measurements taken, complete the following activities:
      a. Ensure the test equipment is at room temperature – approximately 70 degrees F (e.g., if necessary, bring the test equipment in from outdoors and let it set for however long it takes to bring the test equipment to reach room temp).
      b. Clean all launch cords and system cords (if applicable) connectors and all adapters with a lint-free wipe and 90% (or higher) isopropyl alcohol.
   3. Do not power off OTDR's light source during testing activity.
   4. Do not remove launch cord from the OTDR's light source at any time (unless the testing is complete or the equipment is being put away for the evening, or during trouble shooting).
   5. Do not bend the launch cord smaller than 20 times the cord diameter during testing activities (this may induce loss into the cord reducing the accuracy of the measurement).
   6. Fully charge power source before each day's testing activity, if applicable.

C. "Post-Installation" Characterization Testing Procedures
   1. Equipment settings / measurement parameters:

a Index of Refraction: match cable-under-test fiber parameters; default settings as follows:

Multimode	Corning 50/125 Infinicor	1.483 @ 850nm	1.483 @ 1300nm
	SYSTIMAX 50/125	1.483 @ 850nm	1.478 @ 1300nm
Singlemode	SYSTIMAX	1.466 @ 1310nm	1.467 @ 1550nm
	Corning SMF-28	1.4675 @ 1310nm	1.4681 @ 1550nm

b Pulse Width: multimode: 20ns; singlemode: 50 ns.

Multimode 50/125	4 ns for cable lengths up to 500 meters 20 ns for cable lengths from 250 meters to 2,000 meters
Singlemode	10 ns for cable lengths up to 2,000 meters 50 ns for cable lengths from 2,000 meters to 20 kilometers

c Backscatter:

6) Multimode: -67dB @ 850nm, -74dB @ 1300nm;

7) Singlemode: -74dB @ 1310nm and 1550nm

d Event Threshold: 0.05dB for both multimode and singlemode

e Reflection Threshold:

8) Multimode: -45dB

9) Singlemode: -60dB

f Fiber Break/End-Of-Fiber: 3dB for both multimode and singlemode

2. Waveform: The waveform shall be real-time/normal density.

3. Obtain measurements using a 'launch' cord connected to the test instrument and the cable-under-test.

a The fiber of the launch cord shall match the fiber of the cable-under-test in physical and performance parameters (such as type, core/cladding size, index of refraction, refractive profile). The fiber of the launch cord should match the fiber of the cable-under-test in manufacturer and product.

b The length of the launch cord shall be between 25 meters and 100 meters.

4. Review the results of each test and bring to the attention of the Engineer all fibers that do not meet the manufacturer's allowed loss for splices and connectors, or fibers that do not meet the length of the overall cable length.

D. Record Documents:

1. Test reports shall match the cable and fiber IDs as labeled in the field – i.e., the ID on the cable label/fiber port label shall be the same as what is associated with the electronic and printed test record.

2. The units for distance measurements (i.e., the "X" axis of the graph) shown on the print of the test measurements shall be feet.

3. For the traces, the x- and y-axis scales of a given cabling link shall be identical. Preferably, all reports shall be printed with identical scales on both x- and y-axis.

4. The launch cord must be shown in the trace of the printed test report.

5. Measurements shall carry a precision through one significant decimal place (minimum).

6. Each test report shall contain the following information (not necessarily in this order):

a. Project name,
b. General Contractor name / Telecommunications Installer name
c. Cable identifier, fiber number, and fiber type (e.g., "multimode")
d. Measurement direction,
e. Date measurement was obtained,
f. Operator (name an company),
g. Test equipment model and serial number(s),
h. Set up parameters (minimum - pulse width, refractive index, event threshold)
i. Wavelength,
j. OTDR trace,

k. Length of fiber,
l Overall link loss

7 For each passive cabling link, include either a schematic graphic or narrative accurately describing the test set up as a preface to the test reports In other words, show the launch cord with length, expected events with distances, etc. This information will eliminate many questions the Engineer will have while reviewing the reports

3.05 BACKBONE FIBER OPTIC PASSIVE LINK INSERTION LOSS TESTING

A Test fiber optic passive links per "Base Bid Requirements" in Part 1 of this Section

B Launch Conditions:
1. For passive link insertion loss testing for multimode fibers, the modal launch condition from the light source shall be characterized as Category 1 per OFSTP-14.
2 For passive link insertion loss testing of singlemode fibers:
a. Use the launch conditions, as described in FOTP-78.
b. Employ a method to remove high-order propagating modes, as described in FOTP-77

C. Test Methods:
1. The passive link insertion loss testing of multimode fibers shall be performed according to "Test Method B: One Jumper Reference", per OFSTP-14, for 'permanent' links, and shall be performed according to "Test Method C: Three Jumper Reference", per OFSTP-14, for 'channel' links
2. The passive link insertion loss testing of singlemode fibers shall be performed according to "Test Method A.1: One Jumper Measurement", per OFSTP-7.

D Precautions
1 Adhere to the equipment manufacturer's instructions during testing activities.
2. Prior to any testing activity or any measurements taken:
a. Ensure the test equipment is at room temperature – approximately 70 degrees F (e.g., if necessary, bring the test equipment in from outdoors and let it set for about 15 minutes or for however long it takes to bring the test equipment to reach room temp).
b Power on the light source and power meter for at least 5 minutes.
c Clean all test cords & system cords (if applicable) connectors and all adapters with a lint-free wipe and 90% (or higher) isopropyl alcohol.
3 Do not power off light source or the power meter during testing activity.
4. Do not remove Test Cord #1 from the light source at any time (unless the testing is complete or the equipment is being put away for the evening)
5 Do not bend the test cords smaller than 20 times the cord diameter (this may induce loss into the cord reducing the accuracy of the measurement)
6. Fully charge power sources before each day's testing activity

E Passive Link Insertion Loss Testing Procedures
1 Test Equipment Set Up
a Follow the test equipment manufacturer's initial adjustment and set up instructions.
b. If the power meter has a Relative Power Measurement Mode, select this mode
c. If the meter can display power levels in dBm, select this unit of measurement to simplify subsequent calculations
d Set the light source and power meter to the same wavelength.
2. Test Cord Performance Verification
a Connect Test Cord #1 between the light source and the power meter

b. The value displayed on the power meter is the reference power (P_{ref}) measurement. If the power meter has a relative power measurement mode, enter this reference power measurement (P_{ref}) value into the meter. If it does not, hand-write P_{ref} onto the record documents for future reference

c. Disconnect Test Cord #1 from the power meter. Do not disconnect Test Cord #1 from the light source.

d. Connect the 'open' end of Test Cord #1 to an adapter (of matching connector type). Connect one end of Test Cord #2 to the adapter and the other end of Test Cord #2 to the power meter

e. The value displayed on the power meter is the power measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the test cord #2 connection attenuation. If the meter does not have a Relative Power Measurement Mode, perform the following calculation to determine the connection attenuation:

10) If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc): Connection Attenuation (dB) = $\left| P_{sum} - P_{ref} \right|$

11) If P_{sum} and P_{ref} are in watts: Connection Attenuation (dB) = $\left| 10 \times \log_{10} [P_{sum}/P_{ref}] \right|$

12) The measured connection attenuation must be less than or equal to the value found in Table 3 (below).

f. Flip the ends of Test Cord #2 so that the end connected to the power meter is now connected to the adapter, and the end connected to the adapter is now connected to the power meter.

g. The meter reading is the reversed Power Measurement (P_{sum}). Perform the proper calculations if not using Relative Power Measurement Mode.

h. Verify that both connection attenuation measurements are less than or equal to the value found in the following table:

	ST or SC Cord	Mini-Connector Cord
Multimode (50/125)	0.50 dB Max	0.20 dB Max
Singlemode	0.55 dB Max	0.30 dB Max

i. If both measurements are found to be less than or equal to the values found in Table 1, test cord #1 is acceptable for testing purposes. Unacceptable attenuation measurements may be attributable to test cord # or test cord #2. Examine each cord with a portable microscope and clean, polish, or replace if necessary.

j. Repeat this test procedure from the beginning reversing the test cords in order to verify the performance of test cord #2.

3. Determine the Launch Category of the Light Source

a. The launch category of a light source can be determined by measuring its Coupled Power Ratio (CPR). The CPR is a measurement of the modal power distribution launched into a multimode fiber. A light source that launches a higher percentage of its power into the higher order modes of a multimode fiber produces a more over-filled condition and is classified as a lower Category than a light source that launches more of its power into just the lower order modes producing an under-filled condition. Under-filled conditions result in lower link attenuation, while over-filled conditions produce higher attenuation. Therefore, adjusting the acceptable link attenuation to compensate for a light source's launch characteristics increases the accuracy of the test procedure.

b. Provide two test cords, one multimode (Test Cord #1) and one singlemode (Test Cord #2). Both cords shall be directly terminated on connectors that are compatible with the light source and power meter.

13) The fiber of the multimode test cord shall have the core diameter and numerical aperture nominally equal to those of the permanent link.

14) The fiber of the singlemode test cord shall contain Class IVa singlemode fiber, with a mode field diameter of 5.0µm ±0.5µm for 850nm tests and 9.0µm ±1.0µm for 1300nm tests.

c. Connect test cord #1 between the light source and the power meter. Avoid placing bends in the cord that are less than 4 inches in diameter.

d. The meter reading is the Reference Power Measurement (P_{ref}). If the power meter has a Relative Power Measurement Mode, enter the Reference Power Measurement (P_{ref}) value into the meter. If it does not, hand-write P_{ref} for future reference.

e. Disconnect test cord #1 from the power meter. Do not disconnect test cord #1 from the light source.

f. Connect test cord #2 between the power meter and test cord #1, using an appropriate adapter between the test cords.

15) Test cord #2, the singlemode cord, shall include a high order mode filter. This can be accomplished by twice wrapping the cord around a 1.2" diameter (30-mm) mandrel.

g. The meter reading is the Power Measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the CPR. If the meter does not have a Relative Power Measurement Mode, perform the following calculation to determine the CPR:

16) If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc): CPR (dB) = $| P_{sum} - P_{ref} |$

17) If P_{sum} and P_{ref} are in watts: CPR (dB) = $| 10 \times \log_{10} [P_{sum}/P_{ref}] |$

Coupled Power Ratio (CPR) in dB, for 50/125µm Fiber:

	Cat-1 Overfilled	Cat-2	Cat-3	Cat-4	Cat-5 Underfilled
850nm source	20 – 24	16 – 19.9	11 – 15.9	7 – 10.9	0 – 5.9
1300nm source	16 – 21	12 – 15.9	8 – 11.9	4 – 7.9	0 – 3.9

4. Multimode Insertion Loss Measurement

a. After setting up the test equipment, verifying the performance of the test cords, and determining the light source's CPR, the insertion loss of the passive link segments can be measured.

b. Connect test cord #1 between the light source and the power meter.

c. The meter reading is the Reference Power Measurement (P_{ref}). If the power meter has a Relative Power Measurement Mode, enter the Reference Power Measurement (P_{ref}) value into the meter. If it does not, hand-write P_{ref} for future reference and to be included in the Record Documents.

d. Disconnect test cord #1 from the power meter. Do not disconnect test cord #1 from the light source.

e. Connect test cord #1 to the passive link segment 'input'.

f. At the opposite end of the passive link segment, connect test cord #2 to the link segment 'input' and the power meter.

g. The meter reading is the Power Measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the insertion loss. If the meter does not have a Relative Power Measurement Mode, perform the following calculation to determine the insertion loss:

18) If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc): Link Segment Attenuation (dB) = $| P_{sum} - P_{ref} |$

19) If P_{sum} and P_{ref} are in watts: Link Segment Attenuation (dB) = $| 10 \times \log_{10} [P_{sum}/P_{ref}] |$

h. Record P_{sum} for inclusion into the Record Documents. Refer to Records (ref. PART 3: EXECUTION) for all of the information to record.

5. Singlemode Insertion Loss Measurement

a. After setting up the test equipment and verifying the performance of the test cords, the insertion loss of the passive link segments can be measured.

b. Connect test cord #1 between the light source and the power meter
c. The meter reading is the Reference Power Measurement (P_{ref}). If the power meter has a Relative Power Measurement Mode, enter the Reference Power Measurement (P_{ref}) value into the meter. If it does not, hand-write P_{ref} for future reference and to be included in the Record Documents.
d. Disconnect test cord #1 from the power meter. Do not disconnect test cord #1 from the light source.
e. Connect test cord #1 to the passive link segment 'input'.
f. At the opposite end of the passive link segment, connect test cord #2 to the link segment 'input' and the power meter.
g. The meter reading is the Power Measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the insertion loss. If the meter does not have a Relative Power Measurement Mode, perform the following calculation to determine the insertion loss:

20) If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc): Link Segment Attenuation (dB) = $| P_{sum} - P_{ref} |$
21) If P_{sum} and P_{ref} are in watts: Link Segment Attenuation (dB) = $| 10 \times \log_{10} [P_{sum}/P_{ref}] |$
h. Record P_{sum} for inclusion into the Record Documents. Refer to Records (ref. PART 3: EXECUTION) for all of the information to record.

6. Acceptable Measurement Values
a. Any cabling links failing to meet the criteria described in this specification shall be removed and replaced, at no cost to the Owner, with cables that prove, in testing, to meet the minimum requirements.
b. The general insertion loss equation for any link segment is as follows:

22) Insertion loss = <cable loss> + <connection loss> + <splice loss> + <CPR adjustment>.
23) Note: A connection is defined as the joint made by two mating fibers terminated with rematerable connectors (e.g., ST, SC, etc).
c. 50/125µm Multimode Insertion Loss Coefficients
24) Cable Loss = Cable Length (km) x (3.0 dB/km @ 850-nm or 1.0B/km @ 1300-nm).
25) Connection Loss (ST or SC Connectors) = (Connections x 0.4 dB) + 0.42 dB.
26) Connection Loss (Other mini-connectors) = (Connections x 0.2 dB) + 0.24 dB
27) Splice Loss = Splices x (0.05 dB for fusion or 0.10 dB for mechanical).
28) CPR Adjustment = See following table:

	Cat-1	Cat-2	Cat-3	Cat-4	Cat-5
Links with ST or SC Connectors	+0.50	0.00	-0.25	-0.50	-0.75
Links with mini-connectors	+0.25	0.00	-0.10	-0.20	-0.30

d. Singlemode Insertion Loss Coefficients
29) Cable Loss = Cable Length (km) x (0.50 dB/km @ 1310-nm or 0.50 dB/km @ 1550-nm)
30) Connection Loss (ST or SC Connectors) = (Connections x 0.44 dB) + 0.42 dB
31) Connection Loss (Other mini-connectors) = (Connections x 0.24 dB) + 0.24 dB
32) Splice Loss = Splices x (0.07 dB for fusion or 0.15 dB for mechanical)
33) CPR Adjustment = Not applicable for singlemode.

F. Record Documents:
1. All cable and fiber IDs of the test reports shall match the IDs as labeled in the field – i.e., the ID on the cable label/fiber port label shall be the same as what is entered into the stored test result in the power meter.
2. Measurements shall carry a precision through one significant decimal place (minimum).
3. Each test report shall contain the following information (not necessarily in this order):
a. Project name and address,

b. General Contractor name / Telecommunications Installer name
c. Operator's name(s),
d. Date of measurement,
e. Test equipment - manufacturer, model, and serial number,
f. Cable identifier, fiber and fiber type,
g. Measurement direction,
h. Wavelength, and
i. Measured loss values

3.06 BACKBONE TWISTED PAIR CABLING TESTING REQUIREMENTS AND PROCEDURES

A. Testing Requirements
1. Test backbone multipair cabling per "Base Bid Requirements" in Part 1 of this Section
2. The installation will be accepted when testing has indicated a 100% availability of all terminated pairs or the Owner has approved any deviation from this requirement

B. Testing Procedures
1. Test wire map and continuity for all pairs.
2. Test length for 2% of pairs of each cable. None of the pairs tested for length shall be of the same 25-pair binder group.

C. Record Documents:
1. All cable and pair IDs of the test reports shall match the IDs as labeled in the field – i.e., the ID on the cable label/termination label shall be the same as what appears on the test reports.
2. Measurements shall carry a precision through no significant decimal place.
3. Each test report shall contain the following information (not necessarily in this order):
   a. Project name and address,
   b. General Contractor name / Telecommunications Installer name,
   c. Operator's name(s),
   d. Date of measurement,
   e. Test equipment - manufacturer, model, and serial number,
   f. Cable identifier and pair numbers,
   g. Overall test result, and
   h. Measured values of minimum requirements

3.07 HORIZONTAL CATEGORY 6 TESTING PROCEDURES

A. Precautions
1. Adhere to the equipment manufacturer's instructions during all testing.
2. Prior to any testing activity or any measurements taken, ensure the test equipment is at room temperature – approximately 70 degrees F (e.g., if necessary, bring the test equipment in from outdoors and let it set for about 15 minutes or for however long it takes to bring the test equipment to reach room temp)
3. Fully charge power sources before each day's testing activity

B. Test Equipment Set Up
1. Set up the tester to perform a full Category 6 test, as a Permanent Link configuration
2. If the tester has the capability, set the cable type as product specific setting. If not, set as generic Category 6
3. Set the tester to save the full test results (all test points, graphs, etc.)
4. Save the test results with the associated cable link identifier to match that as

specified in Section 27 15 13

5 Calibrate the test set per the manufacturers instructions

C Acceptable Test Result Measurements

1 Links which report a Fail, Fail* or Pass* for any of the individual tests shall result in an overall link Fail. All individual test results must result in a Pass to achieve an overall Pass.

2 Any reconfiguration of link components required as a result of a test Fail, must be re-tested for conformance

3. Any cabling links failing to meet the criteria described in this specification shall be removed and replaced, at no cost to the Owner, with cables that prove, in testing, to meet the minimum requirements.

4. Minimum measurement requirements:

Wire Map	All pairs of the cabling link shall be continuous and terminated correctly at both ends. No exceptions shall be accepted.
Length	The maximum acceptable electrical length measurements for any cabling link measured under a Permanent Link configuration shall be 94 meters, including test cords.
Insertion Loss	The acceptable insertion loss measurements for any Category 6 cabling link shall be no greater than that as listed in TIA/EIA-568B 2 Addendum 1.
Worst Pair-to-Pair Near End CrossTalk (NEXT) Loss	The acceptable worst pair-to-pair NEXT loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B 2 Addendum 1
Power Sum NEXT Loss	The acceptable power sum PS-NEXT loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
Worst Pair-to-Pair ELFEXT and FEXT Loss	The acceptable worst pair-to-pair ELFEXT and loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
Power Sum ELFEXT and FEXT Loss	The acceptable PS-ELFEXT and loss for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
Return Loss	The acceptable return loss measurements for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.
Propagation Delay and Delay Skew	The acceptable propagation delay and delay skew measurements for any Category 6 cable shall be no greater than that as listed in TIA/EIA-568B.2 Addendum 1.

D Record Documents: For each Horizontal Category 6 test measurement, record the following information:

1. Project name and address,
2. General Contractor name / Telecommunications Installer name,
3. Operator's name(s),
4. Date of measurement,
5. Ambient temperature,
6. Test equipment - manufacturer, model, and serial number,
7. Cable identifier,
8. Overall test result, and
9. Measured values of minimum requirements

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
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SECTION 27 11 00

TELECOMMUNICATIONS ROOMS

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7178
SUBMITTAL #30

PART 1 - GENERAL

1.01 Summary

A. Section Includes: Build out of telecommunications rooms and spaces.

B. Products Specified, Furnished, and Installed Under Another Section:
1 Electrical service (120V and 208V circuits and devices)
2 Conduit, device boxes, and sleeves

C. Products Furnished and Installed by the Owner:
1 Network switches, UPS systems, power strips, and telephone handsets

D. 24BRelated Divisions
1 Comply with the Related Sections paragraph of Section 27 00 00.
2 Consult other Divisions, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system
3 General and Supplementary Conditions
4 Drawings, general provisions of the Agreement, and Division 1 apply to this Section

1.02 REFERENCES

A. Comply with the References requirements of Section 27 00 00.

B. In additional to those codes, standards, etc , list in 27 00 00, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified: ANSI/EIA-310-D-1992 Racks, Panels And Associated Equipment

1.03 5BDEFINITIONS

A. Refer to the Definitions requirements of Section 27 00 00.

1.04 6BSYSTEM DESCRIPTION

A. Telecommunications Rooms house the following functions:
1 Data backbone crossconnect field (fiber terminations)
2 Voice backbone crossconnect field (UTP terminations)
3 Data system equipment (distributed switch)
4 Horizontal termination field – both voice and data – of cabling served from this room (refer to floor plans for area served)
5 Interconnection between the data system equipment and the horizontal termination field

B Base Bid Work
1 Telecommunications Room build out includes the following work:
a Preconstruction Submittals
b Plywood backboards
c Rack bays (equipment racks, vertical management sections, anchoring, and bracing).
d Cable, wire and patch cord management

e. Overhead cable support
f. Seismic bracing
g. Identification tags and labeling
h. Record Documents
i. Warranty

1.05 SUBMITTALS

A. Refer to Submittals of Section 27 00 00 for procedural, quantity, and format requirements.

B. Pre-Construction Submittal Requirement: Submit the following prior to the start of construction.
1. Product Data Submittal: Submit product data on products listed in this section and products not listed in this section to be installed related to this section.
2. Sample Submittal: Submit sample of equipment rack label.
3. Seismic Calculations: Rack anchorage into concrete flooring with overall rack bracing.
4. Schedule Submittal: Submit proposed schedule of work (this schedule may be combined with the schedule developed for the 27 00 00 series Sections).
5. Shop Drawings Submittal: Consisting of proposed changes to room plans.

C. Submittal Requirements at Closeout:
1. As-Built Drawings.
2. O & M Manuals.

1.06 QUALITY ASSURANCE

A. Refer to Quality Assurance requirements of Section 27 00 00.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Refer to Product Delivery, Storage and Handling requirements of section 27 00 00.

1.08 WARRANTY

A. Refer to Warranty requirements of section 27 00 00.

PART 2 - PRODUCTS

2.01 Equipment Rack, Floor-Standing

A. Application: Suitable for the support of cable termination devices, management devices, common communications equipment, and other similar equipment, installed onto floor.

B. Material: High strength, lightweight 6061-T6 aluminum, extrusion construction.

C. Channel:
1. Size: The mounting channels shall be 3" deep by 1.265" wide with a 0.17" thick web.
2. Flange: The mounting channels shall have front and back mounting flanges ("double sided"). The flanges shall be 0.25" thick, and shall have mounting holes front and back.
3. Mounting Holes: The hole pattern shall be industry standard spaced at 5/8" - 5/8" - 1/2", compatible with ANSI/EIA-310-D (1992) standard. The mounting holes shall be pre-threaded as #12-24 rolled threading.

D Assembled Rack: The rack shall come complete with base angles (3 5" high by 6" deep by 375" thick) and top angles (1 5" high by 1 5" deep by 375" thick) The assembled rack shall be 8'-0" high (overall) by 19" mounting width (20 25" wide overall), and shall contain 51 EIA mounting spaces

E Include required accessories, such as floor installation kit, etc for a complete installation

F Manufacturer, or equal: CPI, #46353-715, 8'-0"H x 19" equipment rack, black

2.02 Equipment Rack, Wall-Mounted

A Application: Suitable for the support of cable termination devices, management devices, common communications equipment, and other similar equipment, installed onto wall

B Mounting Holes: The hole pattern shall be industry standard spaced at 5/8" - 5/8" - 1/2", compatible with ANSI/EIA-310-D (1992) standard The mounting holes shall be pre-threaded as #12-24 rolled threading

C Assembled Rack: The rack shall come complete with wall bracket and equipment mounting rails The assembled rack shall be 25" deep by 19" mounting width, and shall contain either 27 or 41 EIA mounting spaces (RMU)

D Manufacturer: CPI
1 #11807-725; 49"H x 19" x 25" deep / 27 RMU wall-mounted equipment rack, black
2 #11792-725; 73 5"H x 19" x 25" deep / 41 RMU wall-mounted equipment rack, black

2.03 Vertical Management Section, for Floor-Standing Rack

A Application: Suitable for cable routing (back) & cord slack storage (front) vertically from the bottom of the rack to the top The vertical management sections shall be double sided (i e , the management section shall have covered cable guides on the front and flip-retainers on the rear)

B Size & Capacity: 8'-0" high by 6" wide, with 5-1/3" deep cable storage capacity in back and 6" cord storage capacity in front

C Mounting: The vertical management section shall have matching bolt holes for attachment to the rack

D Color: black (guides and cover)

E Manufacturer, or equal: CPI: #30162-715, vertical mngt section, 8'-0"H x 6"W, double sided

2.04 Horizontal Management Panel

A Application: Suitable for installation into equipment rack for cord routing (front) The horizontal management panel shall match (and fully integrate with) the vertical management sections

B Size & Capacity: 1U high, with hinged/removable cover and pass through capacity Management panel shall be double sided

C Color: black

D. Manufacturer, or equal: CPI: #30529-719; horizontal cable manager, 1U, double sided.

2.05 15BCable Basket

A. Refer to Section 27 11 00 for specifications of cable basket.

2.06 Cable Runway

A. Cable Runway Straight Sections
1. Application: Suitable for the support & management of communications cables, either overhead or mounted vertically on a wall. Also overhead equipment racks bracing.
2. Material (both stringer and rung): Steel tube, rectangular, 1-1/2" by 3/8" by 0.65" wall thickness
3. Rungs: 12" on center, welded to stringer.
4. Size: length: 9' 11-1/2" (cut–to–fit); width: refer to Drawings.
5. Manufacturer, or equal: CPI
   a. #10250-709, 9" wide universal cable runway, black.
   b. #10250-712, 12"wide universal cable runway, black.
   c. #10250-718, 18"wide universal cable runway, black.
   d. #10250-724, 24"wide universal cable runway, black.

B. Cable Runway Sweep Fittings
1. Material (both stringer and rung): Steel tube, rectangular, 1-1/2" by 3/8" by 0.65" wall thickness.
2. Manufacturer, or equal: CPI
   a. #10822-712, horizontal sweep fitting for 12" wide cable runway, black.
   b. #10822-718, horizontal sweep fitting for 18" wide cable runway, black.
   c. #10723-712, vertical outside sweep fitting for 12" wide cable runway, black.
   d. #10723-718, vertical outside sweep fitting for 18" wide cable runway, black.
   e. #10724-712, vertical inside sweep fitting for 12" wide cable runway, black.
   f. #10724-718, vertical inside sweep fitting for 18" wide cable runway, black.

C. Cable Runway Installation Accessories
1. Refer to Drawings for additional information and instances for installation.
2. Manufacturer, or equal: CPI
   a. #11301-001, butt splice kit.
   b. #11313-001, 45-degree butt splice kit.
   c. #11314-001, 90-degree butt splice kit.
   d. #11302-001, junction splice ("T") kit.
   e. #10608-001, vertical wall bracket kit.
   f. #10642-001, end caps
   g. #11421-712, wall angle support kit for 12" wide cable runway, black.
   h. #11421-718, wall angle support kit for 18" wide cable runway, black.
   i. #11421-724, wall angle support kit for 24" wide cable runway, black.
   j. #11312-712, triangle support kit for 9" and 12" wide cable runway, black
   k. #11312-718, triangle support kit for 12" and 18" wide cable runway, black.
   l. #11770-712, end closing kit for 12" wide cable runway, black
   m. #11770-718, end closing kit for 18" wide cable runway, black
   n. #11770-724, end closing kit for 24" wide cable runway, black
   o. #10595-712, rack-to-runway attachment kit, for 9" or 12" wide runway, black

p #10595-718, rack-to-runway attachment kit, for 18" wide runway, black.

2.07 Label Plates, for Equipment Racks

A Application: Label plate shall be suitable to affix onto top angle of equipment rack

B. Label plate shall be 'engrave-able' stock melamine plastic laminate substrate
1 Size (minimum): 1/2 inch high by 6 inches long by 1/16-inch thick.
2 Color: Black

C. Lettering shall be engraved, shall be 1/8" high, and shall be white

PART 3 - EXECUTION

3.01 GENERAL

A Comply with the General Execution requirements of Section 27 00 00.

3.02 INSTALLATION

A Rack Bays
1 Equipment Racks, Floor-Standing
a Provide parts and accessories required to complete each rack
b. Anchor racks to the floor using methods (concrete anchors) approved by both structural engineer and DSA. Brace racks overhead to cable runway where shown on the Drawings.
2. Equipment Racks, Wall-Mounted
a Provide parts and accessories required to complete each rack
b Anchor racks to the wall using fasteners approved by DSA.
3. Vertical Management Sections
a. Provide vertical management sections as shown on Drawings. If not shown, default shall be one vertical management section between each rack and at either end of the bay.
b. Bolt vertical management sections to the equipment racks at the points designed by the manufacturer and per the manufacturer's installation instructions.
c. Install support devices (e.g., brackets, threaded rod with strut, etc.) per the manufacturer's instructions and fastened to the wall or ceiling using appropriate fasteners.
4 Tolerances:
a Equipment Rack, Floor-Standing: Field verify dimensions to establish proper clearances as follows:
1) Front: 40" clearance from channel's front mounting flange
2) Back: 57" clearance from channel's back mounting flange
b. Equipment Rack, Wall-Mounted: Field verify dimensions to establish proper clearances as follows:
1) Front: 40" clearance from channel's front mounting flange
2) Side: 10" between racks and between rack and wall
3) Bottom: 24" clearance from floor to bottom of rack.
c. Provide the correct amount of space between each rack for proper installation (according to manufacturer's written instructions) of the vertical management sections
5. Accessories: Furnish one bag of 50 mounting screws per equipment rack.

B Overhead Cable Support
1. Provide overhead cable support as shown on the Drawings for use to support cables and store cable slack within telecommunications rooms between the exit sleeves/distribution conduits and the rack bay.
2. Provide parts required to complete the installation (e.g., trapeze, junction nuts, etc.).

C. Vertical Cable Support
1. Provide vertical cable support at the locations as shown on the Drawings for use to support cables routing vertically from conduits/sleeves to the overhead cable support.
2. Provide parts required to complete the installation (e.g., vertical mounting brackets, bolts, etc.).
3. If cable runway is used, install the runway such that the rungs are facing outward (the greater distance from the rung to the stringer edge is facing inward). If cable basket is used, install the basket with spacers such that the mesh is spaced 1/2" from the wall.

3.03 Labeling

A. General Requirements: Labeling and identifier assignment shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner before installation.

B. Equipment Rack Label Requirements: Provide one label plate per rack. Permanently affix label plate and position the label plate centered on the rack's front top angle.

C. Identifier Assignment: Equipment Racks
1. Prefix: "RACK"
2. First field: the telecommunications room identity; for example: "TDB".
3. Second field: the rack number; for example: "01".
4. Example; "RACK TDB–01"

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
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Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

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Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

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			1	2	3	
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Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
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			1	2	3	
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AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

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SECTION 27 13 10

TELECOMMUNICATIONS BACKBONE ISP CABLING

INTERMOUNTAIN ELECTRIC W/ NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A Section Includes: Backbone ISP (indoor) twisted pair cabling and fiber optic cabling.

B Related Sections
1 Comply with the Related Sections paragraph of Section 27 00 00 Telecommunications Basic Requirements.
2 27 05 28 Telecommunications Building Pathways
3 27 08 00 Telecommunications Testing

1.02 REFERENCES

A Comply with Section 27 00 00 References requirements.

1.03 DEFINITIONS

A Refer to Section 27 00 00 for Definitions.

B In addition, the following list of terms as used in this specification shall be defined as follows:
1 "CMP": Communications Media Plenum [NEC plenum rating]
2 "CMR": Communications Media Riser [NEC riser/non-plenum rating]
3 "ISP": Inside Plant [cabling]
4 "MM": Multimode [fiber type]
5 "PIC": Plastic Insulated Conductor
6 "OFNP": Optical Fiber Non-conductive Plenum, plenum rating
7 "OFNR": Optical Fiber Non-conductive Riser, non-plenum riser rating
8 "OFN": Optical Fiber Non-conductive, general purpose indoor rating
9 "PE": Polyethylene
10 "PVC": Polyvinyl Chloride
11 "SM": Singlemode [fiber type]

1.04 SYSTEM DESCRIPTION

A Refer to Section 27 00 00for description of the project and building.

B Work Provided Under Other Sections
1 Telecommunications Pathways (Cable Basket, Conduits, Riser Sleeves, etc.) Refer to the Drawings for size/capacity and route information.
2 Buildout of the telecommunications rooms (e.g., backboards, overhead and vertical cable runway, etc.). Refer to the Drawings for buildout information

C Base Bid Work
1 Provide engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working telecommunications backbone twisted pair and fiber optic cabling system installation described in these specifications
2 Consider backbone cabling shown on the Drawings as base bid work, unless otherwise noted. This includes terminations at both ends, unless otherwise noted.

3 In general, the base bid work includes:
- a Preconstruction Submittals
- b Backbone ISP (riser) twisted pair (copper) cables and terminations
- c Backbone ISP fiber optic cables and terminations
- d Cable management
- e Crossconnects
- f Cable identification tags and system labeling
- g Record Documents
- h Warranty

1.05 SUBMITTALS

A Comply with Submittal procedural, quantity, and format requirements of Section 27 00 00

B Preconstruction Submittal Requirements:
1. Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications, and specifications
2. Labeling Submittal, consisting of proposed labeling scheme for backbone cables and backbone terminations
3. Schedule Submittal, consisting of proposed schedule of work This schedule may be combined with the schedule developed for 27 XX XX series Sections
4. Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations

C Submittal Requirements at Closeout:
1. As-Built Drawings
2. Crossconnection records/cut sheets
3. O & M Manuals

1.06 QUALITY ASSURANCE

A Comply with Quality Assurance requirements of Section 27 00 00

B Contractor Qualifications:
1. In addition to the Contractor Qualifications requirements of Section 27 00 00, the Contractor shall be manufacturer certified to install the proposed and submitted cabling system and to provide an extended warranty Provide satisfactory evidence of certification in the form of a current letter or certificate from the manufacturer as part of the bid submission

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A Comply with Delivery, Storage and Handling requirements of Section 27 00 00

1.08 WARRANTY

A Telecommunications cabling system, as specified in this section, shall carry a 15 year (minimum) extended system warranty This extended warranty shall cover parts and labor for the duration of the extended warranty This extended warranty shall also cover electrical performance of the twisted pair cabling system to the specific category per ANSI/TIA/EIA-568-B performance criteria for backbone cabling

PART 2 - PRODUCTS

2.01 SHIELDED TWISTED PAIR CABLES – NON-PLENUM

A Application:
1. Cable shall be suitable for indoor installation, between floors in vertical riser system, under access flooring, and through overhead ceiling space (in cable tray, conduit, & hangers).
2. Each and every cable run shall be a continuous single cable, homogenous in nature. Splices are not permitted anywhere.
3. Cable shall be twisted pair PIC type cable, air core, with an "ALVYN" sheath. Cable shall be compatible with Bell System type "ARMM"

B Conductors:
1. Conductors shall be 24 AWG annealed solid copper.
2. Conductors shall be fully insulated. Insulation shall consist of an inner layer of expanded polyolefin, covered with an outer layer (skin) of solid PVC.
3. Conductors shall be twisted into pairs. Twisted pairs are stranded into 25-pair bundles and into units (and super units, if required by pair count)
4. Color Coding: Twisted pairs and units (supper units, if necessary) shall be individually color coded to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).

C Core & Sheath:
1. Cable core (twisted pairs) shall have a tape applied longitudinally (wrapped around it's entirety). Tape Material: non-hydroscopic polypropylene film, or equivalent.
2. Sheath Type: "ALVYN". Sheath shall consist of an inner shield and an outer jacket.
   a. Shield: Aluminum, 0.008", corrugated tape applied longitudinally, with an overlap.
   b. Jacket: Flame-retardant PVC, adhesively bonded to shield.
3. Cable shall be NEC rated as CMR, and UL listed as such

D Performance:
1. Electrical performance of the twisted pairs and overall cable shall comply with TIA/EIA-568-B Part 2 requirements for Category 3 UTP cabling.

E Manufacturers:
1. General Cable Air Core Cables "Foam Skin ALVYN Riser Cable" series cables
2. SYSTIMAX ARMM series cables.

2.02 FIBER OPTIC CABLES – NON-PLENUM

A Application:
1. Cable shall be suitable for indoor installation, between floors in vertical riser system, under access flooring, and through overhead ceiling space (in cable tray, conduit, & hangers).
2. Cable shall exhibit stable performance in a building environment. The optical transmission performance of the fiber shall not be significantly affected by environmental fluctuations, installation, or aging.
3. Materials used in the cable shall not emit hydrogen in quantities that will increase attenuation

B. 50/125 µm Multimode fiber strands shall meet or exceed the following geometry criteria:
1. Core diameter = 50 µm, ±3.0 µm.
2. Cladding diameter = 125 µm, ±1.0 µm.
3. Core/Cladding Concentricity = ≤ 3 µm.
4. Minimum Tensile Strength = 100,000 psi.

C. 50/125 µm Multimode fiber strands shall meet or exceed the following performance criteria:
1. Attenuation = 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm wavelengths, maximum.
2. Overfilled Bandwidth = 500 MHz•km at 850 nm and 500 MHz•km at 1300 nm wavelengths, minimum.
3. Laser Bandwidth = 2,000 MHz•km at 850 nm and 500 MHz•km at 1300 nm wavelengths, minimum.

D. Singlemode fiber strands shall meet or exceed the following geometry criteria:
1. Core diameter = 8.3 µm.
2. Mode field diameter = 8.8 µm, ±0.5 µm.
3. Cladding diameter = 125 µm, ±1.0 µm.
4. Core/Cladding Concentricity = ≤ 0.8 µm.
5. Minimum Tensile Strength = 100,000 psi.

E. Singlemode fiber strands shall meet or exceed the following performance criteria:
1. Attenuation = 0.4 dB/km at 1310 nm and 0.3 dB/km at 1550 nm wavelengths, maximum.
2. Cutoff wavelength = 1260 nm.
3. Dispersion = 3.5 ps/nm•km at 1285-1330 nm.

F. Buffering:
1. Each fiber shall be completely covered with a "primary coating" (acrylate material). This shall constitute the "fiber strand".
2. Each fiber strand shall be fully covered with a flame retardant thermoplastic material (material = PVC, or equivalent thermoplastic). This shall constitute the "buffered strand" (tight buffer type), and shall have a diameter of 0.9 mm.
3. Buffered Strands: Buffered strands shall be individually color coded to meet the requirements of ANSI/TIA/EIA-598-A-1995. (Also, ref. ANSI/ICEA S-87-640-1992).

G. Cable Sheath:
1. Strength Element: The cable shall have an internal strength element such as aramid yarn (e.g., Kevlar).
2. Tensile Strength: The cable shall have a 150-lb, minimum, rated load.
3. Outer Jacket: The cable shall have a seamless outer jacket (material = PVC, or equivalent) applied to and completely covering the internal components (fiber strands, strength element, other).
4. Flame Rating: The cable shall be NEC (Article 770) rated as OFNR, and UL listed as such.

H. Manufacturer: Corning "MIC" series cables, or equal.

2.03 TERMINATION EQUIPMENT

A. Twisted Pair Cabling Patch Panel
1. Refer to Section 27 15 13 for product requirements.

B Fiber Optic Patch Panels
1. Passive fiber optic physical equipment and apparatus used in interconnecting and cross-connecting fiber optic cables shall possess a minimum fire resistant rating of UL94V-1.
2. The equipment, apparatus, and material for fiber optic equipment an apparatus shall conform to existing OSHA Health and Safety Laws. The equipment and apparatus shall have provision for the application of safety labels such as laser identification or warning labels as required by system considerations.
3. Fiber optic patch panel shall be a fully assembled rack-mounted fiber optic enclosed housing for protecting, storing and organizing the termination of the fiber cable and all fiber strands at each end of the cable. The patch panel shall include an integrated patching facility.
4. "Fully assembled" shall include all required installation & mounting components, and include accessories such as connector panels, coupling adapters, etc. for a complete installation.
5. The fiber patch panel must:
   a. Provide means of strain relief and support of the specified cables
   b. Contain slack storage facilities for fiber slack
   c. Provide patch cord management.
6. Manufacturer: Uniprise (by CommScope)
   a. #RFE-FXG-EMT/1U; 1U fiber shelf, accepts 4 adapter plates
   b. #MFA-SC06-AQ; adapter plate – 6 simplex SC multimode adapters, aqua
   c. #SFA-SC06-BL; adapter plate – 6 simplex SC singlemode adapters, blue

2.04 FIBER OPTIC CONNECTORS

A Multimode Fiber Optic Connectors – SC Type
1. Materials:
   a. Ferrule: ceramic (zirconia or alumina) with pre-radiused finish/face.
   b. Connector housing: plastic.
2. Connector shall have an integral strain relief feature, including a bend limiting rear boot.
3. Connectors shall be aqua.
4. Connectors shall be installable via either epoxy or anaerobic method.
5. Manufacturer: Corning Cable Systems, or equal.
   a. #95-050-48-BP; SC connector, multimode 50/125.

B Singlemode Fiber Optic Connectors – SC Type
1. Materials:
   a. Ferrule: ceramic (zirconia or alumina) with pre-radiused finish/face.
   b. Connector housing: plastic.
2. Connector shall have an integral strain relief feature, including a bend limiting rear boot.
3. Connectors shall be blue.
4. Connectors shall be installable via either epoxy or anaerobic method.
5. Manufacturer: Corning Cable Systems, or equal.
   a. #95-250-08-BP; SC connector, singlemode.

2.05 LABELS

A Labels for Backbone ISP Cables
1. General: Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer. Labels shall be adhesive backed and have a self-laminating feature.
2. Printable Area: 2" x 0.5", minimum.
3. Color: White.

4 Manufacturer: Panduit, or equal
a #LJSL7-Y3-1; laser/ink jet labels for cable diameters 0.16"-0.32", white
b #LJSL8-Y3-1; laser/ink jet labels for cable diameters 0.31"-0.69", white
c #LJSL19-Y3-1; laser/ink jet labels for cable diameters 0.31"-1.42", white

PART 3 - EXECUTION

3.01 GENERAL

A. Comply General Execution requirements of Section 27 00 00.

3.02 EXAMINATION

A. Pathways: Prior to installation, verify pathways (cable trays, conduits, etc.) exist and are 'ready' to accept backbone cables.

B. Telecommunications Rooms: Prior to installation, verify equipment rooms are 'ready' to accept the backbone cables and terminations.

3.03 PREPARATION

A. The Contractor is solely responsible to verify that twisted pair cables and fiber optic cables are fully operational – both cable sheath and conductors (twisted pair and optical) – prior to installation.

B. Documentation of pre-installation testing is not a close out requirement, and shall be the responsibility of the Contractor.

3.04 INSTALLATION – TWISTED PAIR CABLING

A. Backbone Cables
1. General
a. Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
2. Placement
a. Maintain a minimum bend radius of 6 times the cable diameter during and after installation.
b. Maintain pulling tension within manufacturer's limits.
c. Protect cable during installation. Replace cable if damaged during installation.
d. Place cables with no kinks, twists, or impact damage to the sheath.
e. Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of the pull rope.
3. Routing
a. Maximum cable length from the termination within the Entrance Facility to the termination in Telecommunications Room shall be 500 meters.
b. Install cables within designated pathways.
c. When routing horizontally within telecommunications rooms, utilize the overhead cable support. When routing vertically within telecommunications rooms, utilize the wall mounted vertical cable runway and support every 24 inches on center using cable ties.
d. Place and suspend cables in a manner to protect them from physical interference or damage.
e. Route cables a minimum of 6" away from power sources to reduce interference from EMI.

f. Provide a 10 feet (minimum) sheathed cable slack loop at each end of the run. Place the slack in the overhead cable support.

4 Termination
- a Properly strain relieve cables at termination points per manufacturer's instructions.
- b. Perform terminations in accordance with manufacturer's instructions and TIA/EIA-568-B standard installation practices.
- c Perform post-installation testing as described in the Telecommunication Testing specification.

B. Termination Apparatus
1. Provide accessories required for a complete installation.
2. Terminate twisted pair backbone cables to modular patch panels, terminating one pair to positions 4 and 5.
3. Install the patch panels as shown on the drawing. If not is shown, install patch panels at the top of the rack.

3.05 INSTALLATION – FIBER OPTIC CABLING

A Backbone Cable
1. General
- a Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
- b Protect fibers during installation & termination. Fibers damaged beyond repair during installation or termination shall result in replacement of the affected cable at no additional cost.
- c. Place cables within innerduct the entire route.

2. Placement
- a. Bend Radius: Maintain a minimum bend radius of 20 times the cable diameter during installation, and a minimum bend radius of 10 times the cable diameter after installation.
- b Pulling: Maintain pulling tension within manufacturer's limits.
- c Protection: Place and suspend cables in a manner to protect them from physical interference or damage. Replace cable if damaged during installation.
- d. Place cables with no kinks, twists, or impact damage to the sheath.
- e Do not use cable-pulling compounds for indoor installations.
- f Provide 30 feet (minimum) sheathed cable slack loop at each end of the run within the Telecommunications Rooms; place the slack in the overhead cable support.
- g Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of the pull rope.

3. Routing
- a Maximum cable length from the termination within the Entrance Facility to the termination in Telecommunications Room shall be 500 meters.
- b Route cables in innerduct between points of termination throughout entire length (except at the fiber take up reel).
- c. Install cables within designated pathways.
- d Neatly dress and organize cables using designated cable routing facilities, and fasten to support devices via tie wraps or Velcro-type straps.
- e When routing horizontally within telecom rooms, utilize the overhead cable support. When routing vertically within telecommunications rooms, utilize the wall mounted vertical cable runway and properly fasten. "Properly fasten" shall consist of cable ties in a 'crossed' configuration per cable or cable bundle (up to three cables or innerducts) every 24 inches on center.

f. Place and suspend cables in a manner to protect them from physical interference or damage.
g Provide a 10 feet (minimum) sheathed cable slack loop at each end of the run. Store slack in slack storage ring mounted on the wall.

4 Termination
a. Properly strain relieve cables at termination points (at/within the fiber optic termination panels) per manufacturer's instructions.
b Terminate/connectorize fiber strands at both ends using the specified fiber optic connectors appropriate for the mode type of the fiber. Perform terminations in accordance with manufacturer's instructions.
c. Provide required accessories and consumables for the complete termination of fiber strands.
d Provide 3 feet of tight buffered fiber (unsheathed) slack at each end of the run within the patch panel/termination enclosure. Properly store fiber slack in rear of patch panel into the 'routing rings', per manufacturer's instructions.

B. Fiber Optic Cable Termination Panel
1. Provide the termination panel in designated equipment rack; locate per drawings (if not shown, locate at the top).
2. Provide accessories required for proper installation of each termination panel, including connector panels and adapters.

3.06 LABELING

A. General Requirements
1. Labeling and identifier assignment shall conform to the TIA/EIA-606 Administration Standard and as approved by Owner's Representative before installation. Label colors shall conform to the TIA/EIA-606 Administration Standard.
2. Provide permanent and machine-generated labels; hand written labels will not be accepted.

B. Label Formats
1. Cable Labels
a. Text Attributes: Black, 1/8" high, minimum, or #12 font size.
b. Provide labels on both ends of cables. Install labels no more than 4" from the edge of the cable jacket. Fully wrap label around the cable jacket. Install labels such that they are visible by a technician from a normal stance.
2. Termination Apparatus Labels
a. Use labels included in the product packaging. Request approval by the Engineer for substitutions.
b. Provide white label respective field type, per TIA/EIA-606.
c. Text Attributes: Black, 3/32" high, minimum, or #10 font size.

C. Identifier Assignment
1 General: Separate label fields of the identifier with a hyphen.
2. Backbone ISP Twisted Pair Cables
a. First field shall identify the originating termination room identifier as shown on the plans; for example, "B01-TDA".
b. Second field shall identify the ending termination room identifier as shown on the plans; for example, "B01-TDB".
c. Third field of the identifier shall be the campus pair count range; for example, "0401-0600".
d. Example: "B01-TDA–B01-TDB–0401-0600".

3. Termination Positions at the Patch Panels: Each port shall be labeled with the pair count of the campus infrastructure
4. Backbone ISP Fiber Optic Cables
   a. First field shall identify the originating termination room identifier as shown on the plans; for example, "B01-TDA"
   b. Second field shall identify the ending termination room identifier as shown on the plans; for example, "B01-TDB"
   c. Third field shall identify the type and number of strands; for example, "Mxxx" where "M" stands for multimode or "S" for singlemode and xxx stands for the ending fiber strand sequential count
   d. Example: "B01-TDA– B01-TDB–M025-M036"
5. Termination Positions at the Termination Panels
   a. First field of the identifier shall be the destination room; for example "TO B01-TDB"
   b. Second field of the identifier shall be the strand count range; for example, "M025-M036"
   c. Identifier Example:"TO B01-TDB M025-M048".

3.07 FINAL INSPECTION

A. Inspect installed products and work in conjunction with the District or District's Representative Develop a punchlist for items needing correction

B. Issue punchlist to Engineer for review prior to performing punchlist with the Engineer.

C. Repair defects prior to system acceptance.

D. Inspect installed products and work in conjunction with the Engineer for sign off.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

SECTION 27 13 14

TELECOMMUNICATIONS BACKBONE OSP TWISTED PAIR CABLING

INTERMOUNTAIN ELECTRIC CO. W/NETVER SANT
SAN CARLOS, CA.
650 591-7118
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Backbone outside plant (OSP) twisted pair cabling.

B. Related Sections
1. Comply with the Related Sections paragraph of Section 27 00 00.
2. Section 27 05 28 - Telecommunications Building Pathways.
3. Section 27 08 00 - Telecommunications Testing.

C. Products Furnished and Installed Under Another Section: Conduits, pullboxes, and other underground pathways.

1.02 REFERENCES

A. Comply with the References requirements of Section 27 00 00.

1.03 DEFINITIONS

A. Refer to Division 1 for Definitions.

B. In addition, the following list of terms as used in this specification shall be defined as follows:
1. "BEP": Building Entrance Protection [systems]
2. "CMP": Communications Media Plenum [NEC plenum rating]
3. "CMR": Communications Media Riser [NEC riser/non-plenum rating]
4. "HDPE": High Density Polyethylene
5. "ISP": Inside Plant [cabling]
6. "LDPE": Light Density Polyethylene
7. "OSP": Outside Plant [cabling]
8. "PE": Polyethylene
9. "PIC": Plastic Insulated Conductor
10. "PVC": Polyvinyl Chloride

1.04 SYSTEM DESCRIPTION

A. Base Bid Work
1. Base bid work includes engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working telecom backbone twisted pair cabling system installation described in these specifications.
2. Cabling, including terminations at both ends, shown on Drawings shall be considered as base bid work, unless otherwise noted.
3. The Drawings are diagrammatic in nature.
4. In general, the base bid work includes:
   a. Preconstruction Submittals
   b. Backbone outside plant (interbuilding) twisted pair (copper) cables and terminations.
   c. Building entrance protection and terminals
   d. Splicing apparatus, as specified
   e. Cable management

f. Cable identification tags and system labeling
g Record Documents
h. Warranty

1.05 SUBMITTALS

A. Comply with Division 1 for procedural, quantity, and format requirements.

B. Preconstruction Submittal Requirements:
1 Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.
2. Schedule Submittal, consisting of proposed schedule of work.
3. Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations.

C. Closeout Submittal Requirements:
1. As-Built Drawings.
2. O & M Manuals.

1.06 QUALITY ASSURANCE

A. Comply with Division 1 Quality Assurance requirements.

B. Contractor Qualifications In addition to the Contractor Qualifications requirements of Division 1, the Contractor shall be manufacturer certified to install the proposed and submitted cabling system and to provide an extended warranty. Provide satisfactory evidence of certification in the form of a current letter or certificate from the manufacturer as part of the bid submission.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1 Delivery, Storage and Handling requirements

1.08 WARRANTY

A. The OSP cabling shall be warranted under the minimum Project warranty. Refer to Division 1 for requirements

PART 2 - Products

2.01 UNDERGROUND CABLES

A. Application:
1. Cable shall be suitable for outdoor installations, within underground conduit.
2. Cable shall be twisted pair PIC type cable, filled core, with an "ASP" sheath. Cable shall be compatible with Bell System type "ANMW".

B. Conductors:
1. Conductors shall be 24 AWG annealed solid copper.
2. Conductors shall be fully insulated. Insulation shall consist of an inner layer of expanded PE, covered with an outer layer (skin) of solid PE.
3. Conductors shall be twisted into pairs. Twisted pairs are stranded into 25-pair bundles and into units (and super units, if required by pair count).
4. Color Coding: Twisted pairs and units (supper units, if necessary) shall be individually color coded to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).

C Core & Sheath:
1. Cable core (twisted pairs) shall have a tape applied longitudinally (wrapped around it's entirety). Tape Material: non-hydroscopic polypropylene film, or equivalent.
2. Filled: Cable core and sheath shall be flooded with filling compound to protect against moisture penetration. Filling compound: "FLEXGEL", or equivalent
3. Sheath Type: "ASP". Sheath shall consist of a shield and an outer jacket
   a. Shield: Dual corrugated tape of inner aluminum and outer steel longitudinally applied, with a locking overlap.
   b. Jacket: PE, bonded to shield

D Manufacturers:
1. General "Filled Foam Skin ASP (Spec 2100)" series cables.
2. Belden Communications "Exchange Cable, Filled ASP Cable For Buried Installations" series.
3. Superior Essex "Filled ASP ANMW" series cables.

2.02 AERIAL CABLES

A Application:
1. Cable shall be suitable for outdoor aerial installations.
2. Cable shall be twisted pair PIC type cable, air core, with an "ALPETH" sheath Cable shall be compatible with Bell System type "BKMA" and RUS type "PE22".

B Conductors:
1. Conductors shall be 24 AWG annealed solid copper.
2. Conductors shall be fully insulated. Insulation shall consist of solid PE.
3. Conductors shall be twisted into pairs. Twisted pairs are stranded into 25-pair bundles and into units (and super units, if required by pair count).
4. Color Coding: Twisted pairs and units (supper units, if necessary) shall be individually color coded to industry standards (ANSI/ICEA Publication S-80-576, and EIA-230).

C Core & Sheath:
1. Cable core (twisted pairs) shall have a tape applied longitudinally (wrapped around it's entirety). Tape Material: non-hydroscopic polypropylene film, or equivalent.
2. Sheath Type: "ALPETH". Sheath shall consist of a shield and an outer jacket.
   a. Shield: Corrugated tape of aluminum longitudinally applied, with a locking overlap.
   b. Jacket: PE, bonded to shield.

D Manufacturers:
1. General "Air Core ALPETH (Spec 2101)" series cables.
2. Belden "Exchange Cable, Alpeth Cable For Aerial Installations" series cables.
3. Superior Essex "SEALPIC" series cables.

2.03 SPLICE CLOSURES AND ACCESSORIES

A Splice Closure – Underground Vault Type
1. Application: Splice closure system shall be suitable for outdoor installation within underground vault and/or maintenance hole.
2. Enclosure:
   a. Enclosure shall be re-enterable.
   b. Through-splice or butt-splice configurations will be accepted.
   c. Size enclosure based on splice bundle diameter and largest incoming cable.

d. End caps shall accept one cable per end / one incoming cable and two outgoing cables

3. Manufacturer: 3M Telcom, or equal:
   a #50BA3P-510
   b #4460; shield bond connector for cables 100-pair or larger
   c #4460-D; shield bond connector for cables 100-pair or smaller
   d #25T Ground Braid or #25T Ground Braid with Eyelets

B. Splice Closure – Building Entrance Type
1. Application: Splice closure system shall be suitable for indoor installation within entrance facilities for splicing between OSP and ISP cable.
2. Closure:
   a Enclosure shall be re-enterable.
   b Through-splice or butt-splice configurations will be accepted.
   c Sleeve shall be solid / Solid or split sleeve will be accepted.
   d. Size enclosure based on splice bundle diameter and largest incoming cable
   e End caps shall accept eight single collared or shall have multiple holes
3. Include all required accessories, such as collars, grommets, bushings, bonding connectors, etc. for a complete installation.
4. Closure system shall be air and water tight. Closure system shall be RUS listed and UL approved.
5. Manufacturer: 3M Telcom, or equal:
   a. #R-3
   b #4460; shield bond connector for cables 100-pair or larger
   c #4460-D; shield bond connector for cables 100-pair or smaller
   d #25T Ground Braid or #25T Ground Braid with Eyelets

C Splice Closure – Aerial Type, Straight Splice
1. Application: Splice closure system shall be suitable for outdoor installation in an aerial installation for straight splicing of OSP cables.
2. Manufacturer: 3M Telcom, or equal:
   a #BA/SES, SliC aerial closure with attached bond assembly, 2" x 19", for up to 100 pair.
   b #BA/SES, SliC aerial closure with attached bond assembly, 3" x 19", for up to 200 pair.
   c #BA/SES, SliC aerial closure with attached bond assembly, 3" x 33", for up to 400 pair.

D. Encapsulant
1. Application: Encapsulant shall be suitable for outdoor installation within underground splice closures (vault and/or maintenance hole).
2. Encapsulant shall be re-enterable.
3. Manufacturer: 3M Telcom, or equal:
   a #4442; "High Gel" re-enterable encapsulant.

2.04 SPLICE MODULES

A. Splice Module – 710 Dry Straight Type
1. Application: Cable transition (OSP to ISP) in telecom rooms.
2. Modules shall accept mixed solid wire gauges (26 AWG – 19 AWG).
3. Modules shall accept mixed insulation types (PIC, PVC, pulp or paper insulted conductors), up to maximum insulation outside diameter of (.70).
4. Manufacturer: 3M Telcom, or equal:
   a. #3M710-SD1-25; 25-pair 710 dry straight splicing module.

B Splice Module – 710 Filled Straight Type
1. Application: In-line or branch splicing of OSP cables in underground vaults or manholes
2. Modules shall accept mixed solid wire gauges (26 AWG – 19 AWG)
3. Modules shall accept PIC or PVC insulation
4. Modules shall be "preloaded" (filled) with water resistant compound
5. Manufacturer: 3M Telcom, or equal: #3M710-SC1-25; 25-pair 710 filled straight splicing module

2.05 BUILDING ENTRANCE PROTECTION

A General: All BEP terminals shall offer 110-compatible "output" connection type.

B BEP Terminal – 190 Type
1. Application: BEP terminal shall be suitable for indoor installation, within a telecom room (such as an Entrance Facility or 'MPOE'). BEP terminals shall provide termination of the backbone twisted pair cables and shall protect premises equipment against induced voltages and stray currents
2. Configuration: BEP terminal shall be designed for a wall mounted configuration, shall have the capacity to accept 50 or 100 incoming and outgoing pairs, and shall accept 5-pin type protector modules.
3. Media Interfaces:
   a. Input shall be 25-foot 26 AWG fusible link stub.
   b. Output shall be 25-foot 24 AWG stub.
4. Manufacturers:
   a. Porta Systems #26xxx-ST-MST; 190 type BEP terminal, where "xxx" = pair count
   b. SYSTIMAX #190A1-100 (102 995 099); 100-pair 190 type BEP terminal
   c. SYSTIMAX #190A1-50 (102 995 073); 50-pair 190 type BEP terminal

C BEP Modules – With Sneak Current Protection
1. BEP modules shall be standard 5-pin type, and be suitable for installation into BEP terminals.
2. Overvoltage Device: solid state DC Breakdown Voltage: 220 V Response time: <100 nsec.
3. Sneak Current Device: heat coil Sneak Current: 1 A Response Time: < 15 sec
4. Manufacturers:
   a. Porta Systems #115SCG-250V; solid state module, 220V – 300V breakdown voltage with sneak current protection, black
   b. SYSTIMAX #4C1S (104 386 545); solid state module, 220V – 300V breakdown voltage with sneak current protection, black.

2.06 MISCELLANEOUS MATERIALS

A OSP Backbone Cable Labels
1. General: Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer. Labels shall be adhesive backed and have a self-laminating feature.
2. Printable Area: 2" x 0.5", minimum
3. Color: White
4. Manufacturer: Panduit, or approved equivalent.
   a. LJSL7-Y3-1; laser/ink jet labels for cable diameters 0.16"-0.32", white
   b. LJSL8-Y3-1; laser/ink jet labels for cable diameters 0.31"-0.69", white
   c. LJSL19-Y3-1; laser/ink jet labels for cable diameters 0.31"-1.42", white

B. Simplex entry seals for 4-inch conduit
   1. Seal shall create a water-tight seal between the inside of the conduit and the cable. Provide plug sized appropriately.
   2 Manufacturer: Tyco, or equal by Carlon
      a #40S136S; for cable OD 1.19-1.36
      b #40S196SB; for cable OD 1.38-1.96
      c #40S256SB, for cable OD 1.92-2.56
      d #40S291SB, for cable OD 2.56-2.91
      e #40S327SB, for cable OD 2.91-3.27

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with Division 1 General Execution requirements.

B. Install products, components, accessories, hardware, etc, according to the manufacturer's instructions.

3.02 EXAMINATION

A Pathways: Prior to installation, verify pathways (underground conduits, etc.) are complete and ready for cables.

B. Equipment Rooms: Prior to installation, verify equipment rooms are complete and ready for cables, splice closures and/or BEP terminals.

3.03 PREPARATION

A. Verify cable is fully operational – both cable sheath and conductors – prior to installation.

B. Pre-installation testing as described in the Communication Cable Testing specification, is not required and shall be the responsibility of the Contractor

3.04 INSTALLATION

A. OSP Interbuilding Backbone Cable
   1 Each and every cable run between either termination points or designated splices points shall be a continuous single cable, homogenous in nature. Only splices as noted on the Construction Documents will be permitted
   2. Placement
      a. Bend Radius: Maintain a minimum bend radius of 6 times the cable diameter during and after installation.
      b Pulling: Maintain pulling tension within manufacturer's limits. Only use UL approved cable-pulling compounds when necessary to reduce pulling tensions.
      c. Protection: Protect cable during installation. Place and suspend cables in a manner to protect them from physical interference or damage. Replace cable if damaged during installation.
      d. Place cables with no kinks, twists, or impact damage to the sheath.
      e. Cables shall be neatly dressed and organized in the cable routing facilities, and fastened to support devices via tie wraps.
   3 Routing:
      a Maintain maximum conductor length of 1,500 meters from the termination at the MDF to the termination in any IDF.

b. Install cables within designated pathways
c. Route cables a minimum of 6" away from power sources to reduce interference from EMI.
d. When routing vertically within telecom rooms, properly fasten the cable to the cable runway mounted vertically on the wall. "Properly fasten" shall consist of cable ties in a 'crossed' configuration per cable or cable bundle (up to three cables) every 24 inches on center.
e. When routing horizontally within telecom rooms, utilize the overhead cable tray / cable runway. Route all backbone cables to avoid crossing over horizontal cabling or horizontal cabling crossing backbone cabling.

4. Termination
   a. Provide a 10 foot (minimum) sheathed cable slack loop at each end of the run. Store the slack in the overhead cable tray / cable runway.
   b. Terminate copper pairs at both ends on the specified BEP / termination apparatus.
   c. Properly strain relieve cables at designated points per manufacturer's instructions.
5. Labeling
   a. Provide labels on each end of the cable, no more than 4" from where the cable enters the specified splicing enclosure / termination apparatus.
   b. Place labels such that they are visible by a technician from a normal stance.

B. Underground Splicing Systems
1. Provide underground splice systems either as shown on the Drawings or as shown on shop drawing submittal, including closure, end caps, splice modules, grounding components, and all accessories required for a complete installation. Install splice closure and splice modules per manufacturer's instructions using tools intended for the purpose. Provide re-enterable encapsulant within enclosure.
2. Install closure onto rack system within maintenance hole, as shown on drawings.
3. Grounding and Bonding
   a. Bond cable shield to splice closure bond assembly. Provide bonding conductor from splice closure bond terminal to ground terminal within maintenance hole, if available.
   b. Size bonding conductor 6 AWG up to 25 feet in length; size as 1000 circular mils per foot if longer than 25 feet.
4. Labeling: Provide labels on each splice module and binder group in splice closure.

C. Building Entrance Splicing Systems
1. Provide entrance splice system as shown on the Drawings, including closure, end caps, splice modules, grounding components, and all accessories required for a complete installation. Install splice closure and splice modules per manufacturer's instructions using tools intended for the purpose.
2. Fill unused end cap entry holes with appropriate plug (intended for purpose) for future use.
3. Thoroughly clean and separate all binder groups prior to installing splice modules.
4. Grounding and Bonding
   a. Bond splice enclosure and cable shield to closet busbar using bonding conductor per manufacturer's instructions and/or TIA-607 requirements.
   b. Size bonding conductor 6 AWG up to 25 feet in length; size as 1000 circular mils per foot if longer than 25 feet.
5. Labeling: Provide labels on each splice module and binder group in splice closure.

D Building Entrance Protection Terminals
1. Provide BEP system as shown on the Drawings, including terminals, modules, and all accessories required for a complete installation. Install BEP per manufacturer's instructions.
2. Install BEP terminals plumb and square, and at height shown on Drawings. If no height is shown, install such that bottom row is at 24" AFF (+/- 3").
3. Provide quantity of protector modules to completely populate terminals.
4. Grounding and Bonding
   a. Bond BEP terminal to closet busbar using bonding conductor per manufacturer's instructions and/or TIA-607 requirements.
   b. Size bonding conductor 6 AWG up to 25 feet in length; size as 1000 circular mils per foot if longer than 25 feet.
5. Labeling
   a. Provide and permanently affix label on the terminal's cover.
   b. Provide label in the label holder at the terminal's "outgoing" connection.

3.05 LABELING

A General Requirements
1. Identifier assignment and scope of labeling shall conform to TIA/EIA-606. Label colors shall conform to TIA/EIA-606.
2. Labels shall be permanent and machine-generated; hand written labels will not be accepted.

B Label Formats
1. Cable Labels
   a. Text shall black, and shall be 1/8" high, minimum, or #12 font size.
   b. Install labels no more than 4" from the edge of the cable jacket. Fully wrap label around the cable jacket. Install labels such that they are visible by a technician from a normal stance.
2. BEP Labels – "Output" Connection
   a. Text shall black, and shall be 3/32" high, minimum, or #10 font size.
   b. Labels shall either be included in the product packaging or shall be fully compatible, in the opinion of the Engineer, with the specified termination apparatus.

C Identifier Assignment
1. General: Separate all label fields of the identifier with a hyphen.
2. Backbone OSP Twisted Pair Cables
   a. The first field shall identify the beginning and ending pair counts.
   b. The second field shall identify the originating termination room identifier and the destination termination room as shown on the plans.
   c. Identifier Example:"0001-0200 B01-TDA–B02-TDA"
3. BEP Terminal Cover
   a. The first field of the identifier shall be the pair count; e.g., "0001-0200".
   b. The second field of the identifier shall be cable's other end room; e.g., "FROM B01-TDA".

3.06 INSPECTION AND ADJUSTMENTS

A Inspect installed products and completed work in conjunction with the Owner, or Owner's Representative. Develop a punchlist for items needing correction.

B Provide punchlist to Owner, or Owner's Representative. for review prior to performing punchlist with the Engineer.

C Repair defects prior to system acceptance.

D. Inspect installed products and work in conjunction with the Owner, or Owner's Representative for sign off

3.07 DEMONSTRATION

A On completion of the acceptance test, schedule a time convenient with the Owner, or Owner's Representative, for instruction in the layout and maintenance of the system

3.08 CERTIFICATION

A Provide the Owner, or Owner's Representative, with a written form of acceptance for signature

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

SECTION 27 15 13

TELECOMMUNICATIONS HORIZONTAL CABLING

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL # 30

PART 1 - GENERAL

1.01 SUMMARY

A Section Includes: Horizontal Cabling (subsystem of Telecommunications Cabling Infrastructure)

B Related Sections
1. Comply with the Related Sections paragraph of Section 27 00 00
2. Section 27 05 28 - Telecommunications Building Pathways

C Products Furnished and Installed Under Another Section:
1. Conduits, sleeves, and other pathway systems for building distribution.
2. Conduit stubs and device (back) boxes for devices/outlets.
3 Surface raceway – base, cover, and device plates.

1.02 REFERENCES

A Comply with the References requirements of Section 27 00 00

1.03 DEFINITIONS

A Refer to Section 27 00 00 for Definitions

B In addition, the following list of terms as used in this specification shall be defined as follows:
1. "CAT6": Category 6 [UTP]
2. "Channel": End to end transmission path; e.g., the entire portion of the horizontal cabling to each outlet consisting of the Permanent Link, line cord (at the workstation), patch cord, and, if a full cross-connection is implemented, the cross-connect termination/connecting apparatus and equipment cord
3. "CMP": Communications Media Plenum, plenum rating; synonymous with "MPP"
4 "CMR": Communications Media Riser, riser rating; synonymous with "MPR"
5 "FEP": Fluorinated Ethylene Propylene
6 "Permanent Link": Test configuration for a horizontal cabling link excluding test cords, connections at the ends of the test cords, patch cords, equipment cords, line cords; e.g., the 'permanent' portion of the horizontal cabling to each outlet consisting of cable, consolidation point (if used), termination/connecting apparatus in the Telecommunications Room and the connector at the outlet
7. "PVC": PolyVinyl Chloride
8 "UTP": Unshielded Twisted Pair

1.04 SYSTEM DESCRIPTION

A Base Bid Work
1 Provide engineering, labor, materials, apparatus, tools, equipment, and transportation required to make a complete working telecommunications Horizontal Cabling System installation described in these specifications.
2 Consider horizontal cabling as shown on Drawings to be base bid work, unless otherwise noted.

B In general, the base bid work includes:
1 Preconstruction Submittals.
2 Horizontal cables, terminations, and outlets
3 Cable management.
4 Patch cords and cross-connects
5 Cable identification tags and system labeling.
6 Record Documents
7 Warranty

1.05 SUBMITTALS

A Comply with the Submittals article of Section 27 00 00 for procedural, quantity, and format requirements.

B Preconstruction Submittal Requirements:
1 Product Data Submittal, indicating conformance with NEC, UL, TIA/EIA listings, certifications and specifications.
2 Shop Drawings Submittal, consisting of proposed changes to cable routing, or termination locations/configurations.
3 Typical Outlet Sample, including faceplate, faceplate label, connectors/jacks, port labels, cables (about 12" sample), and cable label.

C Closeout Submittal Requirements:
1 As-Built Drawings.
2 Cross-connection records/cut sheets.
3 O & M Manuals

1.06 QUALITY ASSURANCE

A Comply with the Quality Assurance requirements of Section 27 00 00.

B Contractor Qualifications
1 In addition to the Contractor Qualifications requirements of Section 27 00 00, the Telecommunications Installer shall be a Panduit Certified Installer (PCI), certified by Panduit Corporation, and shall be capable of providing an extended warranty in the CertificationPlus system warranty program.
2 Provide evidence in the bid submission of certification in the PCI program. Evidence shall consist of a "Certification Of Participation" issued by Panduit Corp listing the Telecommunications Installer's company name.

1.07 DELIVERY, STORAGE AND HANDLING

A Comply with the Delivery, Storage and Handling requirements of Section 27 00 00

1.08 WARRANTY

A The telecommunications horizontal cabling system, as specified in this section, shall receive a CertificationPlus system warranty. This extended warranty shall cover parts and labor for the duration of the extended warranty. This extended warranty shall also cover electrical performance of cabling system to the specific category per ANSI/TIA/EIA-568-B performance criteria for Permanent Link.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Comply with the Substitutions requirements of Section 27 00 00

2.02 HORIZONTAL CABLE

A. Application: Suitable for indoor installation

B. Conductors:
1. Insulated Conductors: 23 AWG solid-copper fully-insulated with a flame retardant thermoplastic material (material = PVC, or equivalent)
2. Twisted Pairs: Two insulated conductors twisted to form a pair (twisted pair), and individually color-coded to industry standards (ANSI/ICEA Publication S-80-576-1994, and EIA-230).

C Cable Sheath:
1 The cable shall be unshielded
2. Outer jacket shall be seamless (material = LS-PVC, or similar) applied to and completely covering the internal components (four twisted pairs).
3 Flame Rating: NEC (Article 800) rated as CMP, and UL listed as such.
4. Cable sheath shall be round.

D. Electrical Performance: Meet or exceed TIA/EIA-568-B.2-1 and ISO/IEC 11801 requirements for CAT6 UTP cabling.

E Packaging: Cable shall come as 1,000 foot put-ups packaged in a box.

F. Manufacturer: Panduit, or equal by Berk-Tek, General Cable, SYSTIMAX, CommScope, or Belden
1 #PUP6004BU-U, "TX6000" CAT6 UTP CMP, Blue
2 #PUP6004GY-U, "TX6000" CAT6 UTP CMP, Gray

2.03 MODULAR PATCH CORDS

A Application: Suitable for indoor installation within a telecommunications room or workstation environment. Cords shall be assembled from a single, continuous length of cordage, homogenous in nature, and shall be terminated at both ends via 8 position modular plugs. Splices are not permitted anywhere.

B Cordage
1. Insulated Conductors: 24 AWG stranded copper, fully insulated with a flame retardant thermoplastic material (such as PVC, or equivalent)
2. Twisted Pairs: Two insulated conductors "twisted" into a "pair" (twisted pair), and individually color-coded.
3. Sheath shall be unshielded, flame-retardant polyvinyl chloride (PVC) jacketed.
4. Flame Rating: NEC CM (or higher) rated and UL listed as such.

C Electrical Performance: Comply with TIA/EIA 568-B for CAT6 UTP patch cords and Channel requirements (minimum)

D Manufacturer: Panduit #UTPSPx ("x" varies for length).

2.04 CROSSCONNECT WIRE

A. Application: Suitable for indoor installation within a 110-based crossconnect system. Each and every crossconnect wire shall be manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere.

B. Factory splices of insulated conductors are expressly prohibited.

C. Conductors:
1. Insulated Conductors: Conductors shall be 24 AWG solid copper. Conductors shall be fully insulated with a flame retardant thermoplastic material (such as PVC, or equivalent).
2. Twisted Pairs: Two insulated conductors shall be "twisted" into a "pair" (twisted pair). Twisted pairs shall be individually color coded.

D. Manufacturer: General, or equal
1. #7041973; crossconnect wire, 1 pair, Whi-Red / Red-Whi
2. #7042047; crossconnect wire, 1 pair, Whi-Blu / Blu-Whi

2.05 PATCH PANEL

A. Application: Patch panel shall be suitable for installation within a telecommunication room for the termination of the CAT6 UTP 4-Pair Cable (specified herein), and shall be horizontally oriented for a rack-mounted configuration.

B. Patch panel shall have discrete ports, fully compatible with the connectors / modular jacks – refer to this section for connectors.

C. Patch panels shall be capable of supporting, organizing, labeling and patching/crossconnecting between the horizontal termination field and the equipment and/or the equipment termination field.

D. Manufacturer: Panduit #CPPL24M6BL; 24-port discrete patch panel – less connectors/modular jacks.

2.06 WORKSTATION OUTLETS

A. Faceplate for Flush Mount Outlets
1. Refer to outlet schedule in the Drawings for port quantity per outlet type.
2. Faceplate shall include required accessories, such as icons, blank inserts, and labels. Faceplate shall be by the same manufacturer as the connectors.
3. Faceplate shall be "Executive" series, "IE" color.
4. Manufacturer: Panduit
   a. #CFPE2IE; Mini-Com line Executive series faceplate, 2-port
   b. #CFPE4IE; Mini-Com line Executive series faceplate, 4-port

B. Faceplate for Wall Phone Outlets
1. Faceplate for wall phone outlets shall come equipped with 1 modular jack and two mounting studs.
2. Manufacturer: Panduit #KWP6PY; Faceplate for wall phone, with modular jack

C. Faceplate for Open Office Furniture Outlets
1. Application: Faceplate shall be compatible with the baseplate and beltway of the selected open office furniture, and shall "snap" into the furniture opening.
2. Faceplate shall have 4 ports.

3. Manufacturer (example – confirm open office system): Panduit #CFFPL4BL; snap-on faceplate for open office furniture, 4-port

D. Adapters for Raceway Mount Outlets
1. Application: Adapter / module insert shall be compatible with the surface raceway opening designated for telecom use. Refer to the Outlet Schedule of the Drawings for additional information. Refer to the electrical drawings for raceway information
2. Manufacturer: Panduit #CH02MEI-X; module insert for raceway
3. Color shall match electrical device and/or coverplate

E. Adapters for Poke-Thru Devices
1. Application: Adapter / module insert shall be compatible with the poke-thru device. Refer to the Outlet Schedule of the Drawings for additional information. Refer to the electrical Drawings and Specifications for poke-thru device information
2. Manufacturer: Panduit #CH02MEI-X; module insert for Wiremold "Open Systems" devices
3. Color shall match electrical device and/or coverplate

2.07 CONNECTORS / MODULAR JACKS

A. Connectors shall be 8-position 8-conductor modular type, shall be CAT6 rated, and shall be intended for the termination of 4-pair UTP cables. Connectors shall be by the same manufacturer as the faceplates.

B. Connectors shall be T568B wired.

C. Manufacturer: Panduit #CJ688TGOR; Mini-Com TX6 Plus Jack Module, Orange.

2.08 COURTESY/CAMPUS PHONE

A. Indoor, wall-mount type: Allen Tel #GB306V

2.09 WIRELESS LAN ACCESS POINT ENCLOSURE

A. Indoor ceiling-mount type: Oberon #1055

B. Indoor wall-mount type: Oberon #1023-00

2.10 LABELS

A. Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer, or hand-held printer.

B. Horizontal Cable Labels
1. Labels shall be adhesive backed and have a self-laminating feature
2. Labels shall wrap around the cable's jacket.
3. Printable Area: size: 2" x 0.5", minimum; color: white
4. Manufacturer, or equal: Panduit
   a. #LJSL7-Y3-1; laser/ink jet labels for cable diameters 0.16"-0.32", white

C. Outlet Faceplate and Port Labels
1. Labels shall be adhesive backed.
2. Port labels shall fit above the port without overlap to the next port or to the port itself.
3. Manufacturer, or equal: Panduit

a. #C125X030FJJ; "Equipment Room Identifier" label, for laser printer
b. #C061X030FJJ; "Unique Cable Number" label, for laser printer

D Modular Patch Panels
1. Labels shall be adhesive backed.
2. Labels shall fit above the port without overlap to the next port or to the port itself.
3 Printable Area: size: 0.61" x 0.33", minimum; color: white.
4 Manufacturer, or equal: Panduit #CPPLF-5; laser labels for modular patch panels, white

E 110 Termination Block Labels
1 Color: Blue for horizontal termination field
2 Manufacturer, or equal: Panduit #DSL110-BU; label inserts, blue.

2.11 MISCELLANEOUS COMPONENTS

A Velcro Cable Ties
1 Width: .75".
2. Color: Velcro cable ties shall be the same color as the cable to which it is being applied.
3. Manufacturer, or equal: Panduit #HLS-15R-0 Black, 15' roll, cut to length

PART 3 - EXECUTION

3.01 GENERAL

A Comply with the Execution requirements of Section 27 00 00.

B Install products, components, accessories, hardware, etc, according to the manufacturer's instructions.

3.02 EXAMINATION

A Pathways: Prior to installation, verify pathways are complete and ready for cables.

B Equipment Rooms: Prior to installation, verify equipment rooms are complete and ready for cables.

3.03 INSTALLATION

A Horizontal Cable
1. General
a Cable runs shall have continuous sheath continuity, homogenous in nature. Splices are not permitted anywhere.
b Maintain maximum cable length of 90 meters from the termination in the Telecommunications Room to the termination at the outlet.
c A cable bundle shall contain no more than 24 individual cables.
2. Color:
a. Provide Blue cables for data links.
b. Provide Gray cables for voice-only links.
3. Installation
a. Maintain a minimum bend radius of 6 times the cable diameter during and after installation.
b. Maintain pulling tension within manufacturer's limits.
c. Protect cable during installation. Replace cable if damaged during installation.

d. Place cables with no kinks, twists, or impact damage to the sheath
e. Place and suspend cables in a manner to protect them from physical interference or damage.

4. Routing
a. When routing horizontally within Telecommunications Room, utilize the overhead cable support. When routing vertically within Telecommunications Room, fasten the cable bundles using approved cable ties to the wall-mounted vertical cable support every 24 inches on center.
b. Route cables a minimum of 6" away from power sources to reduce interference from EMI.
c. When routing cables in areas without primary horizontal pathways, install cables onto secondary pathways or approved support devices, such as cable hangers.
d. Route cables at 90-degree angles, allowing for bending radius along corridors for ease of access. Do not route through an adjacent space if a corridor borders at least one wall of the room.
e. Provide a 10 feet (minimum) sheathed cable slack loop at each end of the run. In the Telecommunications Room, place the slack in the overhead cable support. At the workstation, place cable in ceiling space before the device conduit stub supported from a cable hanger.
f. Provide six inches (minimum) of sheathed cable slack behind each workstation outlet faceplate. The slack cable shall be coiled inside the device box, the surface raceway, or within the wall, in accordance with the cabling manufacturer's installation standards.
g. At the equipment bay in the Telecommunications Room where floor-standing racks are used, divide horizontal cables equally between both sides of an equipment rack such that a cable does not travel past the midpoint of the rack prior to termination. At the equipment bay in the Telecommunications Room where wall-mounted racks are used, route the horizontal cables down the hinged side of the equipment rack.

5. Termination
a. Properly (per manufacturer's instructions and TIA/EIA-568-B standard installation practices) strain relieve cables at termination points.
b. Terminate pairs on the specified connecting hardware. Perform terminations in accordance with manufacturer's instructions and TIA/EIA-568-B standard installation practices.

B. Patch Panels and Horizontal Management Panels
1. Provide discrete patch panels in a quantity to allow termination of data cables served from respective IDF.
2. Install the discrete patch panels and horizontal management panels in the configuration as shown on the Drawings. Install panels level.

C. Outlet Faceplates
1. Install faceplates plumb, square, and at the same level as adjacent device faceplates.
2. Patch gaps around faceplates so that faceplate covers the entire opening.
3. For surface raceway, color shall match electrical device and/or coverplate.

D. Outlet Modular Connectors
1. Terminate pairs on the specified modular connector. Perform terminations in accordance with manufacturer's instructions and TIA/EIA-568-B standard installation practices.
2. Replace terminations and connectors not passing the required media test.

E. Courtesy/ Campus Telephone
1. Provide backing plate.
2. Install phone unit to height noted in Drawings and per manufacturer's instructions, and in compliance with codes.
3. Obtain extension number from ITS.
4. Provide permanent label on phone unit that displays the telephone's extension.

F. Wireless LAN Access Point Enclosures
1. Refer to Drawings for enclosure cabling service and installation requirements.

G. Cords and Crossconnects
1. Refer to Telecommunications Outlet Schedule of the Drawings for cord (workstation, Telecom Room, and other) patching and crossconnecting requirements.
2. Splices in patch cords and crossconnect wire are prohibited.
3. Record crossconnections in IDFs for MDF crossconnection purposes and for record documents.
4. Color:
   a. For digital handsets, provide: White-Blue / Blue-White
   b. For analog handsets, provide: White-Red / Red-White

3.04 LABELING

A. General Requirements
1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner's Representative before installation.
2. Labels shall be permanent with machine-generated text; hand-written labels will not be accepted.

B. Label Formats
1. Horizontal Cable Labels
   a. Text Attributes:
      1) Black,
      2) 1/8" high, minimum, or #12 font size.
      3) Font: Verdana preferred, or SansSerif or Arial acceptable.
   b. Install labels on both ends of cables no more than 4" from the edge of the cable jacket. Install labels such that they are visible by a technician from a normal stance.
2. Modular Patch Panel Labels
   a. Use modular patch panel labels included in the product packaging. (Approval by the Owner shall be required for other labels.)
   b. Use a label color for the respective field type, per TIA/EIA-606.
   c. Text Attributes: Black, 3/32" high, minimum, or #10 font size.
3. Outlet Labels
   a. Text Attributes: Black, 1/8" high, minimum, or #12 font size.
   b. Provide an "Equipment Room Identifier" label at the top of the faceplate with the serving telecommunication room's identifier (refer to 27 11 00 for telecommunication room identifier assignment).
   c. Provide a "Unique Cable Number" label above each port with the link's unique cable number.

C. Identifier Assignment
1. Horizontal Cables / Cabling Link: Assign each cable a unique number, in ascending order beginning with the number 1.
2. Outlet Ports: The outlet ports shall be identical to the unique cable number.

3. Modular Patch Panel Ports: The modular patch panel ports shall be identical to the unique cable number

3.05 FINAL INSPECTION

A. Inspect installed products and work in conjunction with the Owner. Develop a punchlist for items needing correction.

B. Issue punchlist to the Owner for review prior to performing punchlist walk.

C. Repair defects prior to system acceptance

D. Inspect installed products and work in conjunction with the Owner for sign off

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

SECTION 27 53 13

CENTRAL CLOCK SYSTEM

INTERMOUNTAIN ELECT. CO
SAN CARLOS, CA
650-591-7118
SUBMITTAL #14.1

PART 1 - GENERAL

1.01 SUMMARY

A. General: The district utilizes a Simplex central clock system that provides synchronized timepieces throughout its three colleges and the district administration building. Provide, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to complete a working Central Clock system installation, as described in these specifications.

AMERICAN #A55BHAA522 RFI #69

B. Section Includes:
   1. Secondary field clocks (~~Simplex #6310-9231~~) capable of connecting to a SIMPLEX 6351 Master Clock System
   2. Secondary clock cable requirements

C. Products Specified But Not Installed Under This Section:
   1. Secondary clock single gang back boxes with ¾" conduit to accessible ceiling space

D. Related Sections:
   1. Comply with related section paragraphs of section 27 00 00 Telecommunications Basic Requirements.
   2. Comply with related section paragraphs of section 27 13 10 Telecommunications backbone ISP cabling.
   3. Comply with related section paragraphs of section 27 13 14 Telecommunications backbone OSP cabling.
   4. Comply with related section paragraphs of section 27 15 13 Telecommunications horizontal cabling.
   5. Comply with related section paragraphs of section 26 01 00 Basic materials and methods.

1.02 SYSTEM DESCRIPTION

A. Overview
   1. Central clock system (Existing) will provide a centrally located clock controller to maintain accurate time and adjustment to secondary clocks (New) located in classrooms, offices and administration areas throughout the campus distribution system.

1.03 SUBMITTALS

A. Contractor Qualifications: Submit certification letters for District clock manufacturer "Simplex".

B. Product Data: Submit product information for components specified herein. Refer to Section 280000 for format and requirements.

C. Shop Drawings: Submit shop drawings in accordance with Division 1. Refer to Section 280000 for format and requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

AMERICAN MODEL # A55BHAA5Z2 RFI #69

A. Secondary Clocks: Use ~~Simplex model 6310-9231~~ for secondary surface mounted clocks or equal.

1. 12" diameter round black frame.
2. Black Arabic numerals.
3. ~~Use a continuous sweeping second hand.~~
4. Surface mounted on the wall.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secondary Field Clocks
   1. Provide single gang back box with ¾" conduit to accessible ceiling space at 96" AFF (provided by electrical contractor).
   2. Route connection cable to single gang back box.
   3. Install clock making connection to cable in single gang back box.

END OF SECTION

SECTION 28 00 00

BASIC SECURITY SYSTEM REQUIREMENTS

INTERMOUNTAIN ELECTRIC CO. W/NETVERSANT
SAN CARLO, CA
650 591-7118
SUBMITTAL # 30

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes general administrative and procedural requirements for Sections numbering 28xxxx, and is intended to supplement, not supersede, the requirements specified in Division 1.

B. Related Sections.
1. General: Consult all other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
2. Related Sections:
   a. Section 078400: Firestopping
   b. Section 087100: Door Hardware
   c. Section 081000: Doors and Frames
   d. Section 281300: Access Control & Alarm Monitoring System
   e. Section 282300: Video Surveillance System
   f. Section 280513: Security System Cabling
   g. Section 280553: Security System Labeling
   h. Section 280800: Security System Commissioning
   i. Section 142400: Hydraulic Elevators
   j. Section 260529: Hangers and Supports for Electrical Systems
   k. Section 260533: Raceway and Boxes for Electrical Systems
   l. Section 210900: Instrumentation and Control for Fire-Suppression Systems
3. General and Supplementary Conditions: Drawings and general provisions of Contract and Division 1 of the Specifications, apply to 28xxxx series Sections.

1.02 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.

B. Codes: Perform work in accordance with all applicable requirements of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
1. National Electric Code (NEC), NFPA 70.
2. California Code of Regulations (CCR) Title 24, California Building Standards Code Part 2, Basic Building Regulations and Part 3, California Electrical Code (CEC)
3. Uniform Building Code (UBC)
4. Uniform Fire Code (UFC).
5. Uniform Mechanical Code (UMC).
6. National, State, Local and any other binding building and fire codes.
7. FCC Regulations: Part 15 – Radio Frequency Devices & Radiation Limits.
8. Underwriter's Laboratories (UL): Applicable listing and ratings.
   a. UL 294:Access Control System Units
   b. UL 1076:Proprietary Burglar Alarm Units and Systems
9. EIA testing standards

C. Make a copy of each document readily available during the course of construction for reference by field personnel.

1.03 DEFINITIONS

A. The Definitions of Division 1 shall apply to the 28xxxx sections.

B. In addition to those Definitions of Division 1, the following list of terms as used in this specification shall be defined as follows:

1. "Furnish": To purchase, procure, acquire, and deliver complete with related accessories.
2. "Install": To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the University, all parts, items, or equipment supplied by contractor. Installation shall be complete and ready for regular operation.
3. "Provide": To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation.
4. "Connect": To install all required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
5. "As directed": As directed or instructed by the Owner, or their authorized representative.
6. "Cabling": A combination of all cables, wire, cords, and connecting hardware [e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling].
7. "ACAMS": Access Control & Alarm Monitoring System.
8. "SEC": Security Equipment Panels.
9. "VSS": Video Surveillance System.

1.04 SYSTEM DESCRIPTION

A. Overview: Reference project specific scope.

B. Drawings

1. Layout: Follow the general layout shown on the Drawings except where other work may conflict with the Drawings.
2. Accuracy: The Drawings show a diagrammatic representation of the system within the constraints of the symbology applied.
3. The Drawings do not fully represent the entire installation for the Security System. Drawings indicate the layout and location of control components, as well as location of security devices, i.e. card readers, door locks and contacts, glass break detectors, etc. The Drawings do not show all conduits, wire and cabling between every system component, equipment, device, etc.
4. Provide detailed point-to-point diagrams that allow the Contractor to achieve desired results using their own procedures and methods. Submit CAD shop drawings for review prior to installation.

C. Contractors Design Requirements

1. The Project Drawings represent the level of system design to be provided by the engineer. Contractor shall provide all additional system design work required, including:
   a. Conduit layout and sizing.
   b. Wire and cable layout and sizing including type and quantity.
   c. Point-to-point wiring and equipment hook-up information.
   d. Equipment mounting details.
   e. Design of equipment cabinets and interface components.
   f. System one-line or block diagram.
   g. Other detailed design work required.

h. Reflected ceiling plan for devices installed in ceiling

2 Obtain shop drawings of other related systems that require integration and coordinate means and methods to complete the system as described and specified in these sections.

1.05 SUBMITTALS

A General: Submit required submittal(s) in accordance with General Conditions of the Contract, and Division 1 Submittal Procedures Section 013300.

B Cover Letter: Include a cover letter stating that the submittal is in full compliance with the requirements of the Contract Documents. List in full the items and data submitted, signed (and stamped, if applicable) by the person who prepared the submittal. Failure to comply with this requirement shall constitute grounds for rejection of submittal.

C Submittal Description: Product Data

1 General: Product data submittals must be approved by the Owner prior to release of order for equipment and prior to installation.

2 Quantity: As noted in Division 1 (minimum of four).

3 Format:

a Provide each product data submittal in a 3-ring binder with front cover and spine clear pockets for insertion of the submittal information.

b Clearly label the cover and the spine of each submittal with the following information:

1) Client Name (e.g., "CSM")
2) Project Number and Contract Number.
3) Project Name and Address (e.g., "Building 9").
4) Contractor's Submittal Number.
5) Submittal Title (e.g., "Product Data Submittal For ACAMS System").
6) Specification Section Number (e.g., "Section 13710").
7) Date of Submittal. Format: <month> <day>, <year> (e.g., "January 1, 2007").
8) Contractor Name.

c Include a Table Of Contents at the beginning of the submittal that lists materials by article and paragraph number found in the section and in the order outlined in the specification (e.g., "2.03-b Card Reader").

d Include tabbed separators for improved navigation through the submittal.

e Delivery dates for all equipment.

4 Content:

a. Product Information:

1) Include product data consisting of manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary). This data shall clearly describe the product's characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements.

2) Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories, which are included and those which are excluded.

3) Include delivery dates for equipment.

D Submittal Description: Shop Drawings.

1 General: The Owner must approve shop drawings prior to release of order for equipment and prior to installation.

2. The Owner will provide electronic files via e-mail or via CD-ROM containing the contract documents drawing files for use in preparing shop drawings.
3. Quantity & Media: Furnish quantity and on media specified in Division 1.
4. Format:
   a. Use AutoCAD Release 14 or later.
   b. Use the same sheet size and project title block as the Drawings.
   c. Text a minimum of 3/32" high when plotted at full size.
   d. Use identical symbols as those in the Design Drawings.
   e. Screen background information.
   f. System components (devices, cable routes, etc.) and text shall be plotted at a sufficient line weight to stand out against background information.
   g. Each sheet in the shop drawings set shall be labeled with the Specification Section Number (e.g., "282300").
   h. Scaling:
      1) Floor plans shall be scaled at 1/8"=1'-0".
      2) Enlarged room plans shall be scaled 1/4"=1'-0".
      3) Wall elevations shall be scaled 1/2"=1'-0".
5. Content:
   a. Floor Plans:
      1) Floor and site plans showing the locations of all devices and door furniture associated with each door locations (ex: contacts, rex locks, card readers) and cable routing paths with cable type and quantity called out. Prepare cable schedule if required to simplify sheet plan notation.
      2) Provide termination information for each device on the plans or in a schedule that identifies the physical connections to the equipment panels. Include the panel address, and the termination point ID that is consistent and reflective of the programming fields.
   b. Point-to-Point Diagrams: Include all wiring, points of connection and interconnecting devices.
      1) Include all miscellaneous control relays.
      2) Include all devices connected to the system.
      3) Identify all conductors on the point-to-point diagrams with the same tag as the installed conductor.
   c. Block Diagram/Riser Diagram: Show the system components and all conduit and wire types and sizes between them including all cabling interties between termination hardware.
   d. Installation Details: Include installation details for all devices.
   e. Seismic Calculations: As part of the shop drawings submittal where applicable, the manufacturer shall provide anchorage calculations for floor mounted fully loaded distribution frames such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Structural Calculations shall be prepared and signed by a California Registered Structural Engineer. Specify proof loads for drilled-in anchors, if used. Seismic calculation shop drawings shall be wet stamped and signed by a registered structural engineer.

E. Submittal Description: Labeling Sample.
1. Quantity & Media: Furnish quantity indicated in Division 1.
2. Submit two sets of physical product samples for review and comment by Owner prior to the installation of equipment:
3. Content:
   a. Provide panel label.

b. Provide cable label on a cut length of cable.

F. Submittal Description: Record Drawings.
1. Quantity & Media:
a. Submit a single set of half size prints of record drawings for review by the Owner.
b. Upon receipt of the Owner's review comments, make corrections and furnish the following record drawings:
1) Four half-size sets on bond (or "eco-bond")
2) One CD-ROM
3) One 11x17 set in the Record Documents Manual
c. Drawings become Owner's property and shall maintain all ownership rights.
2. Format:
a. Prepare record drawings using AutoCAD Release 14 or later
b. Use the same sheet size and project title block as the Drawings
c. Text a minimum of 3/32" high when plotted at full size
d. Use identical symbols as those in the Drawings
e. Screen background information.
f. All system components (devices, cable routes, etc.) and text shall be plotted at a sufficient line weight to stand out against background information.
3. Content:
a. Fully represent actual installed conditions and incorporate all revisions made during the course of construction
b. Include drawings submitted as part of the Shop Drawing package, plus any additional information required to accurately document installed conditions.
c. Device addresses & IP address information
d. Floor plans shall show:
1) Locations and identifiers of all devices
2) Size, quantity, location, and routes of all pathways (such as cable trays, conduits, J-hangers, and other cable support devices).
e. Equipment room floor plans scaled at 1/2"=1'-0" showing exact placement of all equipment cabinets/frames, rack bays, and other equipment.
f. Wall elevations scaled at 1"=1'-0" showing exact placement of all security system hardware (e.g., SECs,)
g. Installation details.

G. Submittal Description: Operation and Maintenance Manuals
1. Quantity: Furnish four O & M Manuals.
2. Format:
a. Furnish each O & M Manual in a white, 3-ring binder with front cover and spine clear pockets for insertion of the project information.
b. Clearly label the cover of each O & M Manual with the following information:
1) Client Name.
2) SMCCCD Project and Contract Numbers.
3) Project Name and Address.
4) Manual Name (e.g., "Operation And Maintenance Manual for ACAMS System).
5) Date of Submittal. Format: <month> <day>, <year> (e.g., "January 1, 2007")
6) Contractor Name
c. Include a Table Of Contents at the beginning that lists the contents.
d. Include tabbed separators for improved navigation through the manual

3. Content:
   a. Functional Design Manual: Includes a detailed explanation of the operation of the system.
   b. Hardware Manual which includes:
      1) Pictorial parts list and part numbers
      2) Pictorial and schematic electrical drawings of wiring systems, including devices, control panels, instrumentation and annunciators
      3) Telephone numbers for the authorized parts and service distributors.
      4) Include all service bulletins.
   c. Operator's Manual which full explains all procedures and instructions for the operation of the system and includes:
      1) System start up and shut down procedures
      2) Use of system
      3) Equipment recovery and restart procedures
      4) Reader command functions
   d. Maintenance Manual which includes:
      1) Instructions for routine maintenance listed for each component, and a multi-page summary of all components' routine maintenance requirements.
      2) Detailed instructions for repair of the security system.
      3) A summary of the TCP/IP address used and which system component they are associated with. Include the gateway address, subnet mask, DNS server, and host name information.
      4) Manufacturer's warranty certificates.
   e. Record Drawings Manual: 11"x17" prints of Record Drawings, as described above.

H. Resubmittals: Include a cover letter listing the action taken and revisions made to each product submittal in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

1.06 QUALITY ASSURANCE

A. Contractor Qualifications
   1. Primary business locations from which project management, installation technicians, and service personnel are dispatched must be within 50 miles of the city of San Mateo, to ensure response time for technical assistance within 4 hours.
   2. At least 5 years of experience, and a minimum of five satisfactory completed projects similar in scope and cost.
   3. Provide a resume of satisfactory evidence of project manager, foreman, and lead technician's qualifications and certifications by the manufacturer for the work
   4. A current AMAG "Global Security Management" Certification indicating that contractor has attended training and successfully completed the training course.
   5. A current, active, and valid C7 or C10 California State Contractors License.
   6. Authorized reseller/dealer, warranty provider, and a factory certified installer of the AMAG security system at the Global Level

B. Permits and Inspections
   1. Obtain and pay for permits and inspections required for the work.
   2. Furnish materials and workmanship for this work in conformance with applicable legal and code requirements

C. Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of any legal authority having jurisdiction.

D. Obtain review from compliance officials responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with all requirements of reference codes indicated herein.

E. Materials
1. Provide new and unused materials, equipment, and parts of current manufacturer, and without defects for the units specified herein.
2. Furnish only specified products and equipment, or products and equipment that have been approved in writing.

F. Regulatory Requirements
1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Nothing in these specifications is to be construed to permit work not conforming to the most stringent of the applicable codes.
2. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
3. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this series of Sections, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The Contract Documents address the minimum requirements for construction.

1.07 PROJECT MANAGEMENT AND COORDINATION SERVICES

A. Overview: Provide a project manager/engineer for the duration of the project to coordinate the security system work with all other trades. Coordination services, procedures and documentation responsibility shall include, but shall not be limited to the items listed in this section.
1. Obtain copies of all shop drawings and product data for equipment provided by others that require security connections or interface with the security system work.
2. Prepare and maintain a shop drawing review log indicating the following information:
   a. Shop drawing number and brief description of the system/material
   b. Date of your review
   c. Indication if follow-up coordination is required.

B. Request for Information (RFI)
1. Thoroughly review the contract documents prior to the preparation and submission of an RFI. If an RFI is submitted, attach 8 1/2" x 11" copies of all relevant documents to clarify the issue.
2. Prepare and maintain an RFI log using a Microsoft Excel spreadsheet indicating the following information:
   a. RFI number and brief summary of the issue
   b. Date of issuance and receipt of response.

C. Scheduling of Work
1. Prepare work schedules for each floor indicating the following information:
a. Cable installation dates.
b. SEC buildout dates.
c. Device installation dates.
d. Programming dates.
e. Testing dates.

D. Role of the Engineer
1. During the construction phase of the project, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and 'process') relevant Requests for Information (RFIs), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for general compliance with the Contract Documents and to ensure that the installation meets the design intent of the system.
3. In summary, the Engineer will perform the following specific services during the construction phase:
a. Review product submittals and shop drawings for general compliance with the contract drawings and specifications.
b. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.
c. Interpret field problems for Owner, and translate into understandable language.
d. Review the testing procedures to confirm compliance with industry-accepted practices.

1.08 DELIVERY, STORAGE AND HANDLING

A. Delivery
1. Do not deliver products to the site until protected storage space is available. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels (name of the manufacturer, product name, type, grade, UL classification, etc) intact
3. Replace materials damaged during shipping at no cost to the Owner.

B. Storage
1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.
2. Comply with manufacturer's requirements for each product. Comply with recommended procedures, precautions or remedies as described in the Material Safety Data Sheets (MSDS) as applicable.
3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
4. Storage outdoors covered by rainproof material is not acceptable.
5. Provide heat where required to prevent condensation or temperature related damage.

C. Handling
1. Handle in accordance with manufacturer's written instructions.
2. Damaged equipment shall not be installed.
3. Replace damaged equipment at no cost to the Owner.
4. Handle with care to prevent internal component damage, breakage, denting, and

scoring

1.09 WARRANTY

A. Provide a one-year parts and service warranty at no additional cost to the Owner.

B. Warranty begins when system commissioning is completed, punchlist items resolved, and Owner provides in writing acceptance of system.

C. The warranty package shall include but not necessarily be limited to the following:
1. Emergency maintenance service on regular working hour basis
2. Service by factory trained and employed service representatives of system manufacturer

D. Maintain regular service facilities and provide a qualified technician familiar with this work at the site within four (4) hours of receipt of a notice of malfunction including weekends and holidays. Provide material, devices equipment and personnel necessary for repairs. Install approved temporary, alternate equipment if required by the Owner, complete and operational within twenty-four (24) hours after notification of a malfunction, at no additional cost.

E. Conduct warranty repairs and service at the job site unless in violation of manufacturer's warranty; in the latter event, provide substitute systems, equipment and/or devices, acceptable to the Owner, for the duration of such off-site repairs. Transport warranty substitute and/or test systems, equipment, devices, material, parts and personnel to and from the job site at no additional cost.

PART 2 - PRODUCTS NOT USED – REFER TO ADDITIONAL SECURITY SECTIONS FOR PRODUCT DETAIL.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

B. Verify that all penetrating elements and supporting devices have been properly installed, and that all temporary lines, and markings, have been removed.

3.02 PREPARATION

A. Staffing
1. Provide a qualified foreman in charge of the work at all times and be present at the job site at all times during the installation of the work.
2. Provide a supervised work force capable of performing the installation within the restraints of the construction schedule.

B. Project Management
1. Prepare an overall construction schedule based on the results of the planning meetings with the Owner.

2. Prepare updated schedules whenever there are modifications. Coordinate and attend weekly status meetings to review the overall progress and issues to be resolved throughout the course of construction. The Contractor is responsible for preparing and distributing meeting agenda prior to and meeting notes after all meetings in a format acceptable to the Owner.

3.03 INSTALLATION

A. General
1. Perform this work in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.
2. The work shall be performed by skilled installers under the direction of experienced technician, all of whom shall be properly trained and qualified for this work.
3. A complete, operating system shall be provided. Include all devices specified including basic components and accessories, interconnecting wiring and other equipment and installation devices necessary for a complete system as specified.
4. Provide wire, system cabinets, system devices, etc , shall be in accordance with applicable codes for systems as specified. Label all wiring and equipment.
5. The control equipment and wiring shall be installed in a neat and workmanlike manner by trained mechanics or electricians.
6. Auxiliary and incidental equipment necessary for the operation and protection of the systems specified in this section shall be furnished and installed as if specified in full herein.
7. Install the Security System with the full support of the manufacturer of the system components.

B. Coordination
1. Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner during the entire installation. Change of supervisor during the project shall not be acceptable without prior written approval from the Owner.

C. Boxes, Panels, and Enclosures
1. Install all boxes, panels, and enclosures square and plumb. Set "flush mounted" units so that the face of the cover, bezel or escutcheon shall be in the same place as the surrounding finished surface. Mount boxes, panels and trim so that there are no gaps, cracks or obvious lines between the trim and the adjacent finished surface and ready them to receive final finish, as applicable.
2. Install insulating terminations in signal circuit boxes, panels, wireways or enclosures of this section.
3. Write the destination for every conduit entering a door junction box, SEC enclosure, or wireway using a black permanent ink marker next to the conduit inside the box
4. Provide tamper switches on all enclosures that are accessible and below the ceiling.

D. Painting: Custom paint devices as indicated on the drawings.

3.04 REPAIR/RESTORATION

A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.

B. Punch List:
1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.

2. Provide punch list to Owner for review prior to performing punch walk with the Owner.

C. Re-Installation:

1. Make changes to adjust the system to optimum operation for final use. Make changes to the system such that any defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
2. Repair defects prior to system acceptance

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
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SECTION 28 05 13

SECURITY SYSTEM CABLING

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7118
SUBMITTAL # 30

PART 1 - GENERAL

1.01 SUMMARY

A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working security system installation, as described in these specifications.

B. Section Includes: Wiring and cable.

C. Related Sections:
1. Consult other Divisions; determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
2. Section 280000: Basic Security System Requirements.
3. Section 281300: Access Control and Alarm Monitoring System
4. Section 282300: Video Surveillance System
5. Section 280553: Security System Labeling
6. Section 280800: Security System Commissioning
7. Section 078400: Firestopping
8. Section 260533: Raceways and Boxes

1.02 SUBMITTALS

A. Submit in accordance with the requirements of Section 280000: Basic Security System Requirements, the following items: Product Data.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE

A. General
1. Provide all necessary cable supports and J-Hangers dedicated for security cable
2. Do no share conduits with fire alarm or telecommunications systems.
3. Provide required wire and cable sized to allow for voltage drop on long runs and effectively shielded as required to allow the routing of 12 & 24V power and video signal cable in the same conduit without interference or signal noise.
4. Cable installed outdoors or in underground conduit must contain a PVC or Polyethylene jacket, flooded to prevent water intrusion.
5. Cables installed outdoors or in underground conduit that transition into the building and run in plenum space to contain a plenum rated (type CMP) jacket and contain water block material to prevent water intrusion.
6. Cables installed indoors to contain a plenum rated jacket (type CMP).

B. Manufacturers:
1. Westpenn
2. Belden
3. Commscope.
4. Or Equal

C. Access Control System
1. Provide plenum rated cable by Westpenn, Belden, Commscope, or equal.
   a. #22-4 conductor unshielded: door contacts, glass break detectors, rex detectors
   b #16-2 AWG unshielded: low current lock power.
   c. #16-2 AWG unshielded: Lock power from PS-873 to Exit Device (panic hardware).
   d #18-2 AWG unshielded: Low current relays and card reader power.
   e #22/2 pr unshielded: 20mA card reader data.
   f. #22-8 conductor unshielded: Door Management and Exit Alarms.
2. Provide self-adhesive flat tapewire on all existing wood doors for lock power transfer from hinge to lock.
   a Install tape wire in routed channel along edge of door.
   b. Fill channel with silicone after lock has been tested
   c. Manufacturer: Taperwire 222-CL.
   d. Refer to architectural details and section 8212 Flush Wood Doors for additional information.
   e. Power locks to ensure continuity of circuit.
   f. Refer to Section 08710 and door schedule in Section 13710 for locations.

D. Video Surveillance System
1. Provide plenum rated cable by Westpenn, Belden, Commscope, or equal. #18-2 AWG unshielded: camera power.
2. Provide minimum RG-59/U CCTV video coaxial cable between the camera and the monitoring equipment, with the following features:
   a. 95% percent copper braid.
   b. Foam dielectric.
   c. Solid copper core.
   d 75 ohm characteristic impedance.
   e. Plenum jacket.
3. Manufacturer: West Penn #25815.
4. Provide West Penn #825 with a black jacket for CCTV video cross-connect/patch cabling under 15' in length.

E. Video Surveillance System
1. Provide plenum rated cable by Westpenn, Belden, Commscope, or equal:
   a. #18-2 AWG unshielded: camera power.
2. Provide minimum RG-59/U CCTV video coaxial cable between the camera and the monitoring equipment, with the following features:
   a. 95% percent copper braid.
   b. Foam dielectric.
   c. Solid copper core.
   d. 75 ohm characteristic impedance.
   e. Plenum jacket.
3. Manufacturer: West Penn #25815.
4. Provide West Penn #825 with a black jacket for CCTV video cross-connect/patch cabling under 15' in length.

2.02 SURFACE MOUNTED RACEWAY

A. General
1. Surface mounted raceways are required at card reader doors that are set in existing concrete openings and the opportunity for concealed in wall conduit is not available.

2. Provide surface mounted steel raceways according to door details and where devices are visible and no accessible ceiling exists. Exceptions include MEP spaces and IT rooms.
3 Fasten raceway to concrete with ¼" TAPCON anchors or approved equal.
4 Size raceways to accommodate feeder cables to junction box at doors and from junction boxes to devices
5 Manufacturer: Wiremold V500/V700 & V4000 Raceways Use combinations of series to accommodate cable fill and junction boxes.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Identify all wire and cable clearly with permanent labels wrapped about the full circumference within one (1) inch of each connection. Indicate the number designated on the associated field or shop drawings or run sheet, as applies. Assign wire or cable designations consistently throughout a given system; i e., each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations. Additionally, provide labels where wire and cable first enter and exit from conduit, junction or distribution boxes; labels shall be located within six (6) inches of the point of exit. Labels shall be by Brady, Thomas and Betts, or equal.

B. Secure all wire and cable run vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Non-coaxial cables shall be secured by screw-flange nylon cable ties or similar approved devices, Thomas and Betts or equal. Symmetrical clamping devices with split, circular or other wire conforming, nonmetallic bushings shall be provided for all other cables.

C All wire and cable shall be continuous and splice-free for the entire length of run between designated connections or terminations.

D. Make all connections to screw-type barrier strips on panels and with insulated crimp-type spade lugs when appropriate. Size all lugs properly to assure high electrical integrity, i e , low resistance connections.

E. Lace, tie or harness wire or cable as required herein, and in accordance with accepted professional practice. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point.

F. Wiring for shielding certain conductors from others or routing in separate raceways, shall be as recommended by the manufacturer's current requirements.

G All wiring shall be installed in a continuous steel conduit system when not located above accessible ceiling and shall be of the size recommended by the equipment supplier

H Provide all necessary tie wires.

I. Label all cables at both ends of a run and within all pull and junction boxes using machine generated wrap-around labels.

J. Follow manufacturers recommended guidelines for installation.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

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Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
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3 – Insufficient information to review.
F – Forward specified item.

SECTION 28 05 53

SECURITY SYSTEM LABELING

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7178
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working security system installation, as described in these specifications.

B. Section Includes: Labeling.

C. Related Sections:
1. Consult other Divisions, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
2. Section 280000: Basic Security System Requirements.
3. Section 281300: Access Control & Alarm Monitoring System
4. Section 282300: Video Surveillance System.
5. Section 280513: Security System Cabling.

1.02 SUBMITTALS

A. Submit in accordance with the requirements of Section 280000: Basic Security System Requirements, the following items:
1. Product Data.
2. Label Samples: Submit the following for review and comment prior to the and installation of equipment:
   a. Enclosure labels
   b. Wire and cable labeling detail for all termination points
   c. Include physical samples of each labeling material

PART 2 - PRODUCTS

2.01 LABELS

A. Phenolic two tone for exterior mounting on Enclosures. White lettering on black background.

B. Wire and Cable labels:
1. Provide self-laminating adhesive laser labels
2. Labels shall be machine printable with a laser printer.
3. Text Attributes:
   a. Black.
   b. 1/8" high, minimum, or #12 font size.
   c. Font: Verdana preferred, SansSerif, or Arial acceptable.
4. Printable area: 1.0" X .375" and 1.0" X 0.50"
5. Cable size: 0.16 – 0.32" OD
6. Color: White
7. Manufacturer:

a. Brady wire marking labels WML–211-295 and WML-311-292
b Thomas and Betts
c Or Equal

PART 3 - EXECUTION

3.01 INSTALLATION

A. Label all wiring and equipment.

B. Identify wire and cable clearly with permanent labels wrapped about the full circumference within one (1) inch of each connection. Indicate the number designated on the associated field or shop drawings or run sheet, as applies. Assign wire or cable designations consistently throughout a given system; i.e., each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations. Additionally, provide labels where wire and cable first enter and exit from conduit, junction or distribution boxes; labels shall be located within six (6) inches of the point of exit.

C. Label all cables at both ends of a run and within all pull and junction boxes using machine generated wrap-around labels.

D Boxes, Panels, and Enclosures
1. Write the destination for every conduit entering a door junction box, SEC enclosure, or wireway using a black permanent ink marker next to the conduit inside the box.
2 Install approved labels on the outside of each SEC and relay termination enclosures.

3.02 LABELING

A General Requirements
1. Physically label all of the security system components. The components include, but are not limited to, the following:
   a. Enclosures
   b Cables (both ends)
   c Terminal blocks
   d. Relays
   e. Patch panels, and the termination positions within the patch panels
2. The ends of all cables must be permanently marked with machine-generated or stenciled (not handwritten) wrap around labels with a self-laminating feature, according to current practice and as approved by Owner before installation
3. Components, such as racks and patch panels, must be permanently marked with machine-generated labels, according to current practices and as approved by the Owner before installation
4 Labels shall coincide with device id's use on the record drawings.

B. Equipment Enclosures
1. Label all Enclosures, alarm monitoring, and powers supply enclosures associated with the security system with an adhesive backed phenolic label. Use 12 point text.
2. Labels shall be represented in and match the security system record drawings.

C Security Devices
1. Label all equipment associated with the security system with a permanent machine generated, laminated, label. Use 12 point text with a clear background. Use white or black lettering depending upon the color of the device.
2. Label device in a concealed location with the system point number and address.
3. Label power supply batteries with the month and year they were installed.

D Wire and Cable
1. Label all wire and cable associated with the security system with permanent machine generated, laminated, labels. Use 12 point, black text on a white label
2. All wire and cable labels shall be clearly visible without the need to remove wire management or any other obstructions.

E Cable Label Format
1. Obtain label format document from District or use the following:
2. From Panel to Field Device
   a. Line 1: Device Type and Device Number
   b. Line 2: Panel ID – Port Number
   c. Example: CR 001
   d. Standard Device Types: ACU 1-KP5
3. KP = Keypad
   a. R = Relay Output
   b. A = Alarm Point
   c. Standard Port #
      1) M = Monitored Input
      2) R = Relay Output
4. Miscellaneous Examples:
   a. From Panel to Door Contact
   b. A001
   c. D C.
   d. From Panel to Glass Break
   e. A001
   f. GB PWR
   g. 12 VDC
5. Communications Cable
   a. Line 1: Communication Type and Direction
   b. Line 2: Panel ID
   c. Example: 20MA TO
   d. Typical Communication Types: ACU-2
   e. 10BASE-T
   f. RS485
   g. RS 232
   h. RS 422
   i. 20mA

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
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M – Make corrections noted. Resubmittal not required if installation complies with notes.
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SECTION 28 08 00

SECURITY SYSTEM COMMISSIONING

INTERMOUNTAIN ELECTRICCO W/ NETVERIANT
SAN CARLOS, CA
650 591-7178
SUBMITTAL #30

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. General: Furnish all engineering, labor, materials, apparatus, tools, equipment, and transportation required to test a completed security system installation as described in these specifications.

B. Base Bid Work: Full testing of completed security system which includes:
1. Complete pretest of the security system.
2. Final walk test with the Owner.
3. Test Results Record Documentation.

C. Related Sections:
1. Consult all other Divisions, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to test a complete and operable system.
2. Section 280800: Basic Security System Requirements.
3. Section 281300: Access Control and Alarm Monitoring System (ACAMS)
4. Section 282300: Video Surveillance System.

1.02 SUMMARY OF SYSTEM COMMISSIONING ACTIVITIES

A. Overview
1. The purpose of system commissioning is to ensure the security system operates properly when it is needed most. Security systems are very complex from both equipment and programming standpoint, and thorough testing is necessary to ensure correct operation
2. Perform testing activities when the system is "quiet" and the building is generally unoccupied. This will minimize the amount of irrelevant activity in the system activity reports that will be used as a record of the pre and final test results.

B. Pre-Test
1. Perform a 100% pre-test of all system aspects to verify correct operation prior to scheduling the final test. The pre-test will help to make the final test run smoothly when demonstrating the system's operation to the Owner.
2. Document the results of the pre-test using the approved test forms and submit a copy to the Owner along with the system activity reports.

C. Final Test: Perform a final test of the system in the presence of the Owner to demonstrate correct operation of the security system.

1.03 SUBMITTALS

A. Submit in accordance with the requirements of Section 280000: Basic Security System Requirements, the following items:
1. Sample Test forms: Provide sample test forms that will be used in the pre and final system tests. Furnish the required quantity of each submittal indicated in Division 1.
2. Operation and Maintenance Manuals: Submit the following for review and comment at the completion of the project and before final testing occurs:
a Functional Design Manual

b. Hardware Manual
c Software Manual which includes
d Operator's Manual which full explains all procedures and instructions for the operation of the system and includes
e. Maintenance Manual
f. Test Results Manual, which includes the document results of all tests, required under this Specification, organized by System, Floor, and Door
g Record Drawings Manual

3. Record Drawings:
a Submit for review and comment at the completion of the project:
b Final acceptance will not be made until the record drawings approved by the Owner

1.04 QUALITY ASSURANCE

A. General: All testing work shall be completed in a neat, high quality manner acceptable to the Owner

B. Project Management and Coordination Services: Provide a project manager to coordinate the security system commissioning work with all other trades

PART 2 - PRODUCTS: NOT USED

PART 3 - EXECUTION

3.01 SCHEDULING

A. Prepare a construction schedule based on the schedule developed in Section 280000 for the testing activities. Prepare updated schedules whenever there are modifications

3.02 TESTING REQUIREMENTS

A. Site Tests
1. Perform a 100% pretest of the system prior to final testing by the Owner Provide the Owner with a minimum of a 5-day notice prior to scheduling testing
2. At the conclusion of the work on a floor, test the system on that floor to verify proper operation and reporting of devices
3. Work with the door hardware supplier to resolve any electric hardware failures and door alignment/closure problems
4. At the completion of all work, test the entire system to verify proper operation. These tests shall include:
a. Card Reader Door Test: Test doors to ensure alarm contact provide alarm activation and relock when closed, rex shunts door and command card reader bypasses alarm inputs for area when applicable.
b. Card Reader/ADA Test:Test doors according to card reader test above. In addition, test ADA push plate interlocking function to ensure door does not operate when locked. Test that interior ADA actuator always functions.
c Card Reader/ Holder Test: Test doors according to card reader test above. In addition test magnetic holder interlock function to ensure doors cannot be propped when locked

d. Elevator In-Cab Reader Test:Enable after hours scheduled securing of elevator floor select buttons. Program a card for each floor with only one-floor privileges. Present card 1 and select floor each floor one at a time. Floor 1 shall function while other floors should not. Repeat test with other cards and floors.

e Elevator Hall-Call Reader TestEnable after hours scheduled securing of elevator. Program single card with privileges to all hall select buttons. Present card at floor 1 and press hall select button. Hall select button should function. Have second technician attempt to use hall button on other floors at same time to ensure independent operation.

f. In/Out Card Reader Test:Test door according to card reader test above. In addition test door management alarm for instant alarm on forced exit/entry, remote reset recycle upon card presentation for authorized passing through door. Door held function post authorized card presentation.

g RS232 Modem Dialup TestTest modem functionality for alarms to District Headend. Disconnect network at panel and initiate panel alarm. Modem should dial and connect to head end. Confirm activity at head end workstation.

h CCTV Recording System Test:Test the recording system for correct programming, alarm recording, and event retrieval. Verify correct integration with the ACAMS system for alarm call-up. Test and verify CCTV system viewable from workstations.

i. Security Equipment Room Test:Inspect all system panels, power supplies, and other related security equipment located in these areas.

j. Access Control:Test the software for correct programming and setup to activate door schedules, elevator interface and test cards.

B Test Preparation

1. Provide device identification numbers that differ from or were not included on the original contract drawing set.
2. Furnish a complete systems point list.
3. Furnish paper and toner for the printer so that an event log can be printed out and attached to the test reports as verification of test sequence and systems response.
4. During testing, provide a minimum of two technicians familiar with the installation to assist with the test. Stage the technicians as follows: one at the host and one at the device being tested.
5. Furnish radios for use by the Owner during testing.
6. Furnish pre-programmed access cards for use during testing. One card shall be provided for each access level.

3.03 TEST PROCEDURES

A Prepare and issue for review test forms for each door and device type.

3.04 DOCUMENTATION

A. Provide a full-sized blueline drawing containing a detailed wiring diagram (layout of equipment/elevation, complete parts list, and a complete wiring diagram for each ACU & I/O Board) for each SEC. Fold the diagram and place it inside a clear plastic pocket affixed to the inside door of the SEC.

B Provide a service log on the inside door of each SEC. Service log shall include columns for the following information: date of service, description of work performed, service technician(s), and service company. Place the service log inside a separate clear plastic pocket affixed to the inside door of the SEC.

3.05 DEMONSTRATION

A. On completion of the acceptance test, provide the Owner instruction in the operation and testing of the system, at a time convenient to them

B. Utilized the database for the project during training to give the users a project specific example to learn from.

C. Provide a minimum of 8 hours of on-site training for the both the ACAMS and Video Surveillance System by a factory-trained representative. Conduct separate training sessions for system administrator, system supervisor, and operator level users

D. Maintain a sign in sheet with names and dates of all persons trained and forward to Owner upon completion of training

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
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ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
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1 – Manufacturer not approved.
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SECTION 28 13 00

ACCESS CONTROL & ALARM MONITORING SYSTEM (ACAMS)

INTERMOUNTAIN ELECTRIC CO. W/ NETVERSANT
SAN CARLOS, CA
650 591-7178
SUBMITTAL #30

PART 1 - GENERAL

1.01 SUMMARY

A General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working Access Control and Alarm Monitoring system installation, as described in these specifications.

B Section Includes:
1. Access control and alarm monitoring, including access control units, input/output units, card readers, door contacts, rex detectors and door management alarms, and gals break detectors
2. Interface to electric door hardware
3. ACAMS Power supplies
4. Lock Power Supplies
5. Interface to fire life safety system magnetic door release service
6. Interface to elevator control system
7. Interface to central station alarm monitoring

C Products Supplied But Not Installed Under This Section: Elevator card readers
1. Provide card reader to elevator contractor to install on car operating panel
2. Remove installed reader and make connections to reader from cable in traveler and remount to existing machine tapped mounting holes.

D. Products Installed But Not Supplied Under This Section: Exit Device (panic bar) Power Supplies

E Products Specified But Not Installed Under This Section: Type 1 enclosures at pull box and elevator junction box locations.

F Products Furnished and Installed Under Another Section:
1. Local area network
2. Data cable to network port.
3. Voice cable and connections to District
4. 120V power to system.
5. Elevator traveler cable for card reader
6. Magnetic door holders.
7. Electrified locking hardware.

G Related Sections:
1. Consult other Divisions; determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
2. Section 087100 Door Hardware: includes product information for electrified locking hardware and magnetic door holders.
3. Section 280000 Basic Security Requirements: includes general project requirements, submittal formats, warranty, and installation requirements and additional sections for reference.
4. Section 282300 Video Surveillance System: includes product information for video integration with the ACAMS.

5 Section 280513 Security System Cabling: includes product information for wire and cable needed to support the ACAMS.
6. Section 280553 Security System Labeling: includes label types and formats for security devices
7 Section 280800 Testing/Commissioning: includes the integrating testing/commissioning requirements for the ACAMS

1.02 SYSTEM DESCRIPTION

A. Overview: Refer to Division 1 and Section 280000 for general description.

B Base Building Access Control & Alarm Monitoring System (ACAMS)
1 The ACAMS system will control access control into the building and select interior doors as indicated on the plans. Intrusion alarm monitoring, comprised of door contacts and glass break detectors, is consolidated to the ACAMS system eliminating the need for a conventional burglar alarm panel.
2. Elevator Access Control:
a Elevator – Hall Call.
1) Access is restricted after hours by disabling the hall call buttons on each floor.
2) On schedule the hall buttons, through hardwired integration between the ACAMS and elevator controller, will become inactive and unresponsive to calls.
3) Each hall call button on floors to be access controlled will include an adjacent card reader. Valid card readers will momentarily enable the call button for use and call the elevator to that floor.
4) Car Operating Panel floor select buttons are always unrestricted.
b. Elevator – Interior Elevator
1) Access is restricted after hours by disabling the Car Operating Panel floor select buttons.
2) On schedule the floor select buttons, through hardwired integration between the ACAMS and elevator controller, will become inactive.
3) A single card reader installed in the elevator on the Car Operating Panel momentarily enables specific floor selection buttons and allows travel to floors.
4) Hall call buttons are always unrestricted.
3 Select Interior card readers shall be proximity "Command Card" readers and allow select cardholders to execute preprogrammed commands from the reader numerical keypad. For this scope of work program commands to arm/disarm the door contacts and interior intrusion devices for each space the card reader gains access to with either card plus key command or just key command. Exterior perimeter doors are excluded from card commands.
4. In/Out card readers with door management alarms restrict access to select areas of building and maintain separation between leased space and the building common.
5 Create schedules to automate the opening and closing of the building including unlocking doors, bypassing alarms, and unrestricted elevator access.
6. Connect the ACAMS system to the Districts existing head end utilizing the LAN/WAN and secondary redundant RS232 communications over modems in the event network failure occurs. The first panel in the hub cluster will connect to the IT switch located in the building. All downstream panels are hardwired on a 20mA loop.
7. Provide duress buttons at all public service counters or cash exchange locations. Duress buttons will connect auxiliary inputs on the ACAMS panels.

8 Program conditional commands to output ASCII data to alarm translator/dialer for connection to central station alarm monitoring company. Meet with District to determine unique grouping requirements.

C. Custom Device Requirements
1 Interconnect magnetic door holders on select card reader doors to prevent after hours propping (refer to plans for locations.
a Interlock magnetic holder power through control relay on Von Duprin PS-873. Relay automatically follows lock power state.
b When door is locked power to magnetic holders is cut.
c. When door is unlocked on schedule, during class hours, power is routed to magnetic holders and door can be propped.
d Fire alarms will disconnect power from magnetic holders and release door and is not affected by interconnections to ACAMS.
2. Connect all low voltage cables between lock power supplies, transfer hinges, and locks.
3 Interconnect ACAMS system to ADA operators for secure after hour's operation as indicated in drawings.
a. Interlock exterior ADA push plates with aux relay on PS-873.
b. When door is locked exterior push plate is disabled.
c When door unlocked, even momentarily, ADA push plate is enabled.

D. Tamper Monitoring
1 Provide additional monitor input points for monitoring the following:
a. Tamper switches located within each security equipment enclosure and wire way.
b. Supervision of power supplies and batteries.

1.03 SUBMITTALS

A. Contractor Qualifications: Submit certification letters for the manufacturer of the ACAMS.

B. Product Data: Submit product information for components specified herein. Refer to Section 280000 for format and requirements.

C. Shop Drawings: Submit shop drawings in accordance with Division 1. Refer to Section 280000 for format and requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Access Control and Alarm Monitoring System

B. The ACAMS system is manufactured by Group 4 Technologies AMAG. Pursuant to Section 3400 of the Public Contract Code: AMAG Access Control and Alarm Monitoring System is now in use on the particular public improvement described as San Mateo County Community College District. At each instance in these specifications that "AMAG" is designated by brand name, said manufacturer's system is required and is designated to coordinate with existing systems that are in place at Skyline College, College of San Mateo, Cañada College and the District Administration Building. The Contractor will furnish and install only "AMAG" systems and devices as required, and no substitutions shall be deemed to be "or equal" or allowed.

C Card Readers: AMAG Technologies

D Power Supplies: Altronix

E Intrusion Devices
1 GE Security
2 DSI

2.02 ACCESS CONTROLLERS

A General: 8-door controller capable of expanding to 16 with modular additions, including battery backup, database, user defined reports, and several communication ports. Controller shall serve as a consolidation and control point for all security related field devices including card readers, lock control, elevator control, and intrusion detection devices. Specifically the core functions of the controller are as follows.
1 Central control for devices attached.
2 Makes decisions for access without reliance on communications to host or other field panel.
3 Executes scheduled events such as unlocking doors or bypassing alarms.
4 Responds to monitor activity.
5 Receives input to control its decision-making.
6 Reports activity to other devices.
7 Can support multiple reader technologies.
8 Incorporates Flash Memory for remote upgrades or enhancements to firmware
9 Provides communications in multiple formats to downstream panels or Host Software.

B District Standard Configuration
1 Enclosure – UL listed Cab 4 Enclosure with internal 12VDC charge card and battery backup and external transformer. Note plug-in transformers will not be used and a hardwired consolidated transformer specified later will be used to power up to 3 controllers.
2 Components
a DBU – fitted with Network Interface Module for TCP/IP communications and integral RS232 communications to fall back on dial-up modem communications.
b (2) 4DCU
c (4) I/O modules.

C Capacities:
1. Card Readers: Standard configuration includes 8 cabled to and terminated in main controller enclosure. Controller is expandable to 16 with modular units connected to main database unit.
2. Monitor Inputs: Standard configuration includes 32 inputs in main controller, expandable to 96 when including modular controllers.
3. Relay outputs: 16 standard expandable to 32.
4. Card Holders: 20,000.
5. Elevator Control configuration allows for a single card reader connected with 32 floor control.

D Mounting: Provide in its own enclosure as a complete UL assembly with power supply

E Power:
1 Source: Power is provided via unshielded twisted pair wiring from an external transformer and internal 12VDC charge card and 7 0 AMP Hour Battery.
2 Power only the controller components and card readers from control panel power supply

3 Power all other devices including additional door furniture, locks, intrusion devices, and auxiliary relays from power supplies designated as such and specified herein
4 DBU Battery: A low voltage battery (such as a lithium cell) shall maintain the internally stored database setup when no power is available to the controller

F. Communications
1. TCP/IP or Dial-up Communications from 1st panel on chain to host
2. 20 MA secure bi-directional to downstream panels in chain.
3. 20 MA to card readers

G. Self-protection: The Controller shall have inputs to detect:
1 Power input failures.
2 Controller tampering

H. Manufacturer: AMAG Technologies M2100

2.03 MONITOR INPUT/RELAY OUTPUT BOARDS

A General: Module that monitors inputs and provides relay outputs.

B. Capacities:
1. Monitor Inputs: 8 four-state supervision monitor points
2. Relay Outputs: 4 Normally Open (NO) or Normally Closed (NC) Form C

C Mounting: Plug in (piggyback) to door control units.

D Manufacturer: AMAG Technologies – I/O module

2.04 NETWORK/COMMUNICATION INTERFACE DEVICES

A TCP/IP 10/100BASE-TX Connection

B Any communications that must be achieved for the first panel other than direct connection to District WAN must be reviewed and approved by the District and the Engineer

C Automatic fail over to RS232 dial up communications for alarm routing to host

D Manufacturer: AMAG Technologies Network Interface Module

2.05 CARD READERS

A General
1. Wire readers back to the Controller directly. Do not daisy chain readers together.
2 Presenting a card to the reader shall initiate a single read. Thereafter the card must be removed from the reader's field and re-presented before it is again read by the system
3 Coordinate specific reader types to be used below with district prior to ordering.
4 Integral LED to indicate the status of the door and an audible indicator. The LED status shall be as follows:
a Red steady indicates reader is powered up.
b Red flash after card presentation indicates card has been read but access is denied
c Green Momentary indicates card is valid and access is granted.
d Green Steady indicates door is unlocked indefinitely on schedule.

5 Provide with an internal tamper switch that will indicate an alarm condition if an unauthorized attempt is made to disassemble the unit.
6 Provide units capable of communicating in 20 MA bi-directional supervised protocol.

B Exterior Perimeter Mullion Readers
1. Read Range: 2.5 inches (typical).
2. Operating Voltage: 9-14 VDC
3. Manufacturer: AMAG Technologies S830 Micro Proximity Reader, Black or best color to match mounting surface.

C Interior Prox+Pin Command Card Readers
1. Read Range: 5 inches (typical)
2. Operating Voltage: 9-14 VDC.
3. Additional LEDS indicating card command and alarm armed status. Card Commands programmed from system head end and software based.
4. Manufacturer: AMAG Technologies S840 Keypad Proximity, Ash Gray or best color to match mounting surface.

2.06 REQUEST TO EXIT SENSORS (REX)

A General
1. Mount REX detector directly to top jamb of doors above recessed contacts.
2. Aim detection pattern directly down in front of door plane to minimize pedestrian circumventing.
3. Minimize relay pulse time to 1 second and allow controller to determine bypass time
4. Wire REX cables directly back to controller.
5. Terminate signal to REX input on controller.
6. Power REX detector from auxiliary 12VDC device power supply.

B. Manufacturer: Detection Systems DS160i, Black or best color to match mounting surface.

2.07 DOOR CONTACTS

A General
1. Install door contacts flush in top jamb or side jamb of door near top corner.
2. Align magnet with door contact.
3. Report fire rated assemblies not factory prepped to general contractor to coordinate and acceptable solution.
4. Wire contact cables directly back and terminate to controller
5. Closed-loop, ½" gap.

B. Manufacturer: Sentrol 1076 1" recessed contacts, mahogany; or approved equal.

2.08 GLASS BREAK DETECTOR

A Provide digital type glass break sensor utilizing DSP technology.

B Sensor shall be capable of being mounted on any surface either vertically or horizontally within 25' of glass surface to be protected.

C Coordinate location with Architectural reflected ceiling plan and other devices in ceiling.

D. Connect glass break alarm signal to input modules on ACAMS panel.

E. Power glass break detector from auxiliary 12VDC device power supply.

F. Manufacturer: GE Security Round Acoustic Glassbreak 5812-RND; white; or approved equal.

2.09 TRANSFORMERS

A. General
1. Transformer shall convert 120/240V AC power to 12/24 Volts AC.
2. Hardwire transformer to electrical junction box (plug-in transformers are not acceptable).
3. Transformer must be rated to power three ACAMS controllers and not shared with other device power requirements.

B. Manufacturer: AMAG XFMR

2.10 POWER SUPPLIES/BATTERY CHARGERS

A. Control Panel Power Supply: Integral to AMAG Controller Assembly. Connect to ACME transformer

B. Lock/Relay Power Supplies
1. 120V hardwired input.
2. 6 AMP continuous 24VDC supply.
3. Alarm output for AC fail and low battery; connect to alarm inputs on ACAMS control panel.
4. Integral Isolation relays with 8 access control input triggers and 8 independently controlled and configured outputs.
   a. Dry outputs for triggers to PS-873 power supply at exit device doors
   b. Wet 24VDC to low current locks
   c. Wet 24VDC to power control relays in elevator demarcation enclosure.
5. Interconnect all card reader outputs (8) in a one to one relationship to inputs (8) on power supply
6. Switching lock load through Access Control Panel relays is unacceptable.
7. Do not use for devices other than locks and control relays.
8. Manufacturer: Altronix AL600ULACM

C. Device Power Supplies
1. 120V hardwired input
2. 4 AMP continuous @ 12VDC.
3. Alarm output for AC fail and low battery; connect to alarm inputs on ACAMS control panel.
4. Do not power locks from power supply.
5. Manufacturer: Altronix AL400ULM

2.11 DOOR MANAGEMENT ALARM

A. Provide door management alarms at all in/out card reader locations.

B. Alarm shall be equipped with integral Rim Cylinder and keyed to the building standard

C. Connect door alarms directly to door management alarm.

D. Provide remote reset/shunt recycle function from card reader alarm bypass output to shunt alarm on valid card presentations

E. Power alarm from 12 VDC auxiliary power supply at SEC.

F. Manufacturer: Designed Security Inc; Door Management Alarm ES4200.

2.12 EMERGENCY EXIT ALARM

A Alarm shall be equipped with integral Rim Cylinder and keyed to the building standard

B Connect door contacts directly to exit alarm.

C Power alarm from 12VDC auxiliary power supply at SEC.

D. Manufacturer: Designed Security Inc; Exit Alarm ES4300

2.13 DURESS BUTTONS

A. Provide under-counter pull type duress buttons at each public service or help counters as indicated on the plans

B Coordinate final location for installation prior to owner to ensure they are ergonomically appropriate easily accessed with excessive travel

C Provide pathway and route consistent with telecom pathways to counters as well. Security and telecom cable me share the same furniture raceways if required.

D. Manufacturer: Sentrol 3040

2.14 TYPE 1 PULL BOXES/JUNCTION BOXES

A. Provide 24"x24"x6.62" type 1 lockable enclosure at locations shown on plans.

B Pull Boxes do not require back panel.

C. Elevator junction boxes require back panel and the following components fabricated to panel

1 24VDC low current double pole double throw form c equipment isolation relays
2 Configure each relay for independent control of either floor select buttons Elevator 1 or hall call buttons Elevator 2 and powered from the lock power supplies located in the SEC.
3. Provide terminal strip on panel for landing outputs from relays on one side and interconnecting elevator cables on other side.
4 Provide tamper alarm in enclosures and terminate to ACAMS panel.

D. Manufacturer: Hoffman Type 1 Enclosure A-2420ALP; Panel A2420MP; Cylinder Lock Kit A-L12AR.

2.15 MODEM

A. Provide 56K dialup modem and connect to 1st panel in SEC.

B Modem provides dial up communications if network is unavailable.

C Install modem in separate communications enclosure with network outlet.

D. Manufacturer: US robotics, Black Box, Approved Equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A Control Equipment Installation
1. Coordinate installation of equipment with other trades to avoid unforeseen conflict.
2. Install supervisory and end of line resistors as required.
3. Interconnect all access control panels, lock power supplies and device power supplies with rigid conduit and screw cover raceway (gutter) to protect cables through out.
4. Hardwire all power supplies with electrical conduit fittings and junction boxes, plug in transformers and exposed cable is unacceptable.
5. Coordinate Network Data Drop with Telecom contractor inside access controller.
6. Coordinate IP address with District IT staff.
7. Coordinate Voice connection with District IT department.

B Field Devices
1. Homerun all cable from field devices to control panel, utilizing J-Hangers, sleeves and risers for vertical and horizontal cable runs.
2. Provide wiremold surface mounted raceways to devices when concealment of EMT conduit is mot possible. Exception is long multiple cable pathways routing to pull boxes or homeruns.
3. Install devices as indicated on drawings.
4. Use conduit pathways and fish cable as required to final device locations including using storefront mullion as raceways.

C Locking and ADA Hardware
1. Coordinate the installation and termination of the security cable with the installation of the electric door hardware and transfer hinge provided under Division 28.
2. Connect and configure access control system integration to ADA operator as indicated in drawings. Reconfigure if required to meet sequence of operation for door. Coordinate with door contractor for equipment terminations.

D Elevator Integration
1. Meet with elevator contractor to review scope and delineation of scope.
2. Provide functioning relays in demarcation enclosure prior to elevator button cutover to ensure elevator will function with card readers at time of turn-up.
3. Furnish card reader to elevator contractor.
4. Coordinate the installation and termination of the card reader inside the cab and in the elevator machine room.

3.02 PROGRAMMING

A Prior to the completion of construction, schedule a meeting with the Owner and the Engineer to determine the programming criteria and access to District head end. Discuss the following:
1. Door Names
2. Device Names
3. Alarm groups
4. Schedules and time codes.
5. Action/responses from individual input points.
6. Action response from card and keypad commands.
7. Alarms tagged for routing ASCII data to existing alarm dialer.

B Document the results of the meeting and perform necessary programming to achieve the Owner's requests

C Program the system such that reliance on a remote host for routine building operations, such as scheduled door commands and conditional events, are minimized to the greatest extent possible and decisions are made at the local building controller

D Program the system in a manner that minimizes the amount of time required for the users to make updates and maintain the system on a daily basis especially updates that impact card holder record updates. Nested programs, such as reader groupings used in access codes shall be used to the greatest extent possible such that single actions are required to update an entire card data population. If there is a question regarding the appropriate approach to programming, given the flexibility of most systems, contact the Engineer prior to any initial programming

E Program and setup all system hardware such that no additional programming other than entering new access cards, time codes, and access adding doors to existing access privilege groups is required. Programming shall include the setup of available features of the software.

END OF SECTION

INTERFACE ENGINEERING

214 Grant Avenue, Suite 450,
San Francisco, CA 94108
415.489.7240 OFFICE
415.489.7289 FAX

Submittal Review #30

SUBJECT/PROJECT:	Canada College Building 8 -Base Services			DATE:	October 16, 2008
PROJECT NUMBER:	2007-0730	CONTRACTOR'S SUBMITTAL TRACKING/ REFERENCE NUMBER:	30-270000-0	REVIEWED BY:	Randy Miller
ARCHITECT:	Rashelle Jones BCA Architects 210 Hammond Ave. Fremont, Ca 94539			APPLIES TO:	☐ MECHANICAL ☐ PLUMBING ☐ ELECTRICAL ☐ FIRE/LIFE SAFETY ☒ TECHNOLOGIES ☐ LIGHTING
PHONE NUMBER:	510-445-1000	FAX NUMBER:	510-445-1005		

SYSTEM(S): Structured Cabling 270000 - 271513, Access Control / CCTV 280000 - 281300

This review is only for general conformance with the design concept of the project and general compliance with the information in the Contract Documents. Any action shown below is subject to the requirements of the Plans and Specifications. Contractor is responsible for the dimensions and quantity which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.

Basis of design manufacturers are listed on our equipment schedules and construction documents. Where a submitted manufacturer differs from the basis of design manufacturer, Contractor shall provide coordination drawings and provide modifications as necessary to provide access, clearance, and any other provisions for proper and acceptable installation of any equipment not listed as the basis of design equipment.

The following items have been reviewed for conformance with the requirements of the Contract Documents:

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
Structured Cabling 270000 / 271513						
Panduit 4-pair Category 6 cable, PUP6004BU-UY	X					
Panduit Modular Patch Cord, UTPSP3Y	X					
Panduit 8pin-8contact Communication Jack, CJ688TGOR (orange)	X					
Panduit 4-Port Wall Faceplate, CFPE4IWY	X					
Panduit Stainless Steel Wallphone Faceplate with Mounting Post, KWP6PY	X					
Panduit Faceplate Blank Inserts, CMBIW-X	X					
Panduit 24-Port Rack Mount Modular Patch Panel, CPPL24M6BLY	X					
Panduit Velcro Ty-Wraps, HLS-15R0 (Black)	X					
Erico Caddy Cable Cat wide Base J-Hooks, CAT324Z34	X					
Access Control System / CCTV, 280000 - 281300						
AMAG Network Interface Card MN-NIC-3	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

ITEM – COMMENTS	DISPOSITION					
	N	M	R			F
			1	2	3	
AMAG RS-232 Dial-up Interface Card MN-232	X					
AMAG 8 Door Controller M2100-8RDR-KIT	X					
AMAG Input/Output Board MN-I/O	X					
AMAG S820Card Reader, Ash Grey 820-AG	X					
ACME 250VA Buck Boost Transformer T-1-81050	X					
MIER 12" x 12" Terminal Can, Moden, BW108BC	X					
MIER Lock Set with 005 Key, BWE005	X					
Panduit 6 foot finger joint wire manager G2X2LG6	X					
Panduit 6 foot finger joint wire manager cover C2LG6	X					
Phoenix Terminal Blocks, UK5W	X					
Phoenix Din Rail for Phoenix blocks, 2 meters, NS 35/7.5	X					
Altronics 8CH Power Supplies, Locks, AL600ULACM	X					
Altronics 12/24 VDC 6A Power Supply 16 CH Devices, AL600ULXPD16	X					
Altronics 12V 7 AMP HR Battery BT126	X					
GE Sentrol 1" SPDT Recessed Door Contact Brown, 1076-M	X					
GE Sentrol Shatter PRO 3 Glass Break, Round, 5812-RND	X					
GE Sentrol Surface Mont Door Contact, Wide Gap, 1045W-N	X					
Bosch Request to Exit Sensor LT, Gray, DS160	X					
GRI Tamper Switch for 1300 Can, TS-20	X					
CCTV						
AMAG 4-port Video Server in CAB-3 Enclosure	X					
Altronics 24VAC 4CH 3.5A Power Supply, ALTV244UL	X					
Panisonic Mini Dome Flush Mount, WV-CW484F	X					
Cables & Miscellaneous						
Panduit 250 CT Labels for LS3E Labeler, LWS-2	X					
Belden 16/2 Plenum, Locks, 6200UE	X					
Belden 18/2 Plenum, ,Card Reader Power, 6300UE	X					
Belden 22/4 Plenum, Request To Exit, DC, GB, 6502UE	X					
Belden 22/2 PR Shielded Plenum, CR Data, 6541FE	X					
Belden RG-59 Plenum, Camera Signal, 643948	X					
Cambridge RG-59 Plenum BNC Connector, CP-78-10	X					
Caddy J-hook with ceiling wire hanger bracket, CAT324Z34	X					
Hilti ceiling wire with pin and L-bracket, 283367	X					
Hilti .27 Cal Yellow Shots, 100 PK, 50352	X					

Disposition Code:
N – No exception taken.
M – Make corrections noted. Resubmittal not required if installation complies with notes.
R – Revise and resubmit.
1 – Manufacturer not approved.
2 – Does not meet requirements of Contract Documents.
3 – Insufficient information to review.
F – Forward specified item.

SECTION 28 31 00

FIRE DETECTION AND ALARM SYSTEM

INTERMOUNTAIN ELECTRIC
SAN CARLOS CA
650 591-7118
SUBMITTAL #31 & 31.1

PART 1 - GENERAL

1.1 SCOPE

A. This Section describes a Protected Premises Fire Detection system for the following San Mateo County Community College District sites: Cañada College, College of San Mateo and Skyline College. Modifications to the existing fire alarm system shall provide evacuation alarm tone signaling using horns to sound the alarm signals and ADA-compliant strobe notification devices for visual notification. The system shall be intelligent device addressable, analog detecting, low voltage and modular, with digital communication techniques, in full compliance with all applicable codes and standards. The system provided shall have a Fire Alarm Control Panel (FACP) and field devices as indicated on the DSA-approved drawings.

B. The features and capacities described in this specification are a requirement for this project and shall be furnished by the successful contractor. The District has determined that the Siemens MXL system, provided by Siemens Building Technologies, Hayward, CA (contact Kelly Rogers: 510-783-6000), is the District standard, no equal. The system as described in this specification and as shown on the drawings shall be installed, programmed, tested, and delivered to the owner in fully operational condition. The system shall include all required hardware, software, raceways and interconnecting wiring to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein. The system shall consist of, but not be limited to, the following:

1. Fire Alarm Control Panel (FACP)
2. Fire Alarm Remote Annunciator (FAAP)
3. Booster Power Supplies
4. Addressable Manual Fire Alarm Pull Stations
5. Addressable Analog Smoke Detectors
6. Addressable Area Heat Detectors
7. Addressable Analog Duct Smoke Detectors
8. Addressable Intelligent Interface Modules
9. Audible and Visual Notification Appliances

C. Non-addressable alarm initiating, supervisory and status monitored devices shall be integrated into the fire alarm system, as applicable, via an addressable intelligent interface module, as indicated on the drawings:

D. Sprinkler Water Flow Alarm (alarm initiating)

1. Sprinkler Valve Tamper Switch (supervisory)
2. PIV, OS&Y
3. Kitchen Ansul Systems
4. Security Interface
5. Magnetic hold-opens

E. Connections to existing elevator control panels (by others) and providing the necessary modules for elevator recall and shunt trip functionality.

F. Audible/visual notification appliances and communicating devices to be controlled by the FACP:

1. Horns
2. Strobe Lights

3. Combination Horn/Strobes

G. Connect system to the existing campus MXL network system such that all status changes are transmitted to the Main Campus FACP.

H. DSA and local requirements shall be adhered to with regard to submitting specifications, wiring diagrams, shop drawings and plans. Responsibility for furnishing the quantities of copies in digital format and/or hard copy, as directed by contract requirements, shall be included as part of the work of this section.

1.2 RELATED SECTIONS, RELATED WORK AND EXISTING CONDITIONS

A. RELATED WORK

1. The contractor shall coordinate work described within this section with all related trades and shall relay all necessary coordination information to the System Supplier in a timely manner such that proper coordination shall take place. Work and/or equipment provided in other sections and related to the fire alarm system shall include, but not be limited to:
   a. Mechanical Coordination: Sprinkler water flow alarm and valve tamper switches to be provided and installed by the fire protection sprinkler contractor, if a part of this project. See Division 21. They shall be wired and connected to the fire alarm system monitor modules by the contractor.
   b. Mechanical Coordination: Duct Smoke Detectors shall be provided and wired under this Section and installed under the mechanical section as shown on the fire alarm system drawings.
   c. Security Interface, if required.
   d. Coordinate with all other trade contractors for the mounting of and/or interfacing with any and all other fire alarm system related devices.

B. EXISTING CONDITIONS

1. This project consists of modifying the existing fire alarm system within the existing building. The contractor shall visit the site to determine and verify all existing conditions. Existing conditions that would, in the contractor's opinion, prohibit or greatly delay construction progress shall be brought to the Architect and Engineer's attention in writing in a timely manner.
2. No additional compensation shall be permitted for variations due to accessible field conditions that would affect the installation of the fire alarm system.

1.3 REFERENCES - APPLICABLE LISTINGS, CODES, STANDARDS, DOCUMENTS

A. STANDARDS AND CODES

1. All equipment shall be installed and comply with the current adopted provisions of the following codes and standards.
2. All equipment shall be Underwriters' Laboratories (UL), Inc. listed for its intended use. At a minimum, the following standards shall apply:
   a. UL 268 and 268A - Smoke Detectors for Fire Protective Signaling Systems
   b. UL 346 – Water-Flow Indicators for Fire Protective Signaling Systems.
   c. UL 464 - Audible Signaling Appliances.
   d. UL 864 - Control Units for Fire Protective Signaling Systems.
   e. UL 1481 - Power Supplies for Fire Protective Signaling Systems.
   f. UL 1971 - Signaling Devices for the Hearing-Impaired.
3. National Fire Protection Association (NFPA) standards:
   a. NFPA No. 13 - 1999 Edition - Sprinkler Alarm and Supervision.
   b. NFPA **No**. 70 National Electrical Code.
   c. NFPA No. 72 National Fire Alarm Code.

d. NFPA No. 90A Installation of Air Conditioning & Ventilating Systems
e. NFPA No. 101 Life Safety Code

4 All raceways and wiring shall be installed in compliance with NFPA Standard 70 (National Electrical Code - Article 760) with applicable California amendments. Codes shall be implicitly followed, in particular, with regard to material type and quality, circuitry extensions from and connections to outlet and junction boxes, panel boards and similar appurtenances.

5. The fire alarm system and its installation shall comply with all applicable requirements of the Americans with Disabilities Act of 1992.

6. The fire alarm system and its installation shall comply with DSA and all other local codes and authorities having jurisdiction, including but not limited to, San Mateo County Community College District's engineering design standards and guidelines.

1.4 SYSTEM DESCRIPTION

A. The system shall operate as an integrated, multiplexed, protected premises fire alarm control system tied into the existing campus network system.

B. Changes in the status of monitored points shall be detected by the microprocessor based fire alarm control panel and shall report any change in status to the Main Campus Fire Alarm System utilizing master-slave (Cañada College) networking protocol.

C. Sensor "dirty" and "excessively dirty" trouble conditions shall report automatically.

D. Devices shall be listed by UL for sensitivity testing by means of the portable programmer/tester or by readout from the control panel. Each addressable device address shall be set electronically, devices requiring dipswitch settings, rotary switch settings, staples or jumper settings are not acceptable.

E. Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the fail safe degrade mode.

F System shall individually identify each addressable initiating device and other addressable monitor functions using multiplexing interfacing techniques.

G. System shall be capable of operating alarm notification appliances, and other control functions, using multiplexing techniques.

H. Life safety alarm function programs shall perform automatically upon system alarm actuation. In addition, control points may be operated manually at any time by the attendant through appropriate keyboard commands. The FACP shall also provide integral programmable function control switches to allow personnel to manually operate specific pre-programmed control output functions, as required.

1.5 QUALITY ASSURANCE

A It is the intent of these specifications to provide a complete fire alarm system that complies in all respects with the requirements of all applicable codes and standards. Equipment, materials, software, installation practices, etc. that do not meet these requirements or do not meet the performance standards herein specified shall not be acceptable.

B. The equipment furnished under this specification shall be that of the specified manufacturer, no equal. All information herein is intended to establish minimum standards of performance, quality and construction, and is based upon the Siemens MXL

addressable analog equipment designed and manufactured by Siemens Building Technologies, Inc. Catalog and model numbers are specified herein and indicate the materials as well as the operating features required. It is not the intent of these specifications to eliminate competitive installation proposals, only to standardize the District's Fire Life Safety Systems.

C. Before commencing work the fire protection contractor shall submit data showing that contractor has successfully installed fire alarm systems of the same scope, type and design as specified. The contractor shall also include the names and locations of at least three installations where such systems have performed satisfactorily for the preceding 18 months.

1. The contractor shall submit copies of all required Licenses and Bonds as required by the State.
2. The system supplier shall employ on staff a minimum of one NICET level 4 personnel or a professional engineer, registered in the State of California.
3. Installing contractors unable to comply with the provisions of 1.06 shall present proof of engaging the services of a subcontractor qualified to furnish the required services.

D. Provide the services of a representative or technician from Siemens Building Technologies. The representative or technician is to be certified and experienced in the installation and operation of the type of system specified. The representative shall be licensed in the State, if required by law. The fire alarm contractor shall supervise installation (duct detector locations are to be determined by the mechanical contractor). The system supplier shall provide all software programming, software documentation, system adjustments, preliminary testing, final testing and certification of the system. The fire alarm supplier shall also be required to provide a 4 hour operational instruction to the owner's personnel.

E. All fire alarm system equipment furnished under this specification shall be UL listed, under the appropriate category, as the product of a single manufacturer. All control equipment shall be listed under UL as a single control unit. The manufacturer shall have been engaged in the production of this type of equipment for at least ten (10) years and have a fully equipped service organization capable of responding within 48 hours from the initial contact for warranty or regular service work. Emergency and/or off hours calls shall be responded to within 4 hours of initial contact, seven days a week.

F. Prior to bid submittal, contractor shall state what, if any, specific points of the proposed system's operation or the equipment's quality differ in any way from this specification by submission of a complete technical proposal to include supporting literature and drawings. Only those departures from these specifications shall be considered by the engineer. Failure to submit all departures from these specifications and to receive approval for such departures, shall be cause for summary rejection of any submittal documents where unapproved departures are discovered.

G. Should conflicts arise between project drawings and/or these specifications, regarding design, quantities of devices or circuits, the higher standard and/or quantity and/or cost shall be considered correct.

H. It is the contractor's responsibility to submit acceptable equipment for review by the engineer. The contractor shall bear all liability for damages arising from his failure to submit equipment that meets these specifications, including, but not limited to, any penalties for failure to meet construction deadline.

I. Final determination of compliance with these specifications shall rest with the Engineer of Record, who, at its discretion, may require proof of performance at the cost of the contractor. Required proof may include, but shall not be limited to, expense paid visits by

representatives of the owner and engineer to sites where identical equipment is installed and providing beneficial use.

1.6 SUBMITTAL REQUIREMENTS

A Prior to the start of work, the contractor shall provide a complete and comprehensive submittal for review by the engineer. These are to describe the proposed system and its equipment. Failure to provide a complete submittal shall be grounds for summary rejection of any incomplete submittal documentation. District reserves the right to deduct monies from payments due Contractor to cover District and Architect/Engineer's additional costs of review beyond the second submission. The complete submittal shall include, but not be limited to, all of the following material:

1. Power Calculations
   a. Battery capacity calculations shall be a minimum of 125% of the calculated requirement.
   b. Supervisory power requirements for all equipment.
   c. Alarm power requirements for all equipment.
   d. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst case condition plus 25% spare capacity.
   e. Voltage-drop calculations for wiring runs demonstrating worst-case condition.
2. Complete manufacturers catalog data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements.
3. Complete drawings covering the following shall be submitted by the contractor for the proposed system. Floor plans in the current AutoCAD version showing the locations of all equipment and raceways, conductor counts with type and size.
4. A complete proposed system database including a description of all logic strings, control by event programming and point identification labels on a unique CD-ROM and in a formatted printed form, as required for off site editing, shall be submitted for evaluation by the owner.
   a. The program shall include all required interactive control functions between the local network systems and the methods for implementing these actions.
5. Provide the address, telephone number, and contact person(s) of the manufacturer's local service facility for normal and off-hour warranty issues.
6. Provide a fire alarm system function matrix. Matrix shall illustrate alarm output events in association with initiating devices input events. Matrix shall represent a summary of the installed system alarm, supervisory and trouble functions. (See Appendix-A NFPA-72 for minimum matrix requirements - A-7-5.2.2 (9) 1999).
7. For each system control and/or power panel, provide panel ampere loading during both normal and alarm modes, with time calculations to substantiate compliance with battery back-up power requirements (battery Ampere-Hour capacity), described elsewhere in these specifications.
8. For each system control panel, provide written schedule of active and spare addresses provided on each addressable circuit to substantiate compliance with circuit usage/spare requirements, described elsewhere in these specifications.
9. For each system control panel and system transponder notification appliance circuit, provide proof of spare capability in amperes available for future use, if needed.
10. Provide manufacture's printed product data, catalog pages and descriptions of any special installation requirements and/or procedures. Drawings depicting any special physical installation requirements shall show physical plans, elevations, all dimensions, conduit entry, minimum access clearances and any other details required.
    a. Provide shop drawings as follows:
    b. Drawing or catalog page showing actual dimensions of the main FACP

c. Drawing(s) or catalog page(s) showing actual dimensions of any additional system control panels and/or battery cabinets.
d. Drawing or catalog page showing actual dimensions of the Remote Annunciator.
e. Single line riser diagram showing, all equipment, all connections and number and size of all conductors and conduits
f. Provide samples of various items when so requested by the Architect/Engineer.

B. A maximum of two submittal reviews will be performed by Engineer. Compensate additional time and material to the Engineer based on their published fees for additional reviews.

PART 2 - SYSTEM OPERATION

2.1 BASIC SYSTEM EQUIPMENT, CIRCUITING, ADDRESSING AND OPERATING CAPABILITIES

A. GENERAL
1. The FACP shall communicate via an RS-485 Carrier Sense, Multiple Access, Collision Detect protocol, also known as CSMA/CD or an ETHERNET type topology.
2. The FACP shall provide NFPA 72, Style 4 (Class B) analog signaling line circuits. Each loop card shall communicate with and receive alarms from up to 120 points, consisting of a maximum of sixty intelligent analog alarm initiating and sixty intelligent controllable output devices. Circuits shall be configured with loop isolators and wired in a manner that prevents a catastrophic wiring event on a floor from affecting the performance of other floors.
3. Remote Annunciator (Siemens RCC Series): LCD type with two lines of 40 characters each. The Remote Annunciator shall communicate to the FACP on one #16 TSP and derive power from the FACP over a pair of #14 AWG conductors. It shall be possible to Acknowledge general "ALARM", "TROUBLE", and "SUPERVISORY" conditions from the Remote Annunciator using a key. Each Remote Annunciator must be housed in a lockable box. NEMA rated boxes are required for any locations, interior or exterior, where adverse weather or high humidity conditions occur. Mount Remote Annunciator(s) as indicated on the drawings, at a height where reasonable viewing is possible by the responding fire authority. Obtain approval of the specific location from the Architect and/or Engineer of Record prior to mounting the Annunciator.
4. System power supplies, including necessary Booster Power Supplies, transformers rectifiers, regulators, filters and surge protection required for system operation, with the capacity to power the system in a worst case condition with all devices in alarm and all local indicating appliances active without exceeding the listed ratings. Provide adequate notification appliance Booster Power Supplies so as to allow for a minimum of 20% spare capacity on each NAC.
   a. System primary power: Primary power for the FACP and the secondary power battery chargers shall be obtained from a dedicated emergency power circuit. Circuit breakers shall be fitted with a suitable guard, requiring removal of a screw to open, and used only for fire alarm. Each circuit used for fire alarm purposes shall be permanently labeled for function.
   b. Secondary power supply: Provide sealed gelled electrolyte batteries as the secondary power supply for all fire alarm functions. The battery supply shall be calculated to operate loads in a supervisory mode for twenty-four (24) hours no primary power applied and after that time, operate in alarm mode for five (5) minutes. Batteries shall be sized at

125% of the calculated size to compensate for deterioration and aging during the battery life cycle. Battery calculations shall be submitted to justify the battery size.

5. The system 16 bit core processor shall incorporate an internal operating system to process incoming alarm signals and issue output commands required as a result of the alarm reception, by system programming or by manual commands. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity. Systems with single watchdog circuits for all processors shall not be acceptable unless supplied with a "hot" standby CPU. Digital communication capabilities required for the control panel to communicate with remote annunciators, input/output drivers and displays shall be provided.

6. Manual Addressable Pull Stations (Siemens MSI-10B) shall be the single action type, unless specifically noted otherwise by these specifications or on project drawings, and listed by Underwriters' Laboratories, Inc. The intelligent manual fire station shall operate on any addressable detection circuit. It shall be red in color. Manual fire stations shall be individually annunciated on the control panel. Mounting height shall be 48" inches to the manual station actuation handle from the finished floor.

7. Intelligent/analog smoke detectors (Siemens FP-11) shall be photoelectric and listed by Underwriters' Laboratories, Inc. The detector shall contain a long life light emitting diode (LED) as its light source, and photo diode as a light receiver. An automatic gain control circuit shall be compensating for detector aging and dirt accumulation. The smoke detector shall be a plug-in twist/lock unit that allows for easy connection to its mounting base. Each smoke detector, when activated, shall have a flashing tri-color LED alarm indicator that shall indicate red for alarm, yellow for trouble and green for normal operational mode. Application Specific Detection environmental settings shall be programmed as directed by the engineer. System programming shall provide multiple output functions from a single initiating multi-criteria smoke detector. This capability shall mean a separate alarm event output for smoke alarm and a separate alarm output function for thermal alarm from a single analog initiating address device. Systems not capable of providing this design requirement shall provide alternate programmable logic accomplishing design performance, acceptable to the Engineer of Record.

   a. It shall be possible to adjust and/or electronically measure the sensitivity of each individual intelligent analog smoke sensor from the control panel. Relative sensitivity or manual test methods, which check the smoke sensor at the maximum allowable obscuration, will not be considered as being equivalent.

   b Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the fail safe degrade mode.

8 Intelligent/Analog Duct Smoke Detector (Siemens FP-11/AD2-XHR, or ILP-1/AD-3ILP for rooftop applications) shall be photoelectric and listed by Underwriters' Laboratories, Inc. The detector shall contain a long life light emitting diode (LED) as its light source, and photo diode as a light receiver. An automatic gain control circuit shall be compensating for detector aging and dirt accumulation. The smoke detector shall be a plug-in twist/lock unit that allows for easy connection to its mounting base. Each smoke detector, when activated, shall have a flashing tri-color LED alarm indicator that shall indicate red for alarm, yellow for trouble and green for normal operational mode. Application Specific Detection environmental settings shall be programmed as directed by the Engineer. System programming shall provide multiple out-put functions from a single initiating multi-criteria smoke detector. This capability shall mean a separate alarm event output for smoke alarm and a separate alarm output function for thermal alarm from a single analog initiating address device. Systems not

capable of providing this design requirement shall provide alternate programmable logic accomplishing design performance, acceptable to the Engineer of Record.

a. It shall be possible to adjust and/or electronically measure the sensitivity of each individual intelligent analog smoke sensor from the control panel. Relative sensitivity or manual test methods, which check the smoke sensor at the maximum allowable obscuration, will not be considered as being equivalent.

b. Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the fail safe degrade mode.

c. Coordinate sampling tube sizing with mechanical ducting requirements prior to shipping.

9. Heat detectors (Siemens FPT-11) shall be 135° F fixed temperature or fixed temperature/rate of rise and be listed by Underwriters' Laboratories, Inc. Rate-of-rise alarm threshold rate shall be 15° F per minute with a maximum coverage area of 2,500 sq. ft. Activation of the rate-of-rise heat detector shall be self-restoring. All detectors shall be addressable and have a white finish. The thermal detectors shall be individually annunciated on the control panel. Each heat detector, when activated, shall have a flashing tri-color LED alarm indicator that shall indicate red for alarm, yellow for trouble and green for normal operational mode.

10. High temperature heat detectors (Siemens DT-200R) shall be conventional 200° R fixed temperature/rate compensated and listed by Underwriters' Laboratories, Inc. The detector shall have a maximum coverage area of 2,500 sq. ft. Upon activation, the detector shall latch in alarm until reset at the main fire control panel and be self-restoring. The detector shall be individually annunciated at the control panel by means of interfacing with a remote addressable monitor module (TRI Series) or an addressable conventional zone module (CZM-4). The detector's interface module address shall be set by electronic means only, no mechanical means such as programming pins, dip-switches or rotary dials shall be used.

11. Interface modules (Siemens TRI Series) shall be intelligent and listed by Underwriters' Laboratories, Inc. The unit shall incorporate a custom microprocessor based integrated circuit that provides communication with main fire control panel. The interface module shall supervise and monitor normally open or normally closed dry contacts and report their status to the control panel. The intelligent interface module shall be used to uniquely identify field devices (contacts) such as kitchen Ansul, suppression system, water flow switches, tamper switches, OS&Y valves or as directed by these specifications and project drawings.

12. Intelligent interface modules (TRI-R) shall also be used when remote relays are required for system control functions, such as, but not limited to, fan shut down, door holder trip and elevator recall and shunt trip functions. Relay dry contacts shall be rated at 4 AMPS, 120 VAC resistive or 30 VDC resistive and contacts shall be Form "C" type.

13. The MXL and Booster Power Supplies shall provide NFPA 72, Style Y, two-wire (Class B), notification appliance circuits.

14. Horns (Wheelock AH Series) shall be installed as shown on the drawings in accordance with the requirements of the UL 1971 standard and NFPA 72. Provide UL listed weatherproof units and their required back boxes where shown on the drawings.

15. Horn Strobes (Wheelock Z-Series) shall be installed as shown on the drawings in accordance with the requirements of the UL 1971 standard and NFPA 72. Provide UL listed weatherproof units and their required back boxes where shown on the drawings. See Strobe requirements below.

16. Strobes (Wheelock Z-Series) shall be installed as shown on the drawings in

accordance with the requirements of the UL 1971 standard and NFPA 72. Where multiple visual notification appliances can be seen from any location, circuitry shall be incorporated for the synchronization of flash rate. Strobes shall be of the latest compatible Siemens appliances. See DSA approved drawings for device quantities and locations. Provide UL listed weatherproof units and their required back boxes where shown on the drawings.

a. Strobes shall produce a flash rate of one (1) flash per second minimum over the listed input voltage (20VDC - 31VDC) range.

b. Strobes shall incorporate a Xenon flashtube enclosed in a rugged Lexan lens or equivalent with solid state circuitry.

c. Strobe intensity shall be rated per UL 1971 for 15/75, 30/75, 60/75, 75 or 110 Candela. Dual listing strobes of 15/75 intensity for UL 1971/near-axis requirements shall be used where acceptable.

d. Strobes shall be available for semi-flush or surface mounting and in conjunction with audible appliances as required.

17. Magnetic Door Hold-Opens (Rixen FM-998) shall be of the wall mount type and capable of operating at three voltages, 120VAC, 24VDC AND 24VAC, shall be provided under this section. They shall operate using local 24VDC power. The power shall be intercepted by a fire alarm system addressable control module or a relay base detector in order to interrupt the circuit so that the door closes in a fail-safe manner. See DSA approved drawings for device quantities and locations.

18. Software and firmware control:

a. All software and firmware provided with a fire alarm system shall be listed for use with the fire alarm control unit.

b. A record of installed software and firmware version numbers shall be maintained at the location of the fire alarm control unit.

c. All software and firmware shall be protected from unauthorized changes through the use of "access levels."

B. SYSTEM ALARM OPERATION

1. Activation of any addressable manual fire pull box, area smoke detector, heat detector or waterflow switch shall result in, at a minimum, the following functions and indications:

a. Activate "ALARM" status change at the local FACP and annunciate on its LCD display, indicating device address, device type, device location, time and date

b. Indicate "ALARM" status change at the respective building Remote Annunciator indicating device address, device type, device location, time and date

c. Activate General "ALARM" status change at the Off-Site Monitoring Station, through the Campus Network System.

d. Activate emergency evacuation audible and visual notification appliances within the associated building(s).

e. Annunciate "ALARM" status change at the On-site Main Campus Fire Alarm Control Panel location.

f. Record event in the non-volatile system historical log.

g. Record event system status change on the Main Campus Printer.

2. Elevator Recall:

a. Activation of smoke detector in an Elevator Lobby (other than the Lobby designated "Primary Recall Floor) Machine Room or Elevator Shaft shall cause the associated elevator(s) to be recalled to the designated Primary Recall Floor.

b. Activation of the Lobby Smoke detector on the designated Primary Recall Floor shall cause the associated elevators to be recalled to the designated Secondary Recall Floor.

c. Activation of any Elevator Machine Room heat detector shall shunt trip

the respective elevator main breaker.

C. SYSTEM SUPERVISORY FUNCTIONS

1. Activation of any Supervisory circuit, (i.e.; duct detector, supervised fire sprinkler valve closure, fire suppression system air pressure abnormal, low temperature, fire pump trouble, emergency fuel tank level alarm, as applicable to this project), shall cause the following actions and indications:
   a. Activate "SUPERVISORY" status change at the FACP and annunciate on its LCD display, indicating device address, device type, device location, time and date
   b. Indicate "SUPERVISORY" status change at the respective building Remote Annunciator indicating device address, device type, device location, time and date
   c. Activate General "SUPERVISORY" status change at the Off-Site Monitoring Station, through the Campus Network System.
   d. Annunciate "SUPERVISORY" status change at the On-site Main Campus Fire Alarm Control Panel location.
   e. Record event in the non-volatile system historical log.
   f. Record event system status change on the Main Campus Printer location.

D. SYSTEM TROUBLE FUNCTIONS

1. Receipt of a system trouble alarm, shall cause the following actions and indications:
   a. Activate "TROUBLE" status change at the FACP and annunciate on its LCD display, indicating device address, device type, device location, time and date
   b. Indicate "TROUBLE" status change at the respective building Remote Annunciator indicating device address, device type, device location, time and date.
   c. Activate General "TROUBLE" status change at the Off-Site Monitoring Station, through the Campus Network System.
   d. Annunciate "TROUBLE" status change at the On-site Main Campus Fire Alarm Control Panel location.
   e. Record event in the non-volatile system historical log.
   f. Record event system status change on the Main Campus Printer location.
2. The fire alarm system wiring shall be electrically supervised to automatically detect and report trouble conditions to the FACP.
3. System addressable devices shall be supervised for placement and normal operation. Removal of an addressable device or the failure of its internal electronic circuitry shall initiate a system trouble condition.
4. The FACP shall initiate a system trouble condition when the following occurs:
   a. Primary 120/220 VAC power loss.
   b. Battery disconnect.
   c. Battery low voltage.
   d. LCD annunciator panel power loss.
5. Operating an Off-Site Station agency alarm disconnect switch or any manual control commands that alter the system from its normal programmed standby configuration shall initiate a trouble condition.
6. Trouble conditions shall automatically activate an audible signal and flash the general system trouble LED indicator at the FACP. Pressing the trouble acknowledge key on the FACP shall silence the audible signal and continuously light the LED indicator, until the trouble condition is repaired. Subsequent trouble conditions shall re-sound the audible signal and again flash the LED. Each trouble condition must be individually acknowledged.
7. Removal of or failure of internal electronic circuitry of any addressable device

shall initiate a system trouble condition.

E INSTALLATION SHOP/AS-BUILT DRAWINGS

1. Show general layout of complete system including equipment arrangement. It shall be the responsibility of the fire alarm installing contractor to verify dimensions and ensure compatibility of all system interfaces. Shop drawings shall be maintained at the job site and shall be updated on an as needed basis. During the project life cycle, the Architect/Engineer may require updated drawings as reference during scheduled project meetings.
   a. Identify on the drawings, conduit and conductor sizes and types with number of conductors in each conduit. Provide each conduit and device with a unique identification. For addressable alarm initiation devices, the system identifier shall be the system address for that device. Signals shall be sequentially numbered with the address of the associated control module.
2. As-built drawings shall indicate point to point wiring diagrams of interconnecting wiring within all system control panels and termination enclosures showing wiring between modules and connecting field device terminals. All field numbering and/or labeling shall be reflected on As-built drawings.
3. Provide mounting details of FACP, remote transponder control panels (if any), system terminal enclosures and other boxes to building structure, showing fastener type, sizes, material and embedded depth.

F. CONDUIT, BOXES, ENCLOSURES AND WIRING DEVICES

1. All system wiring shall be in conduit and shall comply with all applicable article of the current California-amended NEC edition.
2. Boxes shall be installed plumb and firmly in position.
3. Extension rings with blank covers shall be installed on junction boxes where required.
4. Junction boxes served by concealed conduit shall be flush mounted.
5. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
6. All junction boxes shall be painted fire department red and be affixed with a decal or silk-screened label "Fire Alarm System."
7. Wet or damp locations shall require a NEMA rated enclosure suitable for the environment in which an addressable field device or module are to be installed. (i.e. monitoring of sprinkler water flow, tamper switches and OS&Y valves)
8. Electrical conduits shall enter only at the side or the bottom of control cabinets, unless designed and approved for entry on the top.
9. All conduits shall be grounded to a water main by approved ground clamps with a conductor equal in size to the largest conductor used in the system; but in no case shall the ground conductor be smaller than no. 10 AWG.
10. All openings in fire rated walls, floors or ceilings where conduits, cables or wiring trays pass through shall be fire stopped with an approved fireproofing material rated to meet or exceed the rating of the assembly penetrated.

G. CONDUCTORS

1. Each conductor shall be identified as shown on the drawings at each with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
2. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer-wiring guides.
3. Wiring for analog loop circuits, conventional detection circuits, speaker circuits and telephone circuits shall based on the fire alarm manufactures wiring guidelines, but shall not be smaller than #16 AWG.

4. Notification Device Circuits: Minimum wire size shall be 12 AWG for horn and strobe circuits.
5. Splices shall be made with UL listed mechanical connectors to assure reliable service.
6. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
7. Wire nuts or other solderless splicing devices shall not be used.
8. A consistent color code for fire alarm system conductors throughout the installation shall be provided. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types.
9. All nominal voltage branch circuit power feeds (120/220 VAC) shall be identified "labeled" at both ends of the circuit to indicate its source and purpose. Each FACP and control panels shall have a dedicated branch circuit with shunt trip disconnect, labeled as such.
10. Wiring within system control panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance and to isolate nominal voltage wiring from system low voltage wiring.

H. DEVICE DESCRIPTORS

1. Descriptors at SMCCCD MXL panels shall be developed following this standard SMCCCD protocol. No exceptions are allowed.
   a. Address, Device, Equipment ID (if needed), Building Number, Floor Number, Description
2. Devices shall be identified by an abbreviation or code from the following table below.

Initiating Devices			Communication Devices	
Smoke Detector	SD		Fireman's Phone	FP
Heat Detector	HD		Fireman's Jack	FJ
Duct Detector	DD			
Beam Detector	BD		**Panels**	
Air Sampling	AS		Fire Alarm Control Panel	FACP
Monitoring Device (By Name)	MSC		Printer	PRT
Pull Station	PS		Annunciator	ANN
Tamper Switch	TS		Video Display Terminal	VDT
Water Flow	WF		Voice Evac Panel	EVAC
Fire Smoke Damper	FSD		Fan Control Panel	FAN
			Network Control Center	NCC
Notification Devices			Aux Power Supply	PWR
Audible	AUD		Dialer	DIAL
Visual	VIS		Foreign System Interface	FSI
Audible/Visual	AV			
Voice Evac Speaker	SPKR			

3. If the device is monitoring or controlling a piece of equipment, then that equipment's ID shall immediately follow the Device. (e.g., TRI HV-5A)
4. If the description is to contain a single compass point, it should be spelled out (e.g., North). If the description uses multiple compass points such as North East it should be abbreviated (e.g., N.E.).
5. If the description contains a room number, then state the building number followed by a dash and then the three digit room number. (e.g., 2-105)
6. Examples:
   a. 02:002-007 PS B2 F1 RM 2-105

b. 02:001-047 SD B1 F3 MECH RM
c. 02:004-034 DD B7 F3 N.E. CORRIDOR
d. 02:004-059 TRI HV-5A B7 F1 MCC

PART 3 - TESTING AND ACCEPTANCE

3.1 FIELD QUALITY CONTROL

A. CERTIFICATE OF COMPLIANCE
1. Complete and submit to the project engineer in accordance with NFPA 72, paragraph 1.7.2.

B. FIELD - TESTING GENERAL
1. Each addressable analog smoke detector shall be individually field tested prior to installing the device at its designated location to ensure reliability after shipment and storage conditions. A dated log indicating correct address, type of device, sensitivity and initials of the technician performing the test - using test equipment specifically designed for that purpose - shall be prepared and kept for final acceptance documentation. After testing, the detection devices and base shall be labeled with the system address, date and initials of installing technician. Labeling shall not be visible after installation is complete.
2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance (Megger), current and voltage readings shall be made as work progresses.
   a. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.
   b. The acceptance inspector shall be notified before the start of any required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
   c. Test reports shall be delivered to the acceptance inspector as completed.
3. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
   a. Ladders and scaffolds as required to access all installed equipment.
   b. Multimeter for reading voltage, current and resistance.
   c. Intelligent device programmer-tester.
   d. Laptop computer with programming software for any required program revisions.
   e. Two way radios, flashlights, smoke generation devices and supplies.
   f. An approved device for measuring air flow through air duct smoke detector sampling assemblies.
   g. Decibel meter.
   h. Testing documentation.
4. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.

C. FINAL ACCEPTANCE TESTING
1. A written "Acceptance Test Procedure" (ATP) for testing the fire alarm system components and installation will be prepared by the Engineer in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits and programming.
2. The acceptance inspector shall use the system record drawings in combination

with the documents specified under sections (2.01-G and 3.01-C.) during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:

a. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
   1) Open, shorted and grounded intelligent analog signaling line circuit
   2) Open, shorted and grounded conventional initiating device circuits.
   3) Intelligent device removal.
   4) Primary power or battery disconnected.
   5) Incorrect device address.

b. System evacuation alarm indicating appliances shall be demonstrated as follows:
   1) All alarm notification appliances actuate as programmed.
   2) Audibility and visibility at required levels.

c. System indications shall be demonstrated as follows:
   1) Correct message display for each alarm input, at the control panel alphanumeric LCD display.

d. System on-site and/or off-site reporting functions shall be demonstrated as follows:
   1) Correct alarm custom message display, address, device type, date and time transmitted for each alarm input.
   2) Correct trouble custom message display, address, device type, date and time transmitted for each alarm input.
   3) Trouble signals received for disconnect.

e. Secondary power capabilities shall be demonstrated as follows:
   1) System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
   2) System primary power shall be restored for forty-eight hours and system-charging current shall be normal trickle charge for a fully charged battery bank.
   3) System battery voltages and charging currents shall be checked at the fire alarm control panel using the test codes and displayed on the LCD display.

3. In the event of system failure to perform as specified and programmed during the ATP procedure, at the discretion of the acceptance inspector, the test shall be terminated.
   a. The installing contractor shall retest the system, correcting all deficiencies and providing test documentation to the acceptance inspector.
   b. In the event that software changes are required during the ATP, the system manufacturer to compare the edited program with the original shall furnish a utility program. This utility shall yield a printed list of the changes and all system functions, inputs and outputs effected by the changes. The items listed by this program shall be the minimum acceptable to be retested before calling for resumption of the ATP. The printed list and the printer log of the retesting shall be submitted before scheduling of the ATP.
   c. The acceptance inspector may elect to require the complete ATP to be performed again if, in his opinion, modifications to the system hardware or software warrant complete retesting.

D. DOCUMENTATION

1 System documentation shall be furnished to the owner and shall include but not be limited to the following:
   a System record drawings and wiring details including 3 sets of as-builts as well as as-builts on a CD-ROM in the current version of AutoCAD.
   b. System operation, installation and maintenance manuals.
   c. Written documentation for all logic modules as programmed for system operation with a matrix showing interaction of all input signals with output commands.
   d. System program "hard copy" showing system functions, controls and labeling of equipment and devices.
   e. All specified documentation as required under sections (2.01 E. and 3.01 C.).

E. CLEANING
1. Contractor shall thoroughly clean all areas in which it works at the end of each work day and upon completion of installation.

F. WARRANTY/SERVICES
1. The contractor shall warrant the entire system against system hardware and electrical defects including programming software defects for a period of one year. This period shall begin upon Substantial Completion of the project by the Architect of Record/Engineer of Record, but not prior to certification of final acceptance testing of the system. Contractor shall provide to owner a letter stating the start-date and end-date of warranty period. In addition, the contractor shall also provide an updated list of name(s) and phone number(s) for normal and off-hours contacts necessary to respond to warranty issues. Response to warranty notification shall require a reply within 24 hours of initial contact.

G. TRAINING
1. The fire alarm contractor shall furnish training as follows for a minimum of four employees of the system user:
   a. Training in the receipt, handling and acknowledgment of alarms.
   b. Training on system operation including manual control of output functions from the FACP.
   c. The total training requirement shall be a minimum of 4 hours, but shall be sufficient to cover all items specified.

END OF SECTION